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Compounds in sign languages: The case of Italian and French Sign Language

Mirko Santoro

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Mirko Santoro. Compounds in sign languages: The case of Italian and French Sign Language. Linguistics. EHESS - Paris, 2018. English. NNT: . tel-03058785

HAL Id: tel-03058785

<https://hal.science/tel-03058785>

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THÈSE DE DOCTORAT

de l'Université de recherche Paris Sciences et Lettres
PSL Research University

Préparée à l'École des Hautes Études en Sciences Sociales

Compounds in sign languages: The case of Italian and French Sign Language

Ecole doctorale n°286

ART ET LANGAGES

Spécialité Sciences du langage
Option: Linguistique

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le 19 décembre 2018

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Acknowledgements

This dissertation would not have been possible without the support of many people. First and foremost, I express my sincere gratitude to Carlo Geraci, who I have now known for over twelve years. He is not only my advisor, but also the person who first showed me that formal linguistics could be applied to LIS, who pushed me to re-enroll in the Science of Language department, and who supported and guided me throughout years and years of study (thank you for your patience). Carlo's influence can be seen throughout my linguistic work. I am happy to call Carlo not only a colleague, but also a friend.

I thank Philippe Schlenker for his unwavering commitment to support Deaf people in linguistics. It is through his consistent support that it was even possible to consider undertaking a dissertation, and that apparently unsurmountable obstacles were quickly and easily resolved. Without his help, I would not be here today.

Many thanks go to my committee: Christian Rathmann, who I have been lucky to have the chance to interact with, and whose feedback and ideas have had a large impact on my work. Christian has been, and continues to be, an extraordinary Deaf role model in the field of linguistics. I can only hope one day to be so accomplished. Diane Brentari, for great feedback, always accompanied by a smile. Jeremy Kuhn, who has been a great interlocutor and collaborator throughout these years. Natasha Abner, Marie-Anne Sallandre, and Roberto Casati, who have each provided insight and expertise on their field.

It has been an honor and privilege to be part of the Italian and French Deaf community. I would like to thank all the Deaf people who have worked with me throughout these years. On the Italian side, a special thanks goes to Lorenzo Laudo and Ezio Bramato, as well as rest of the Italian Deaf community, without whom this work would not be possible. On the French side, thank you to Thomas Levêque, Laurène Loctin, Delphine Kholoukhouev, Ludovic Ducasse, Damien Ducasse, and Yohan Marcelino for all their help, and to the French Deaf community

who always gave me their time with a positive spirit.

To my best friends, EROI, the heros: Fabio Poletti, Giuliano Nonnis and Giovanni Trezza, who have provided me joy, positive feelings, and support throughout the years. Twenty-one years, to be precise. To my colleagues in the IJN Sign Language Group: Jeremy Kuhn, Charlotte Hauser, Justine Mertz, and Kyle Duarte, who filled my days at work with stimulating scientific exchange and joyful camaraderie.

At the ENS and the IJN, thanks to Vincent Gaudefroy, Lucie Raveaux, and Nathalie Evin.

Last but not least, thank you to my amazing family. Their support has been unconditional. First of all, I would like to thank my mom, dad, and sister, who taught me to have great aspirations and to have greater perseverance in order to achieve them. Thanks to my large extended family, to the many relatives on both my father's and my mother's side. A special thanks to my Deaf uncles and aunts—Nicola and Santina, Ludovico and Giuseppina, and Angelo and Filomena—who watched me grow up. I hope to make them proud as the first Deaf person in the family to have a PhD. Many thanks go to my parents-in-law Antonina and Giuseppe, my brothers-in-law Alessandro and Tommaso, my sister-in-law Mariella, my niece Martina, and my nephew Giuseppe.

Words cannot express how grateful I am to my wife Valentina Aristodemo, my traveling partner on this long journey. I have stopped counting how many times I have fallen, because every time it has happened, there is my wife to pull me up again. I could never alone have climbed as many mountains as we have together—the last of these mountains, of course, being this dissertation.

Abstract

In this dissertation, I investigate the domain of compounds in sign languages. Compounding has been documented as a key strategy to enrich the lexicon of sign languages even in situations of emergent sign languages. I address this topic with three main angles: typological/empirical, theoretical and experimental.

In the typological/empirical part, I offer a thorough description of compounds in two sign languages: Italian and French Sign Language (LIS and LSF). I offer a refined and more comprehensive typology of compounds, in which classifiers and simultaneous forms are also taken into account.

In the theoretical part, I provide a formal account of how to derive the whole typology of compounds found in LIS and LSF. I show i) that compounds can be derived in multiple ways depending on their morphosyntactic properties and ii) that morphosyntactic derivation is not the only process that affects the combinatorial options of compounding. Post-syntactic processes, especially linearization, have to have access to at least partial representations in order to distinguish between forms that have to be spelled out either sequentially or simultaneously.

In the experimental part, I investigate whether phonological reduction is a sufficient condition to identify compounds in SL. I show that importing criteria from one SL to another can be done, but with extreme caution.

Keywords: compounds, Italian Sign Language, French Sign Language, typology of compounds, compounds in Distributed Morphology, compounds and Experimental approaches.

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List of Symbols and Abbreviations

List of symbols:

{ }	Unordered set.
⟨ ⟩	Ordered pairs or n-tuples.
^	Symbol for compound forms.
'...'	English Translation.
<i>word</i>	Italics is used for object language in the text.
SIGN	Small caps is used for sign glosses.
argument	Subscripts are used to provide additional information.
-number	-1, -2, etc. at the gloss level are used to indicate lexical variants.
-start	Subscript used in captions to indicate the starting point of a sign.
-middle	Subscript used in captions to indicate the middle point of a sign.
-end	Subscript used in captions to indicate the end point of a sign.
G-L-O-S-S	Hyphens separates fingerspelled letters (in small caps).
LIS	Italian Sign Language (LIS). Acronyms are always capitalized.

List of abbreviations:

ATAP	Attributive and Appositive
Att.	Attributive
ASL	American Sign Language
BSL	British Sign Language
Cl	Classifier
Coord.	Coordinate
DGS	German Sign Language (Deutsche Gebärdensprache)
DM	Distributed Morphology
Endo	Endocentric
Exo	Exocentric
Exp.	Exposure
F	Female
FS	Fingerspelling
Hlg	Handling classifier
ITA	Italian
BP	Limb and body part classifier
Lex	Lexical
LIS	Italian Sign Language (Lingua dei Segni Italiana)

LSF	French Sign Language (Langue des Signes Française)
M	Male
NGT	Dutch Sign Language (Nederlandse Gebarentaal)
NS	Name-Sign
O-SL	Other-Sign Language
SASS	Size And Shape Specifier
Seq.	Sequential
SL	Sign Language
SLs	Sign Languages
Sim.	Simultaneous
Std.	Standard
Stim	Stimulus
Sub.	Subordinate
ThSL	Thai Sign Language
TÎD	Turkish Sign Language (Türk İşaret Dili)
WE	Whole entity classifier
Hyp.	Hypothesis

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Chapter 1

Introduction

Morphology is the branch of linguistics dedicated to both the study of lexical meaning and the study of processes that affect the morphological word (in contrast to the prosodic word). It is the place where minimal meaningful units are compositionally assembled to create words, and where further addition of minimal bits of information (affixes) create more complex words. Traditionally, morphological processes are of three kinds: derivational, inflectional and compounding.

Derivational processes create new lexemes (i.e., new words) or change the syntactic category (Lieber 2017). Some examples are verb/noun pairs in Italian *saltare/salto* ‘jump’, *nuotare/nuoto* ‘swim’, etc. and noun/adjective pairs in English *derivation/derivational*, *nation/national*, etc.

Inflectional processes affect the relation between morphosyntactic content and morphological form (?). Some examples are tense inflection in the verbal system of Romance languages, like present vs. imperfective past tense in Italian (*bev-o*, *bev-i*, *bev-e* etc. vs. *bev-ev-o*, *bev-ev-i*, *bev-ev-a*, etc. ‘drink’), and comparative morphology in English (*big/bigger*, *smart/smarter*, etc.).

Compounding is process that creates new words based on the combination of lexical elements like words, stems or roots (?). Some examples from English are *blackbird*, *taxi driver*, *swordfish*, etc.

Across the world’s spoken languages, these processes tend to be formed via concatenative morphology in the overwhelming majority of cases. Non-concatenative morphology in spoken languages is found in some forms of allomorphy (e.g., some irregular plural forms of nouns

and past tense forms of English like *foot/feet*, *goose/geese*, *freeze/froze*, *speak/spoke*) and in transfixation processes of semitic languages.

However, once one starts looking at the realm of sign language, an immediate contrast arises. Most of the morphological information and processes are expressed simultaneously with the stem/root/lexeme during the articulation of a sign, both in the case of derivational and inflectional morphology (?). Examples of non-concatenative derivational morphology in sign language are noun/verb alternations in ASL (?); and the formation of “characteristically x” adjectives in ASL (?). Examples of non-concatenative inflectional morphology are aspectual modification in the verb system of ASL (Klima and Bellugi 1979b) as seen in Figure 1.1; and pluralization via reduplication in several sign languages including LIS (Pizzuto and Corazza 1996). In all these processes, the morphological manipulation happens at the level of the movement component of a sign. The size of the trajectory (lengthening, shortening), the shape (straight vs. circular) and the repetitions of the movement (including trilled features) are used to convey these differences in meaning. Cases of concatenative morphology are also found in sign language, although to a lesser degree. One example is agentive nominalization in ASL, where a suffix derived from the sign for PERSON is attached to a verb root to generate the agentive noun (e.g., STUDY/STUDENT, OPERATE/SURGEON, etc.) An example of concatenative morphology in ASL is shown in Figure 1.2.

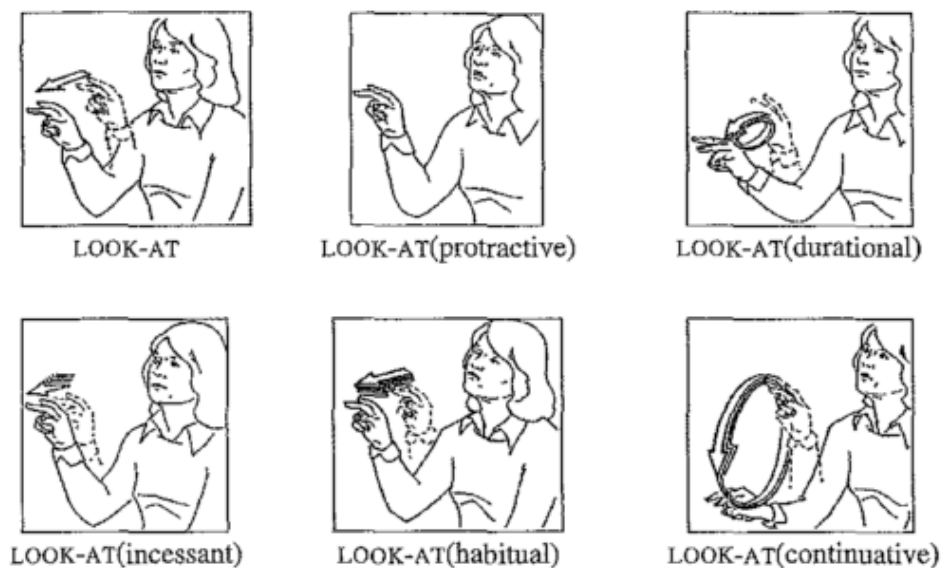


Figure 1.1: ‘ASL aspectual marker’



Figure 1.2: ‘Surgeon’

Modality has been hypothesized to be the main reason for the difference between sign and spoken languages (Vermeerbergen and Demey 2007). While spoken language articulators (tongue and vocal tract) force the linguistic information to be produced sequentially, sign languages do not have this constraint and are free to express information simultaneously (at least at the word level). Conversely, the hands are somehow slower articulators than the mouth and tongue, which potentially introduces a pressure against concatenation in sign languages (Bellugi and Fischer 1972). The morphological component of the linguistic system simply capitalizes on this possibility to maximize simultaneous expression of morphemes. The most extreme case are classifier signs, where virtually every bit of the sign is meaningful (see Chapter 2 for some examples).

In this dissertation, I will focus on compounds in sign language, using LIS and LSF as the main empirical ground of research. Although not very deeply investigated, compounding has been widely documented as a productive process in sign language (Sandler and Lillo-Martin (2006), Quer et al. (2016) and Vercellotti and Mortensen (2012)), including in emergent sign languages (Meir et al. 2010). Most of the descriptions focus on the properties of sequences of two roots (e.g., THINK[^]SAME ‘agree’ in ASL, Figure 1.3). Compounds with more than two items are also mentioned in the literature (e.g., APPLE[^]ORANGE[^]BANANA ‘fruit’ in (Klima and Bellugi 1979b: 231)).



(a) THINK



(b) SAME

Figure 1.3: ‘Agree’

Compounding is a domain where a bias for sequential realization is widely expected as the amount of morphological information carried by the combination of two roots is quantitatively and qualitatively different from that of root-affix combinations. Nonetheless, the pressure/advantage of conveying information simultaneously is such that cases of simultaneous compounds have been documented in sign language. One example is the sign for MINICOM, ‘TTY’, in BSL, formed by the combination of the signs for ‘telephone’ and ‘type,’ first reported in [Brennan \(1990\)](#). In simultaneous compounds, each hand produces more or less faithfully one root of the compound.



Figure 1.4: ‘TTY’

Although extremely interesting, very little is known about these forms, except that they

are rare (see Chapter 2 for a review of the literature).

The main goals of this dissertation are:

- Establish a comprehensive typology of compounds in sign language which takes into account:
 - The complexity of the SL lexicon (e.g., native vs. non-native forms)
 - Phonological properties (e.g., sequential vs. simultaneous)
 - Morphosyntactic properties (e.g., subordinate vs. coordinate vs. attributive)
 - Semantic properties (e.g., compositional vs. non-compositional forms)
- Provide a satisfactory description of compounds in LIS and LSF and a thorough description their properties
- Offer a formal account to derive the various attested forms
- Experimentally evaluate phonological reduction as a sufficient criterion to identify compounds in sign language by looking at LIS and LSF.

The rest of the thesis is divided as follows: in [chapter 2](#), I present the structure of SL lexicon as developed in [Brentari and Padden \(2001\)](#), showing the main properties of core lexical signs, classifier signs and non-native forms (fingerspelled signs and initialized forms). Then, I provide an overview of the significant literature on compounds in both sign and spoken languages. The goal is to review some basic concepts, definitions and diagnostics that will be used in the following chapters.

In [chapter 3](#), I offer a description and analysis of compounds in LIS. The description will be based on traditional classifications of compounds in spoken and signed languages, which include syntactic and semantic taxonomies. I will also propose a new sign language specific classification based on the fact that compounds can be simultaneous or sequential. The description of the SL lexicon made in [chapter 2](#) serves as a baseline to investigate the various possibilities that SL may employ to create compounds. I will show which forms are attested in LIS and which are absent and I describe in very detail the phonological, morphological, syntactic and semantic properties of compounds in LIS. In the second part of this chapter, I will present a formal analysis based on the framework of Distributed Morphology.

Chapter 4 focuses on LSF and is structured in the same way as Chapter 3.

Chapter 5 and Chapter 6 are also “twin” chapters, one on LIS and the other on LSF. Here I will use experimental methods to test whether a diagnostics very often used to assess if a form is a compound in SL or not is valid for LIS and LSF compounds. Specifically, [Klima and Bellugi \(1979b\)](#) claim that phonological reduction is a sufficient condition to identify compounds in ASL (and a fortiori in other sign languages), and that reduced forms (i.e., compounds) are perceived as lexical units. I experimentally test this claim using LIS and LSF compounds.

Chapter 2

State of the Art

2.1 Introduction

This chapter provides an overview of the significant literature on the lexicon of sign language and relevant studies on compounds in both sign and spoken languages. The goal is not to offer a comprehensive overview of the literature, but rather to review some basic concepts, definitions and points of views that will be used in next chapters. I start by presenting the theory of SL lexicon developed in [Brentari and Padden \(2001\)](#), and then focus on the basic properties of compounds in spoken and sign languages and a general typology.

2.2 The lexicon of sign language

Since sign languages are minority islands inside an environment where spoken languages are normally used, contact phenomena are quite common in SL. This can be easily detected in the case of syntax, for example, when looking at word order phenomena. In the lexical domain, the influence from spoken languages manifests at least in two ways. One way is via lexical borrowings and calques (i.e., literal translation of the word like “posta elettronica” for *electronic mail* in Italian). This is a fairly common situation in minority spoken languages too. Another way of borrowing words, which is more specific to sign language, is via fingerspelled (or initialized) forms which use the manual alphabets. An influential theory of the ASL lexicon was developed in [Brentari and Padden \(2001\)](#) and then tacitly assumed for other SL. In this section, I briefly review the system as it clarifies the typology of lexical items found in SL vocabularies. This

classification will constitute the basis of the investigation of compounds in LIS and LSF.

Brentari and Padden (2001)'s system distinguishes between native and non-native lexical items. The general schema is illustrated in Figure 2.1 below:

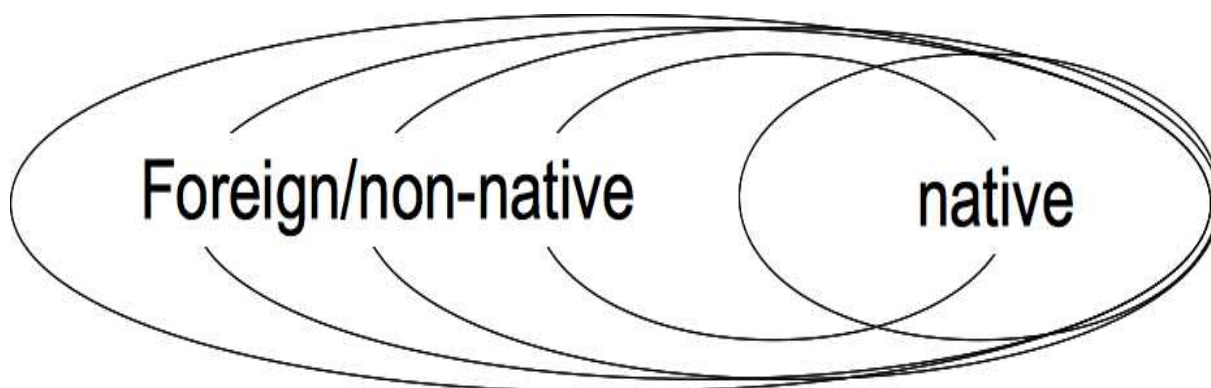


Figure 2.1: SL lexicon schema

The native lexicon includes typical signs (which are called core lexical items) and classifier signs. The category of core lexical signs can be defined either by exclusion (i.e., all those signs that are not classifiers and that are not borrowings), or positively as meeting a series of phonological criteria (e.g., constraints on syllable structure, number and features of sequential handshapes, etc.). Both iconic and non-iconic forms may belong to this category. An example of an iconic core lexical sign is BERE ‘drink’ (cf. Figure 2.2) in LIS, while an example of a non-iconic core lexical item is the sign ROSSO ‘red’ (cf. Figure 2.3) in LIS.



(a) BERE-start



(b) BERE-end

Figure 2.2: ‘Drink’



Figure 2.3: ‘Red’

Classifiers are polymorphemic signs with an iconic component that are used to identify concepts by depicting some of their crucial properties (e.g., the shape, how they are used, etc.). Working on Danish sign language, ? proposed a widely accepted typology of classifiers:¹

- **Whole-entity classifier:** the handshape instantiates the entire object/concept
- **Handling classifier:** the handshape instantiates how an object is handled
- **Size and shape specifier:** the hand (and the movement) define some properties of the object/concept but not the whole object
- **Body part classifier:** the handshape instantiates one specific part of the body

¹There are a variety of theories of SL classifiers. All of them acknowledge the fundamental facts that these are i) polymorphemic forms, ii) they include a high iconic component, iii) they can be used to express concepts both at the lexical and sentential level, iv) they interact with other non-classifier signs. Among others, see for instance the Transfer theory of ?, of the theory of depictive signs in ?. The reason why I am adopting Engberg-Pedersen’s typology is that it easily allows me to assess the logically possible combinations across the various lexical categories of SL lexicon. All the empirical findings described in the next chapters can be restated in the other theories as all of them include the possibility of interacting at the morphological and lexical level with core lexical signs.

Examples from each category are given in [Figure 2.4](#).



(a) WE-CL



(b) HDL-CL





(c) SASS-CL



(d) BP-CL

Figure 2.4: Typology of classifiers

The non-native lexicon is composed by forms that are clearly borrowed from external systems. These could be signs borrowed from other sign languages, proper names, or forms that are derived from manual alphabets like initializations and fingerspelled signs (the vehicle of borrowing words from spoken languages, at least for those communities with alphabetic writing systems). An example of a borrowing from another sign languages is the sign *WORKSHOP* in LIS. The original sign is borrowed from ASL and it has a  handshape. This handshape is not part of the phonemic inventory of LIS and is ‘adapted’ to LIS phonology as a  handshape. The relevant examples are illustrated in [2.5\(a\)](#) and in [2.6\(a\)](#).

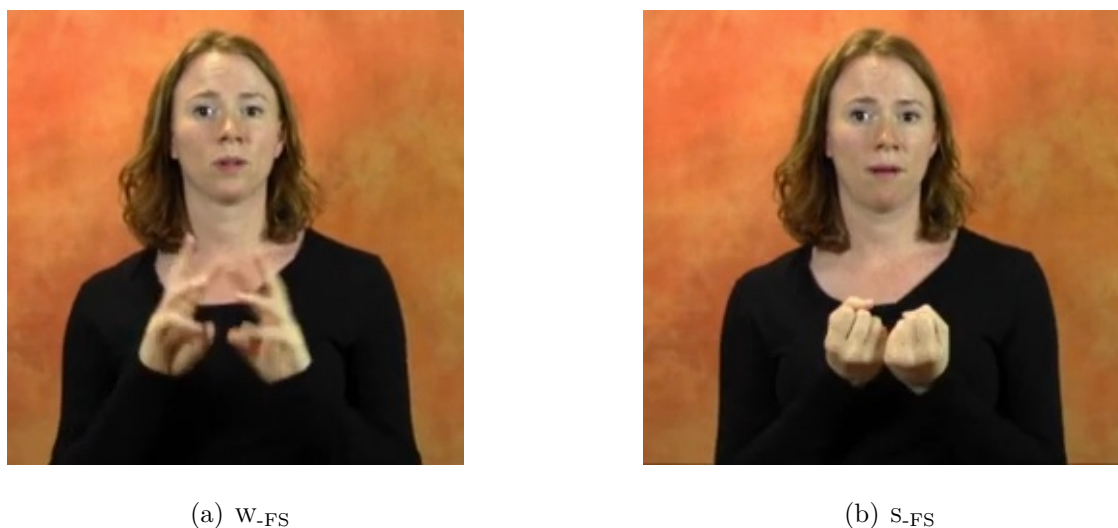


Figure 2.5: 'Workshop'(ASL)

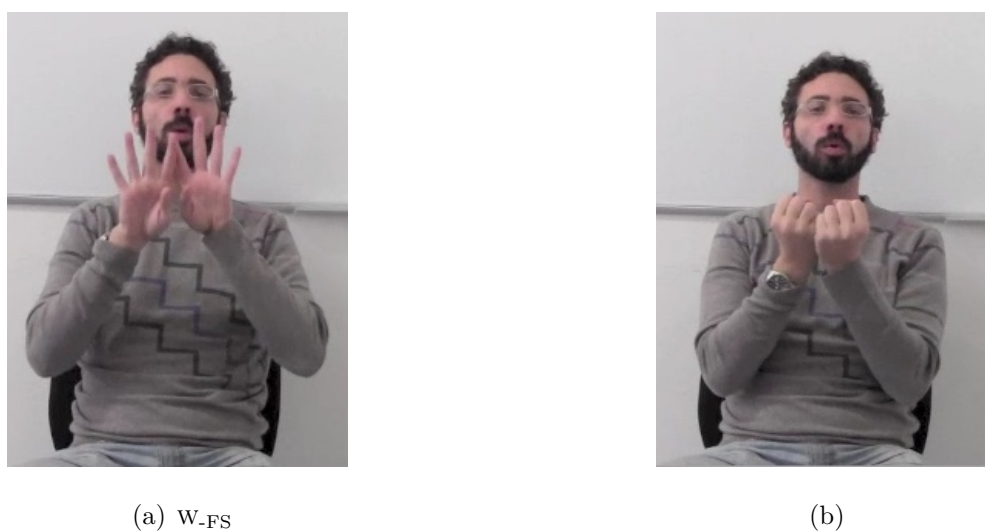


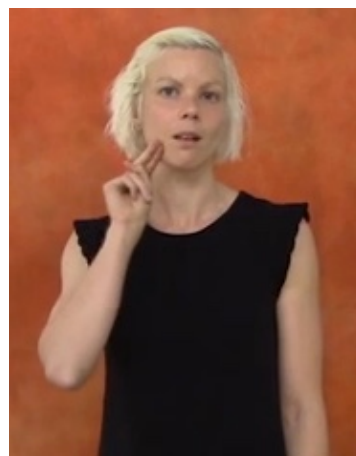
Figure 2.6: 'Workshop'(LIS)

Fingerspelled signs are usually produced in the neutral space and consist in the spelling of the whole orthographic word using the manual alphabet. Although in principle accessible to any SL, this way of borrowing signs is not equally frequent across SL. For instance it is widely used in ASL, but only rarely in LIS and LSF. Abbreviated forms also use the manual alphabet and are normally produced in the neutral space. They normally consist of two fingerspelled letters corresponding to two letters of the orthographic word or to the initial letter of each member of a compound form. An example of the former is the sign for 'Vietnam' in ASL (cf. [Figure 2.7](#)), where the fingerspelled letters are 'V' and 'N'; while an example of the latter is

the ASL sign for ‘social work’ (cf. [Figure 2.8](#)), where the fingerspelled letters are ‘S’ and ‘W’.



(a) V-FS



(b) N-FS

Figure 2.7: ‘Vietnam’



(a) S-FS



(b) W-FS

Figure 2.8: ‘Social work’

Initialized forms are defined as signs where:

‘...the handshape of a native sign is replaced with one corresponding to the first letter of an English translation ...’ [\(Brentari and Padden 2001: 104\)](#)

As part of the natural enrichment of the lexicon of a language, forms can be “nativized” and get integrated into the core part of the lexicon. Beside having a clear component coming from spoken languages they have all the other properties of core lexical signs.



(a)



(b)

Figure 2.9: 'Money'



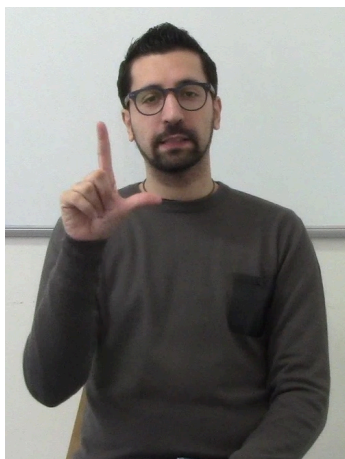
(a)




(b) E-PS

Figure 2.10: 'Economy'

Another example are the signs for weekdays in LIS and LSF, which are clearly initialized forms that are probably integrated into the SL core lexicon. The example in [Figure 2.11](#) is the sign LUNEDI 'monday' in LIS.

Figure 2.11: L_{-FS} ‘Monday’

The sign has an  handshape which represent the letter ‘L’ of the manual alphabet, corresponding to the first letter of the Italian word *lunedì*. The sign is produced in neutral space and it has a repeated short straight movement or in some variants a small circular movement.

2.3 Definitions used in compound morphology

2.3.1 Compounds in spoken languages

The literature on compounds is quite extensive and cannot be summarized in one short section. I would rather highlight here some relevant properties that compounds have across languages. These are often included in the definitions that have been proposed in the literature. Some of these definitions are given below.

“...A lexical unit made up of two or more elements, each of which can function as a lexeme independent of the other(s) in other context, and which shows some phonological and/or grammatical isolation from normal syntactic usage”

(?: 695)

“Composition [...] denotes the combining of two free forms or stems to form a new complex word referred to as compound. [...] Composition has come to be viewed in current linguistic work as the process of concatenating two existing stems

from the lexicon of a language to form a new, more complex stem which has the potential to enter the lexicon as a stable morphological unit.”

(?: 280)

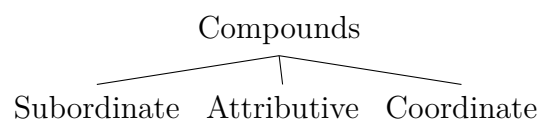
So compounds are the result of a special morphological process that combines (in the lexicon) two or more (morphological) units. The process enriches the lexicon and is substantially different from the standard mechanism of phrasal combination as indicated by Guevara and Scalise:

“...compounds are special [...] because in a compound there are typically two constituents that are held together by a relation which is not explicitly (phonetically) realized: for example, apron string can be paraphrased (and is probably interpreted) as the string of an apron.”

(Guevara and Scalise 2009: 107)

The aim of this dissertation is not that of proposing a new general definition of compounds, but rather to investigate whether the properties normally used to identify compounds in spoken languages can be fruitfully applied to investigate similar mechanisms in SL. Leaving aside issues related to historical evolution, [Bisetto and Scalise \(2005\)](#) propose a classification of compounds according to two criteria: one is the grammatical relation between the two members, and the other is the semantic relation between the constituents. The schema in (2.1) illustrates the three grammatical relations found in compounds:

(2.1)

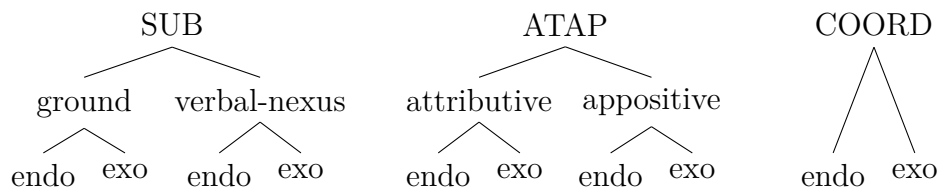


In subordinate compounds, the relation is that of a head and its complement (e.g., a verb and its object). An English example of this type is *taxi driver*. The nominal constituent *taxi* is the internal argument of the verb *drive*. Subordinate compounds at the nominal level include N+N forms like *hotel room* ([Guevara and Scalise 2009](#): 110 footnote 17).

In attributive compounds, the non-head constituent acts as a syntactic modifier of the head. An example of this type are adjective+noun forms such as *blue cheese*, *red carpet*, etc. N+N compounds can express an attributive relation like in *sword fish* (Bisetto and Scalise 2005). The noun *sword* expresses a property (shape) of a part of the head noun *fish*.

Coordinate compounds involve constituents of the same type and whose relation is that of a conjunction. Some Italian examples of this type are *bianconero* ('black and white'), *mangiaebevi* ('eat and drink'). In some languages coordinate compounds may also express disjunction, like in Mordvin² *vest'-kavst*, 'once or twice'. Scalise and Bisetto, in ?, propose a further level below the syntactic categorization to differentiate the morphological categorizations between the constituents of compounds. They divide the subordinate group into Ground (i.e., compounds without a verbal root) and Verbal-Nexus (i.e., compounds with a verbal root). The attributive group is split into Attributive (i.e., the modifier is an adjective) and Appositive (i.e., the modifier is a noun). The schema is illustrated in (2.2).

(2.2)



Finally, at the semantic level, Bisetto and Scalise (2005) distinguish between endo- and exo-centric compounds. In endocentric compounds, the semantic relation between the members of a compound is transparent/compositional; while in exocentric compounds, the relation is not compositional. Examples of the former category are: *book seller*, *wind mill*, *student-athlete*, etc; while examples of the latter are: *pick pocket*, *sans papier*, *father-daughter*, etc.

One example of each compounds typology extracted by (? : 72) are illustrated in Table 2.1.

²The Republic of Mordovia is a federal subject of Russia, its language is a subgroup of the Uralic languages, comprising the closely related Erzya language and Moksha language (both spoken in Mordovia).

SUB			
ground		verbal-nexus	
endo	exo	endo	exo
wind mill	sottoscala (Ita)	book seller	pick pocket

ATAP			
attributive		appositive	
endo	exo	endo	exo
high school	grandfather	sword fish	kryssord (Norv.)

COORD	
endo	exo
Bosnia-Erzegovina	mother-child

Table 2.1: Scalise and Bisetto’s classification

We will see in the next sections that Bisetto and Scalise’s categorization is problematic for SL as the distinction between grammatical categories is far from obvious (Sandler and Lillo-Martin 2006). Indeed, Vercellotti and Mortensen (2012) propose to use the more neutral label “predicate” rather than that of verb.

2.3.2 Compounds in sign languages

For compounds, like many other linguistic domains in sign linguistics, ASL is the language where most studies and descriptions are available. Klima and Bellugi (1979b) offer a series of properties of ASL compounds that allow them to be distinguished from simple phrasal constructions and idiomatic expressions. These are listed in (2.3).

- (2.3) a. ‘...whether or not the two signs are lexical roots in the language’
 b. ‘... whether or not the two signs in such a composite function syntactically as single lexical unit’

- c. ‘... whether or not grammatical operations differ in application or form with respect to single signs and to phrases’
- d. ‘... whether the meaning of the composite differs from the meaning of the same signs in a phrase or clause’

(Klima and Bellugi 1979b: 203-204)

In addition to these, criteria that identify compounds as single lexical unit are also proposed. These are listed in (2.4):

- (2.4)
- a. ‘...unlike a sign in a phrase, a member of a compound cannot serve as a constituent in a syntactic construction’
 - b. ‘... like a single sign, a compound is an indivisible unit and cannot be interrupted by other signs...’
 - c. ‘... like a single sign, a compound (as a unit) can undergo certain grammatical operations that cannot extend over phrases’

(Klima and Bellugi 1979b: 206)

Furthermore, several phonological processes may also apply, which affect the global shape of the compounds. In particular, Klima and Bellugi (1979b) noticed that the length of compounds is similar to that of single signs (i.e., on average the time to articulate a compound is similar to the time that it takes to articulate a core lexical sign). This implies that some movement reduction is applied to either or both members of a compound form. Another process involved is the unification of manual arrangement (i.e., preservative assimilation of the second member into the first member); and the transition between signs is also smoothed. One example of an ASL compound is the sign THINK[^]SAME ‘agree’ (cf. Figure 2.12). It is made by the lexical sign THINK and the sign for SAME.

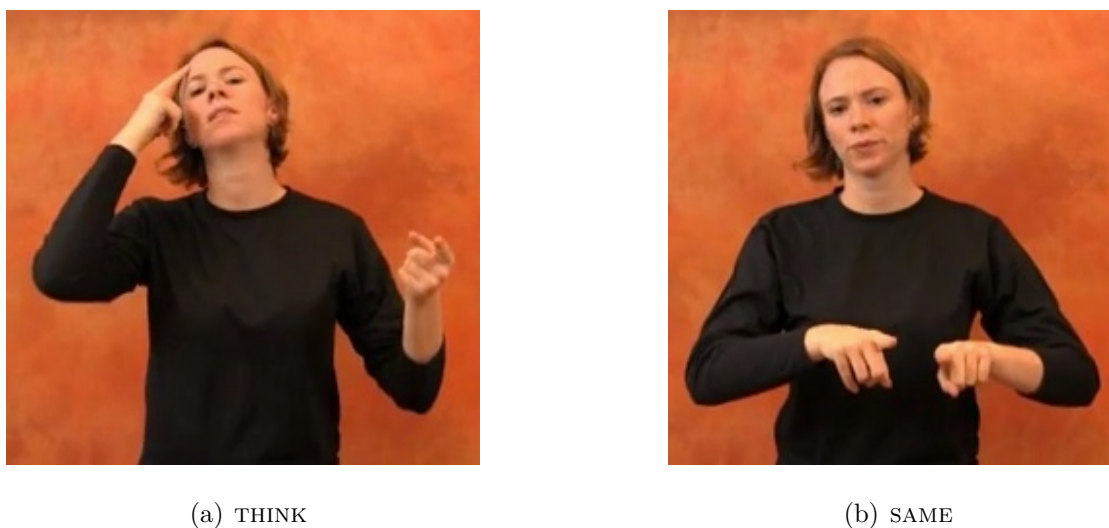




Figure 2.12: ‘Agree’

In the citation form, the sign THINK has a  handshape and is produced on the forehead with a single movement to the forehead. The sign SAME is a symmetrical two-handed sign. It has a  handshape and it is produced in neutral space. The arc-movement starts from the ipsilateral side and goes toward the center of the signing space. In the compound form, the sign THINK has no movement and is produced directly on the forehead. The non-dominant hand is also activated as part of an anticipatory assimilation process. The sign SAME loses the arch movement too. The movement of the compound is obtained with a re-analysis of the transition movement (including a wrist rotation) between handshape and location of the sign THINK and handshape and location of the sign SAME.

As we have seen, the SL lexicon shows a wide variety of ways to incorporate foreign vocabulary, via loan signs, initialized sign, abbreviation signs or sign-fingerspelled forms (Padden 1998). All these may be used to create compound forms. Padden (1998) describes compounds with fingerspelled words. Like compounds with lexical signs, compounds with fingerspelled words also have their lexical integrity (e.g., they can function as single lexical units and cannot be broken by inserting other linguistic items). Padden shows that the fingerspelled compounds are quite productive and that a finger spelled element may appear as the first, the second, or both elements of the compound. Relevant examples are given in (2.3.2).

(2.5) Sign[^]fingerspelled words

a. DEAD[^]E-N-D

b. SUN[^]B-U-R-N

c. PAY[^]R-O-L-L

(2.6) Fingerspelled words[^]sign

a. P-R-O-O-F[^]READ

b. F-O-O-T[^]WORK

c. B-E-L-L[^]BOY

(2.7) Fingerspelled words[^]Fingerspelled words

a. P-R-O-O-F[^]P-O-I-N-T

b. L-A-P[^]T-O-P

c. W-O-R-K[^]O-U-T

(Padden 1998: 53-54)

Padden also noted some curious examples in which the same concept can be expressed either as a lexical sign or as a fingerspelled form in compounds. This is the case of *line*, which is produced as a core sign in the DEAD[^]LINE compound, while it is fingerspelled in S-K-Y-L-I-N-E. Padden claims that when it is used as a sign it can refer either to a boundary or a conduit, while when it is fingerspelled it only means *outline*.

Vercellotti and Mortensen (2012) try to apply Scalise and Bisetto's classification of compounds in spoken language to the case of ASL. One problem they found in applying directly the taxonomy of Scalise and Bisetto is in the difficulty of appropriately identify the grammatical category of the members of the compound, as ASL does not distinguish verbs from nouns and adjectives by overt morphology (at least not systematically, as discussed in ?). Rather than trying to force one form into some particular category, they use the notion of predicate and argument/adjunct. Once defined this way, they apply the traditional partition of subordinate, attributive and coordinate compounds to ASL.

Vercellotti and Mortensen (2012) then apply this categorization to compounds that involve sequential core lexical signs only (i.e., they did not include compounds with classifiers, gestures or fingerspelled forms, nor simultaneous compounds). Of the 429 potential compounds found

in the ? dictionary, they excluded forms that involve classifiers or reduplicated lexicalized forms. They tested the compound status with ASL informants, relying on the inseparability criterion. This way they identified 124 compounds in ASL. These forms then divided into the three syntactic categories proposed by Scalise and Bisetto: subordinate, attributive-appositive and coordinate compounds. They also categorized them at a semantic level when it was possible distinguishing between endocentric and exocentric compounds.

This is summarized in [Table 2.2](#), [Table 2.3](#) and in [Table 2.4](#).

Hierarchical compounds			
Subordinate			
Expressed predicate		Unexpressed predicate	
Endo	Exo	Endo	Exo
<i>bookseller</i>	<i>pickpocket</i>	<i>windmill</i>	<i>sans papier</i>
SLEEP [^] SUNRISE 'oversleep'	EAT [^] NOON 'lunch'	FOOD [^] STORE 'grocery'	CLOTHES [^] DOOR 'closet'
KILL [^] SELF 'suicide'	RED [^] SLICE 'tomato'	MUSIC [^] GROUP 'band'	MONEY [^] GIFT 'charitable organization'
MAN [^] MARRY 'wife'	BECOME [^] QUIET 'peace'	JEW [^] TEMPLE 'synagogue'	

Table 2.2: Vercellotti's subordinate classification

Hierarchical compounds			
Attributive			
Expressed predicate		Unexpressed predicate	
Endo	Exo	Endo	Exo
<i>high school</i>	<i>redskin</i>	<i>snailmail</i>	<i>shithead</i>
THINK [^] SAME 'agree'	EAR [^] CLOSE 'deaf'	POLITE [^] ROOM 'living room'	EAR [^] YELLOW 'gold'
DEER [^] MEAT 'venison'	NOSE [^] OPPOSITE 'allergic'		
BABY [^] DOG 'puppy'			

Table 2.3: Vercellotti's attributive classification

Coordinate	
Endo	Exo
<i>student-athlete</i>	<i>father-daughter</i>
GIRL [^] FISH 'mermaid'	EAT [^] SLEEP 'home'
HOT [^] WET 'humid'	EAR [^] MOUTH 'deaf'
LAZY [^] APATHY 'lazy'	CHAIR [^] TABLE [^] SOFA 'furniture'

Table 2.4: Vercellotti's coordinate classification

In his dissertation, [Lepic \(2015\)](#) addressed the issues of compounds in ASL (and more generally in SL) from the perspective of lexicalization. He compared the status of compounds as identified in [Klima and Bellugi \(1979b\)](#) with other forms that possibly underwent lexicalization in ASL, namely fingerspelled forms and classifiers. Lexicalized fingerspelled forms have a reduced number of handshapes (i.e., handshape contrast is often neutralized in these forms) and transition movement is reduced. He also observes that other constraints on wellformed

core lexical signs also apply to these forms (see also ?). Lexicalized classifiers (often known as “frozen” forms) are not perceived as morphologically complex forms. Rather they have become conventional signs and their meaning does not arise by combining the different morphemes like in typical classifiers (i.e., they are assimilated to core lexical signs). These properties are also found in what Lepic calls lexicalized compounds: handshape contrast is often reduced (e.g., due to assimilation), sign internal movement is reduced (e.g., blocking epenthesis), transition movement is reduced (e.g., by assimilating place of articulation). At the meaning level, some compounds have undergone semantic shift (i.e., the forms are not compositional anymore). These properties affect the compound up to the point that they are normally not perceived as compounds anymore (i.e., the two stem units are not distinguishable anymore). Lepic labels these forms “blended forms”.

An example of blending reduction in ASL is the sign HOME, which sign is illustrated in [Figure 2.13](#).

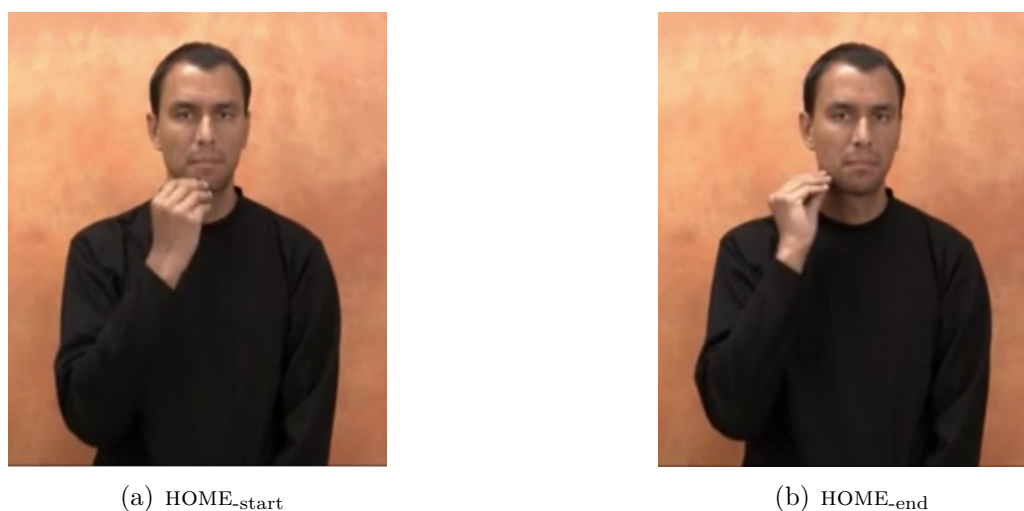


Figure 2.13: ‘Home’

The lexicalized sign is historically derived by combining the sign EAT and the sign BED. The citation forms are illustrated in [Figure 2.14](#) and [Figure 2.15](#).


In the ASL sign HOME, handshape assimilation neutralizes the handshape contrast (i.e., the  handshape is eliminated), the straight movement towards the face that is present in both EAT and BED is lost and the a small arch transition between the two locations (chin and cheek) is reanalyzed as the whole movement. Since forms like HOME are not really distinguishable from core lexical signs, Lepic then questions their compound status and tries to assimilate them to



Figure 2.14: EAT



Figure 2.15: BED

lexicalized forms on a par with lexicalized fingerspelled forms and frozen classifiers.

Lepic then extends this line of reasoning to certain combinations of lexical signs and SASS classifiers. In modern ASL, it frequently happens that the classifier component of these sequences can be easily dropped and Lepic assimilates this process to what is found in English reduced forms like *paper* for *newspaper*. An ASL example of this type is the sign RULER.

These considerations brings Lepic to conclude that most of the compounds as identified in ASL linguistics are not genuine compounds anymore, but rather lexicalized forms that are more similar to core lexical signs than to compounds. Real compounds, on the other hand, are those forms that are still clearly perceived as made up by distinct units. In particular, Lepic discusses the case of coordinate or dvandva compounds.³ Unlike two-member sequential compounds, these forms involve at least three elements and are followed by an the optional sign ETC. They are normally used to refer to the superordinate category (i.e., the hypernym), hence he labels these forms as hypernym compounds. Some examples (already discussed in the literature) are given in (2.8), while others, identified by Lepic, are given in (2.9).⁴

³The word is etymologically derived from Sanskrit *dvandva*, literally pair, couple. It is used to refer to coordinated combinations in which the conjunction has been eliminated. An example from Friulan, an Italian dialect, is *marimont* ('sea and mountains') to refer to the entire world.

⁴These forms are first discussed in Klima and Bellugi (1979b) and labeled "superordinate compounds". Meir et al. (2010) uses the term "dvandva compounds", although compounds in spoken languages normally involve concatenation of two items only.

(2.8) a. NECKLACE[^]RING[^]BRACELET

b. APPLE[^]ORANGE[^]BANANA

c. CHAIR[^]TABLE[^]LAMP

Klima and Bellugi (1979b)

(2.9) a. RAKE[^]BROOM[^]MOP

b. ICE[^]CREAM[^]PIE

Lepic (2015)

Another type of compound that is productive and still perceivable as made by separate lexical items are those that express the relation “kind of”. Some example of this type are given in (2.10).

(2.10) a. NAME[^]SIGN ‘name sign’

b. FORMAL[^]ROOM ‘living room’

c. NUMBER[^]STORY ‘number story’

d. DEAF[^]CULTURE ‘deaf culture’

Lepic (2015)

Consider NUMBER[^]STORY. Here, the compound denotes a *kind* of story, in which numbers are somehow visually integrated. Lepic (2016) also discusses forms labeled “Chain compounds”. ? describe these as mixed forms emerging in formal educational settings. They consist of an ASL sign followed either by its fingerspelled form or a written form (either pointing to a printed version or written on spot on a blackboard). Some examples are given in (2.11).

(2.11) a. DUTY[^]D-U-T-Y

b. D-U-T-Y[^]DUTY

c. DUTY pointing to a printed form

d. DUTY pointing to a written form on a blackboard

While the first two cases are very similar to fingerspelled ASL compounds, the latter two are more complex to define. The interesting point is that Lepic found out that chain compounds are also used in informal contexts and not just in formal education settings for pedagogical purposes. Examples of these types are given in (2.12).

(2.12) a. P-R-O-S-O-D-Y[^]CL: ‘WAVE’

- b. CL:‘4X4 GRID’[^]P-A-T-T-E-R-N
- c. A-B-S-T-R-A-C-T[^]SUMMARIZE
- d. CUTE[^]Q-U-A-I-N-T (Lepic 2015: 91)

The main contribution of Lepic (2015) can be summarized in two points: First, the process of lexicalization fossilizes compounds up to the point that they are not compounds anymore. This can be observed either phonologically by the extreme cases of phonological reduction or semantically by cases of semantic shift. These forms have the same lexical status as modern English forms like *dunno*, which is derived from *don't know*. Second, there are genuine cases of compounds in the ASL lexicon. These are hypernym forms and sequences that express the relation ‘kind of’.

The criteria proposed by Klima and Bellugi (1979b) typically identify sequences of two signs that are relatively stable in the lexicon and that can be safely considered compounds. However, the fact that signers can in principle use both hands as independent articulators opens the possibility that compounds can be also generated simultaneously (i.e., the dominant hand produces one member and the non-dominant hand the other). The image in Figure 2.16 clarifies the distinction between sequential and simultaneous compounds.

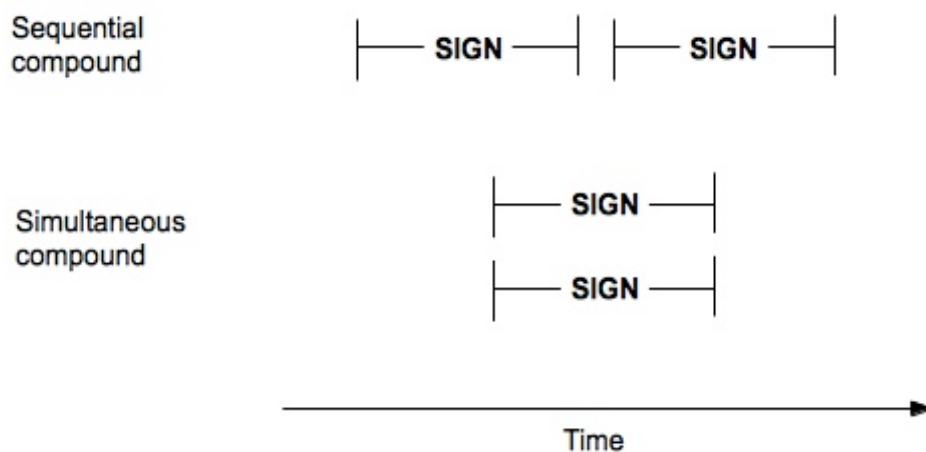




Figure 2.16: Sequential vs. simultaneous compounds

Examples of simultaneous compounds have been reported in the literature of British Sign Language (BSL). Two examples are the sign MINICOM reported in (Brennan 1990: 151), and

the sign $\text{SPACE} \hat{\text{SHUTTLE}}$ reported in (Sutton-Spence and Woll 1999: 103).



Figure 2.17: ‘TTY’

The sign MINICOM is made by the sign TELEPHONE and the sign TYPING . In the citation form, TELEPHONE is a one-handed sign with a  handshape. It is produced next to the ear with a straight movement toward the addressee. The sign KEYBOARD is a symmetric two-handed sign with a  handshape. It is produced in the neutral space with a finger movement mimicking the gesture of typing. In the compound, the dominant hand of the sign TYPING dropped and TELEPHONE is articulated next to the non-dominant hand. However, Aronoff et al. (2003), ? and Meir et al. (2010) report that simultaneous compounds in sign languages are rare and that this fact contrasts with the behavior of affixes which are very often expressed simultaneously (see for instance SL aspectual morphology).

Nonetheless, these simultaneous forms seem to be attested cross-linguistically. An example from NGT is the sign $\text{SATURDAY} \hat{\text{SUNDAY}}$, ‘weekend’. The compound retains the handshape of SATURDAY in the dominant hand and that of SUNDAY in the non-dominant hand. Still images for SATURDAY , SUNDAY and WEEKEND in NGT are given below:

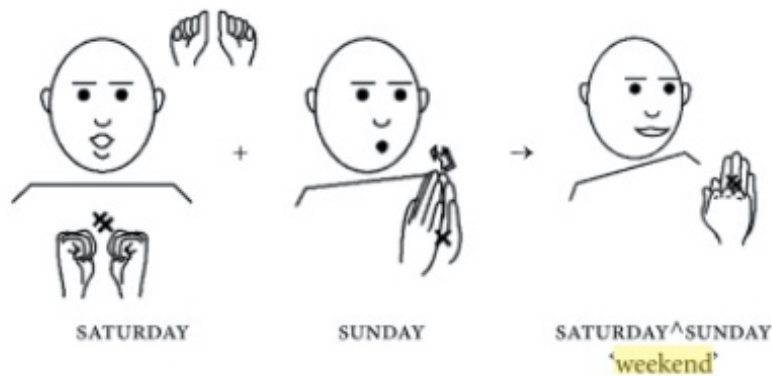


Figure 2.18: ‘Weekend’

In WEEKEND (Figure 2.18), the dominant hand produces the handshape of SATURDAY while the non-dominant hand produces the handshape for SUNDAY. Other cases of simultaneous compounds from LIS and LSF will be discussed in the next chapters.

Finally, Quer et al. (2016) reports the class of semi-simultaneous compounds in sign languages which are similar to blend compounds in spoken languages. Examples are shown in (2.13):

- (2.13) a. brunch
 b. smog
 c. apericena

The English word *brunch* is composed by two blended words. The first part *br-* comes from **breakfast** and the second part *-unch* comes from **lunch**. While there could be certain similarities between blend compounds in spoken languages and simultaneous compounds in sign language, one macroscopic difference remains. Blended compounds are still composed sequentially. Semi-simultaneous compounds are combinations of signs in which the two members are almost unidentifiable because the phonological processes that applied to them made hardly distinguishable or recognizable the two signs. Some examples from German Sign Language (DGS) and American Sign Language (ASL) are given below.

- (2.14) a. GOD[^]WAIT (advent) (DGS)
 b. EAT[^]BED (home) (ASL)
 c. THINK[^]MARRY (believe) (ASL)

Although the terminology is different, semi-simultaneous compounds are similar to lexicalized compounds in Lepic (2015).

While they have been mentioned several times in the literature, there is no serious attempt at systematizing compounds that include classifier forms. Quer et al. (2016) reports two cases in which SASS classifiers are used:

(2.15)

a. SWIM[^]SASS-CL ('swimming-pool') (NGT)

b. D-V-D[^]SASS-CL ('DVD') (TID)

(Quer et al. 2016: 177)

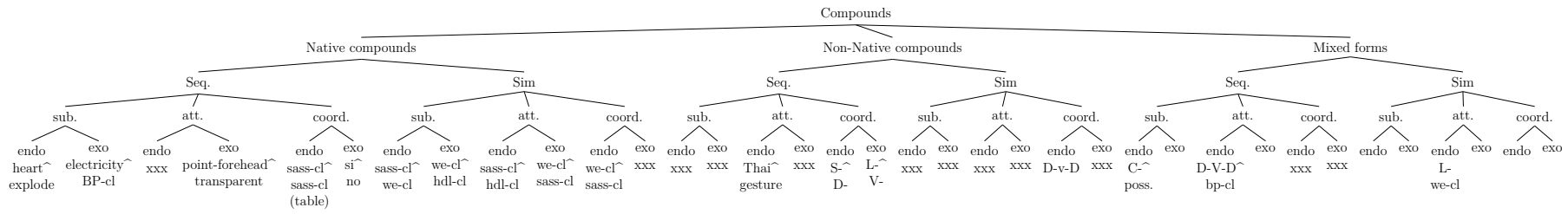
However, Meir et al. (2010) treated SASS classifiers as affixes rather than root units, hence undermining the compound status of these forms. While Quer et al. (2016) do not provide any evidence in favor of a compound analysis of these forms, I will analyze these (and other forms with other types of classifiers) in great detail in chapter 3 and chapter 4, and I will provide convincing arguments that these *are* compounds rather than affixed forms.

2.4 Conclusions and directions

Typologically, the classification of compounds in SL can be addressed by looking at their syntactic relation (subordinate, attribute or coordinate), their semantic relation (endocentric vs. exocentric), as well as their prosodic nature (sequential vs. simultaneous). Furthermore, given the complexity of SL lexicon (core lexical items, classifiers, non-native forms), a variety of combinations is potentially available to generate compounds, including the stacking of signs to create hypernyms. In the next two chapters, I will adopt these typological approaches to describe compounds in LIS and LSF. I will use several diagnostics to assess their status and I will finally provide a formal account. I capitalize on the typology of ? and Vercellotti and Mortensen (2012) typology to investigate the possible combinations. I will add an extensive discussion on simultaneous compounds and on compounds with classifier signs. One of the most problematic points of adapting the approach of ? and Vercellotti and Mortensen (2012) to compounds is that of defining the morphological category of the signs. Vercellotti and Mortensen (2012) by-passed this problem by using a semantic category (predicate) for a morphological purpose.

However, recent developments in the morphology and theory of compounds has revised the role of categorization. In particular, [Harley \(2009\)](#) offers a first attempt to integrate the morphology of compounds in the framework of Distributed Morphology (for an overview on Distributed Morphology see [Embick and Noyer 2007](#)). In this framework, the categorization process is treated as an independent and separate process from compounding. At the typological level, this can be easily integrated by simply removing the intermediate level of Ground/Nexus & Attributive/Appositive (in ?) or Predicate/Argument/Adjunct (in [Vercellotti and Mortensen 2012](#)). The general schema I will adopt in the next chapters is offered in (??).

I will also adopt [Harley \(2009\)](#)'s formal proposal to derive compounds, although modifications will be needed in order to meet descriptive adequacy. These will be illustrated in [chapter 3](#) with the concrete case of compounds in LIS.



Chapter 3

Compounds in Italian Sign Language

3.1 Introduction

In the previous chapter, I reviewed the relevant literature on compounds in signed and spoken languages. I also presented the classification of sign language lexicon, and the tests to identify whether a lexical item is a compound or not in sign language. The aim of this chapter is to offer a description and analysis of compounds in LIS. The description will be based on traditional classifications of compounds in spoken and signed languages, which include syntactic and semantic taxonomies. I will also add a sign language specific classification based on the fact that compounds can be simultaneous or sequential. The description of the SL lexicon made in [chapter 2](#), serves as a baseline to investigate the various possibilities that SL may employ to create compounds. I will show which are attested in LIS and which are absent. The rest of the chapter is divided as follow: In [section 3.2](#), I describe the methodology used to collect data. Section [3.3](#) illustrates the typology of compounds in LIS. In [section 3.4](#), I focus on the tests used to identify compounds. In [section 3.5](#), I provide a formal account of compounds in LIS within the framework of Distributed Morphology (DM). Section [3.6](#) Concludes the Chapter.

3.2 Methodology

The methodology used for data collection is discussed in this section. The first step consisted in a corpus survey. In previous works (?), I annotated part of the LIS corpus ([Geraci et al. 2010](#)). In particular for the narration task, the first one-hundred signs for each signer recorded

in the corpus have been annotated (at least for the gloss tier). I identified all the compounds present in this part of the corpus. This original list has been then enriched to cover for the various combinations between different types of lexical items (e.g., between core lexical items, classifiers, initialized forms, etc.). This part of the enrichment is based on my own intuitions as native signer of LIS. The list has then been checked with other two LIS signers, who participated as informants for this project.

3.2.1 Informants

The main source of data are my own intuitions as native signer. I was born in Salerno, a city in the South of Italy. I moved to Modena when I was 5 years old, then I moved to Padua in the residential school ‘Istituto Magarotto’.

In addition to my intuitions as native signer, two informants worked at this project. They are early signers (exposed to LIS before the age of 3) and use LIS as their primary means of communication in everyday life. Although technically speaking they are not native signers, their intuitions and judgments do not differ from mine.

Lorenzo Laudo (LL) was born and lived in Trani, a small city in the South of Italy. He attended the deaf school Filippo Smaldone in Barletta. He is a Deaf interpreter and collaborates with the media department of the Italian Deaf association, Ente Nazionale Sordi. At the time of data collection he was 31 years old. Giovanni Trezza (GT) was born in Teggiano, a rural village in the Salerno area (South of Italy), he attended two deaf schools, the Filippo Smaldone in Salerno and the Antonio Magarotto in Padua (in the North of Italy). At the time of data collection he was 36 years old and lived in Reggio Emilia (North of Italy). Despite the geographical variation of the informants, we all agree on the general evaluation of the data.

Other Deaf friends also helped me in finding other compounds.¹ Their proposals have always been double checked by me, another Deaf native signer of LIS (VV), my thesis director, Carlo Geraci (who is also a native signer of LIS) and Valentina Aristodemo who is a professional interpreter of LIS.

¹I want to thank Ezio Bramato, Davide Genna, Filippo Minolfi, Giuliano Nonnis, Fabio Poletti, Angela Petrucci and many other people with whom I discussed my data.

3.2.2 Data collection

To my knowledge, compounds in LIS (and LSF) have never been systematically investigated. As mentioned above, part of the compounds I started have been identified by looking at the LIS corpus (Geraci et al. 2011); others have been elicited from informants. In this section I describe the elicitation procedure I adopted to collect the data discussed in this chapter. I have also collected experimental data. The methodology and the major findings of the experimental study are presented separately in [chapter 5](#).

Beside the potential compounds that I found in the corpus, I created list of signs that according to my intuition are possible candidates to be compounds. Then, I elicited those compounds from the informants. The main strategy I used was to let the compounds emerge as spontaneously as possible by directing a simple conversation towards particular topics where specific compounds were expected to emerge. Once a particular form was produced by the informant, I asked him to repeat it in front of a camera and recorded it. The second step was to play back the potential compound and ask the informant to provide the meaning of the whole sign and that of each member. Then I applied the following tests for compounding: the inversion test (asking whether the members of a compound could be inverted); the insertion test (i.e., inserting lexical material between the two members); and, when possible, I also applied the recursion test (i.e., creating on-spot compounds starting from the basic form). This last test was conducted as a game whose goal was to create grammatical sentences including the newly created form. For instance, the compound form for ‘toy gun factory parking lot’ was used as locative modifier in a sentence like ‘I saw three cars in the toy gun factory parking lot’. This game ensured that the sequence of signs corresponding to the compound has the appropriate morphosyntactic category. Finally, by analyzing the videos of the signs I also found phonological processes (e.g., assimilation, movement reduction, non-dominant hand dropping, etc. that are typically found in SL compounds). Following this procedure, I have been able to collect one hundred and forty seven compounds in LIS.

3.3 Towards a typology of compounds in LIS: sign combinations

In this section, I show which combinations of the SL lexicon are attested in LIS. I assume [Brentari and Padden \(2001\)](#) as the general theory of SL lexicon in which signs are split into native lexicon (core lexical signs and classifiers) and non-native lexicon (fingerspelling, borrowings and initializations; see [Chapter 2](#) for a more detailed description of the SL lexicon). I will discuss cases that are traditionally analyzed as compounds (i.e., sequences of two core lexical signs). I will also discuss more controversial cases of combinations of two classifier signs which have been analyzed as cases of affixation in the literature (?). I will provide evidence that even those cases that were formerly analyzed as affixes are better treated as compounds. I present 1) compounds in the native lexicon, 2) compounds in the non-native lexicon and 3) mixed forms. For each section, I distinguish between sequential and simultaneous compounds, and within each group I first present a syntactic typology and then a semantic typology. I will then discuss in a separate section some aspects relative to compounds that are made with two classifiers. The discussion flow is summarized by the image in [\(3.1\)](#).

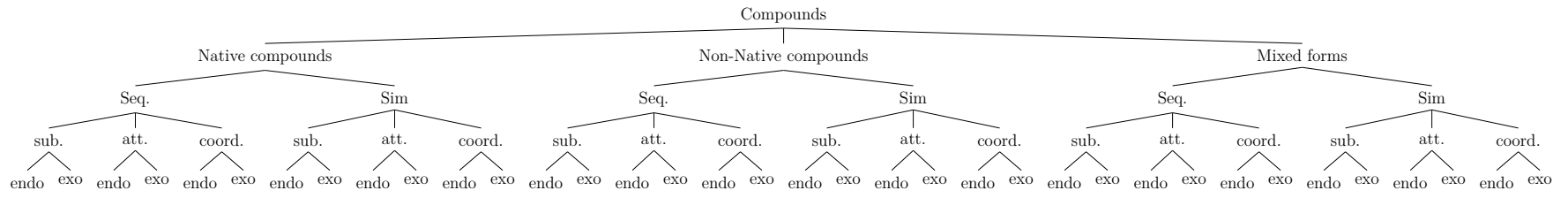


Figure 3.1: General Schema

3.3.1 Combinations of native lexicon

The native lexicon is composed of core lexical items and classifiers, therefore there are four logical combinations, which are illustrated in [Table 3.1](#).

	Core	Classifier
Core	Core [^] Core	Core [^] Classifier
Classifier	Classifier [^] Core	Classifier [^] Classifier

Table 3.1: Combinations of native lexicon

All the logical possibilities, shown in [Table 3.1](#), are attested in LIS. An example of each type is offered here.

(3.1) a. $\langle \text{core}^{\wedge} \text{core} \rangle$ signs:





(a) POINTING-head ('head/know')



(b) PICCOLO ('small')

Figure 3.2: 'Ignorant'

An example of a $\langle \text{core}^{\wedge} \text{core} \rangle$ compound is the sign for 'ignorant'. The first member is a pointing sign toward the forehead, (cf. [3.2\(a\)](#)). It is normally used to refer to the head and by extension to the mind. The  handshape is the same as in the

sign for HEAD/KNOW, but differently from the sign ‘head/know’ the sign does not have a repeated movement, and it only includes the transition to the head. The second sign is the sign for ‘small’. It has a  handshape with index and thumb selected in contact each other, and non selected fingers extended, shown in 3.2(b). The sign is located in neutral space, but the repeated short straight movement of the citation form is lost and the transition movement between the first and second member of the compound is reanalyzed as the phonological movement of the compound.

b. ⟨core[^]classifier⟩ signs:





(a) MEMORIA (‘memory’)



(b) SASS-CL

Figure 3.3: ‘Hard disk’

An example of a ⟨core[^]classifier⟩ compound is the sign for ‘hard disk’. The first member comes from the sign for ‘memory’. It has a B handshape and is produced with a  handshape (cf. 3.3(a)). The sign is produced with fingertip contact on the forehead. The repeated movement that is present in the citation form is lost. The second member of the compound is a SASS classifier which represents the shape of the box. As shown in 3.3(b), it has a  bent handshape. The whole compound represents the concept of hard-disk.

c. $\langle \text{classifier} \hat{\text{core}} \rangle$ signs:




(a) HLG-CL



(b) FREDDO ('cold')

Figure 3.4: 'Refrigerator'

An example of a $\langle \text{classifier} \hat{\text{core}} \rangle$ compound is the sign for 'refrigerator'. The first member is a handling classifier sign. It has a  handshape with palm orientation toward the lateral plane (cf. 3.4(a)). The handling classifier represents how the refrigerator could be opened. The second member is the sign for 'cold'. It is a symmetrical sign with same handshape of first member with repeated movement toward of another hand, as shown in 3.4(b). It is just a coincidence that both members have same handshapes (i.e., there is no assimilation here). The whole compound means 'refrigerator'.

d. $\langle \text{classifier} \hat{\ } \text{classifier} \rangle$ signs:





(a) SASS-CL



(b) HDL-CL

Figure 3.5: ‘Dishwasher’

The example in [Figure 3.5](#), means ‘dishwasher’; it is composed by two classifiers produced one after the other. The first one is a SASS-cl, it has a  handshape produced in neutral space with circular movement of the wrist (cf. [3.5\(a\)](#)). It iconically represents the movement of a dishwasher wing. The second one is a handling classifier. It has a  handshape, (cf. [3.5\(b\)](#)). It has a downward (diagonal) movement, from a high location in the signing space toward the lower part of the signer’s chest. The movement represents how dishwashers open.

Before concluding this section, I want to stress one point. In [Table 3.1](#) I treated classifiers as a single class, however I am aware of the fact that the group of classifier signs is not a homogeneous class. Indeed, there are different types of classifiers (entity, handling, body part and size and shape). I will not investigate here whether all possible combinations with all classifier types are attested (this will be discussed in section [3.3.1.1.3](#) and in section [3.3.1.2.3](#)). I rather focus on the linguistic properties of the attested combinations.

The illustrative examples discussed above all involve compounds of the sequential type, however, as discussed in [chapter 2](#), sign languages offer the possibility of producing the two members of the compound simultaneously. These cases will be discussed in section [3.3.1.2](#). In

the next two sections, I illustrate the syntactic and semantic properties of these two types of compounds.

3.3.1.1 Sequential Compounds

3.3.1.1.1 Syntactic structure

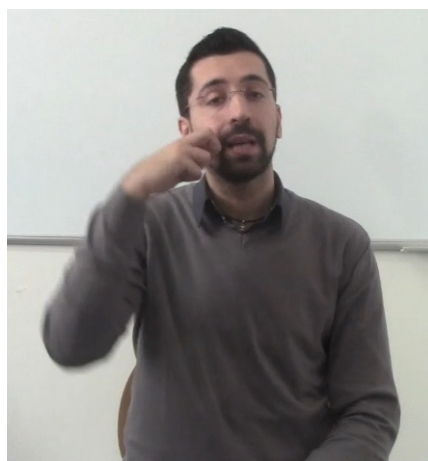
From a syntactic point of view, the relation between the two members of a compound could be either that of complementation, modification, or coordination.

Let us focus on subordinate compounds with a head-complement relation. English examples of this kind are listed here in (3.2):

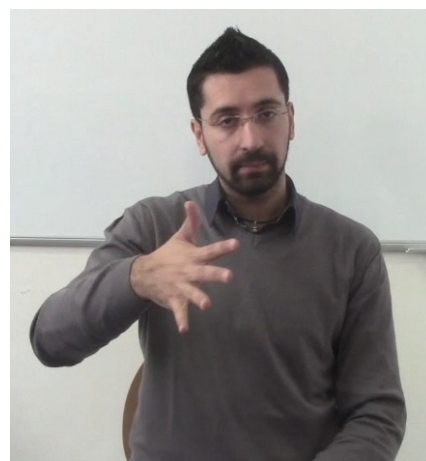
- (3.2) a. apple cake
 b. sun glasses
 c. water pipe
 d. taxi driver

(Lieber and Stekauer 2011: 67)

A LIS examples of this kind is the sign $CARNE \hat{WE-CL}$ ('meat food'), which is composed by the sign for $CARNE$ ('meat') and an entity classifier as shown in 3.6(a) and in 3.6(b), respectively.





(a) $CARNE$ ('meat')



(b) $WE-CL$

Figure 3.6: 'Meat food'

The first sign has a  handshape. The index and the middle fingers are selected and both have bent non-base joints. The location is the cheek and, differently from the sign 'meat' produced in isolation, there is no movement in the compound form.

The second sign has as  handshape, in which all selected fingers are extended. It has a trilled movement realized at the level of the wrist and it is produced in the neutral signing space. The classifier defines flat objects.

All possible combinations of core and classifier signs are attested, as shown by the list in (3.3).

- (3.3) a. $\langle \text{core} \hat{ } \text{core} \rangle$: ‘heart attack’
 b. $\langle \text{core} \hat{ } \text{cl} \rangle$: ‘meat’, ‘computer’
 c. $\langle \text{cl} \hat{ } \text{core} \rangle$: ‘refrigerator’
 d. $\langle \text{cl} \hat{ } \text{cl} \rangle$: TTY

Attributive compounds define a syntactic head-adjunct relation, such as an adjective that modifies a noun, or a noun modifying another noun. The adjunct modifier typically expresses a property of the noun. English examples of attributive compounds are listed in (3.4):

- (3.4) a. *blue cheese*
 b. *atomic bomb*
 c. *sword fish*
 d. *green house*

(Lieber and Stekauer 2011: 67)

A LIS example of attributive compounds is the sign for ‘hard disk’, already shown above and repeated here in Figure 3.7.



(a) MEMORIA (‘memory’)



(b) SASS-CL

Figure 3.7: ‘Hard disk’

A list of compounds of this type is offered in (3.5). Differently from the case of complement compounds, I have not been able to find examples of Classifier[^]Core and Classifier[^]Classifier combinations.

- (3.5) a. ⟨core[^]core⟩: ‘fall in love’, ‘psychology’
 b. ⟨core[^]cl⟩: ‘hard disk’, ‘corrector’
 c. ⟨cl[^]core⟩: unattested
 d. ⟨cl[^]cl⟩: unattested

Finally, coordinated compounds establish a symmetric relation between the two members. Indeed the two members belong to same grammatical category, (N+N, V+V, etc.) and can be related by functional elements, like *and/or*. Examples of coordinated compounds in Italian are shown in (3.6):

- (3.6) a. *cassapanca* (‘chest’, lit. ‘case bench’)
 b. *sediasdraio* (‘deckchair’, lit. ‘chair deck’)
 c. *mangiaebevi* (lit. ‘eat and drink’)
 d. *saliscendi* (lit. ‘go up go down’)

A LIS example of coordinated compound is the sign ‘parents’ shown in Figure 3.8.





(a) MAMMA (‘mom’)



(b) PAPÀ (‘dad’)

Figure 3.8: ‘Parents’

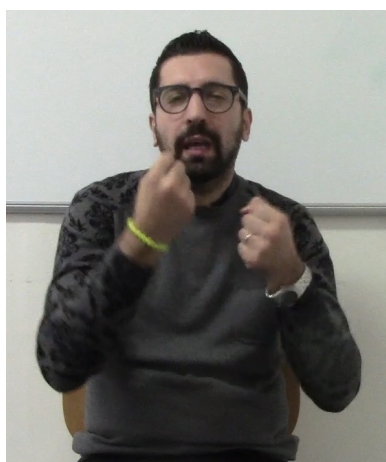
The first member is the sign for ‘mother’ (3.8(a)). The handshape is a close fist, . There is a transition movement towards the cheek, which is different from the movement of the citation form where the movement towards the cheek is repeated. The second member is the sign for ‘father’, shown in 3.8(b). It has a  handshape with selected thumb and index finger. The movement is contact between thumb and index fingertips. Like the sign for ‘mother’, the movement in the citation form is repeated.

A list of coordinate compounds is given in (3.7), combinations of Core[^]Classifier and Classifier[^]Core are unattested.

- (3.7) a. $\langle \text{core}^{\wedge} \text{core} \rangle$: ‘parents’, ‘Do something despite uncertainty or risk’
 b. $\langle \text{core}^{\wedge} \text{cl} \rangle$: unattested
 c. $\langle \text{cl}^{\wedge} \text{core} \rangle$: unattested
 d. $\langle \text{cl}^{\wedge} \text{cl} \rangle$: ‘table’

Finally in the SL literature, dvandva compounds are often discussed. These compounds are composed by at least three lexemes and create a superordinate meaning. From a syntactic point of view, these are similar to coordinated compounds. Working on ASL, Lepic (2016) distinguishes between coordinate compounds with two members from coordinated compounds with more than two members and defines the latter as generating hypernyms. For concreteness I use Lepic’s terminology here.

An example of a LIS hypernym compound is the sign for ‘vehicle’ illustrated in (3.9):



(a) AUTO ('car')



(b) MOTOCICLETTA ('bike')




(c) CAMION ('bus')



(d) VARIO ('Several')

Figure 3.9: 'Veichle'

In this example, the first three members are signs for particular vehicles such as 'car', 'bike' and 'bus'. The sign for 'car' and 'bike' are handling classifiers and iconically represents how the steering wheel and the handlebar are held while driving. The sign for BUS is a size and shape classifier in which the  handshape depicts the shape of a BUS.

The last member of the compound is a sign that indicates the fact that we are dealing with a sort of 'open list'. In [section 3.5](#), I analyze this last sign as the hypernym marker. The signs that can appear at the end of hypernym compounds in LIS are: VARIO (i.e 'several'), GENERALE (i.e 'general') and LISTA (i.e 'list'). In the case of 'vehicles' the hypernym marker is VARIO.

Other LIS examples of hypernym compounds are listed in (3.8):

- (3.8) a. GENERALITÀ ('personal details')
 b. GIOIELLI ('jewels')
 c. VEICOLI ('vehicles')
 d. MUSICA ('music')
 e. POSATE ('flatware')

To sum up, in this section I presented the various syntactic combinations of compounds attested in LIS: subordinate, attributive and coordinate relations. In addition to these, I also presented hypernym compounds.

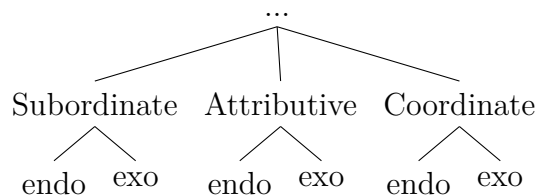
3.3.1.1.2 Semantic structure

In this section the semantics of sequential combination of the native lexicon will be treated. The meaning of each component will be analyzed as well as how the meaning of the whole compound is computed.

The typology of compounds distinguishes between endocentric and exocentric compounds. The former have a clear compositional meaning derived either by the head-complement, head-adjunct relation or by the coordination relation, while the latter are opaque in the sense that the meaning cannot be immediately derived by combining the meaning of the members.

For each of the syntactic categories identified in section 3.3.1.1.1, I show cases of endocentric and exocentric compounds in LIS. This is illustrated by the schema in (3.9).

(3.9)



Examples of subordinate endocentric compounds from English and Italian, respectively, are shown in (3.10):



- (3.10) a. *taxi driver*
 b. *capostazione* ('station master')

The meaning of the English compound *taxi driver* refers to a person who drives a taxi, so head of the compound is the lexeme 'driver', and the lexeme *taxi* is treated as the complement of drive(r). The Italian example *capostazione* is made by the lexemes *capo* (manager) and *stazione* (station). The whole compound means station manager. The head of the compound is *capo* and *stazione* is its complement providing a specification relation.

A LIS example of subordinate endocentric compound is given in Figure 3.10.



Figure 3.10: 'Heart attack'

The first member is the sign for 'heart' (cf. 3.10(a)). It has  as its handshape with the selected middle finger in contact with the chest of the signer. Differently from the citation form, in the compound form there is no repeated movement towards the chest. The second member is the sign for 'explode', shown in 3.10(b). It is a symmetrical sign and has a  handshape. The sign starts with crossed arms with contact with body. Both arms move in arch. The head of the compound is SCOPPIARE ('explode') and CUORE ('heart') is its complement. The meaning of the whole compound is 'heart attack' and is compositionally obtained combining the meanings of the two members.

A list of sequential subordinate endocentric compounds is offered in (3.11). Combinations of Classifier[^]Classifier are unattested.

- (3.11) a. ⟨core[^]core⟩: ‘heart attack’, ‘culture’
 b. ⟨core[^]cl⟩: ‘meat’
 c. ⟨cl[^]core⟩: ‘refrigerator’
 d. ⟨cl[^]cl⟩: unattested

Turning to subordinate exocentric compounds, examples from English and Italian are shown in (3.12):

- (3.12) a. *pickpocket*
 b. *lavapiatti* (‘dishwasher’, lit. wash dishes)

In the English compound *pickpocket*, the syntactic head is the lexeme *pick*, while its complement is *pocket*. However, semantically neither of the two lexemes is the head, because the meaning of whole compound is neither a type of pocket nor an action of picking. These types of compounds are called exocentric compounds. A similar analysis applies to the Italian compound *lavapiatti*. It is an exocentric compound because the whole compound refers to a machine for dish cleaning and not to a kind of dish nor to a kind of washing.

A LIS example of a sequential subordinate exocentric compound is given in Figure 3.11:





(a) ELETTRICITÀ (‘electricity’)



(b) BP-CL

Figure 3.11: ‘Computer’

The compound in [Figure 3.11](#) is the sign for ‘computer’. The first member is the sign for ‘electricity’ (cf. [3.11\(a\)](#)). It is a symmetrical sign with a  handshape. The movement is downward on the vertical plane. In the citation form, it has a complex movement: the distal movement is a trilled movement of the wrist; the proximal one is the movement of arms from up to down once in neutral signing space. The second member of the compound is a Limb/Body part classifier which represents the action of the hands. The sign is symmetrical with a  handshape and a trilled movement. The semantic relation between members is not compositional: the relation between ‘electricity’ and the classifier does not give us a clear association with the concept of the whole compound, namely ‘computer’. So it is an exocentric compound.

A list of compounds of this type is provided in [\(3.13\)](#). Notice I have been able to find only one out of four combinations, namely the Core[^]Classifier one.

- (3.13) a. $\langle \text{core}^{\wedge} \text{core} \rangle$: unattested
 b. $\langle \text{core}^{\wedge} \text{cl} \rangle$: ‘laptop’
 c. $\langle \text{cl}^{\wedge} \text{core} \rangle$: unattested
 d. $\langle \text{cl}^{\wedge} \text{cl} \rangle$: unattested

Now we move to sequential attributive compounds. Examples of attributive endocentric compounds in spoken languages are given in [\(3.14\)](#):

- (3.14) a. *blackboard*
 b. *girlfriend*
 c. *sword fish*
 d. *atomic bomb*

In the case of *blackboard*, the adjective black modifies the noun board. The semantic relation between each member and the whole compound is transparent.

At present, I have not been able to find any sequential attributive endocentric compound in LIS, hence we move on to attributive exocentric compounds. Examples of this type are offered in [\(3.15\)](#):

- (3.15) a. *greenhouse*
 b. *white collar*
 c. *grey beard*
 d. *free lance*

Consider *greenhouse*. The meaning is not literally that of a house with green walls. Instead the meaning refers to those constructions that allow cultivations. A LIS example of this type is the sign 'psychology' shown in Figure 3.12:




(a) POINTING-forehead



(b) TRASPARENTE('transparent')

Figure 3.12: 'Psychology'

The first member is a pointing sign toward the forehead, (cf. 3.12(a)). It is normally used to refer to the head and by extension to the mind. The second member is the sign for 'transparent/deep' as shown in 3.12(b). It is a symmetrical two-handed sign with a  handshape. The non-dominant hand has the palm oriented toward the signer. The dominant hand has the palm orientation toward the lateral plane and moves downward.

The meaning of the compound is psychology and it is clearly not compositional (i.e., it does not mean transparent hear/mind).

A list of compounds of this type is provided in (3.16), Examples of lexical combinations, such as Classifier[^]Core and Classifier[^]Classifier, are not found.

- (3.16) a. $\langle \text{core} \hat{=} \text{core} \rangle$: ‘fall in love’, ‘psychology’
 b. $\langle \text{core} \hat{=} \text{cl} \rangle$: ‘hard disk’, ‘corrector’
 c. $\langle \text{cl} \hat{=} \text{core} \rangle$: unattested
 d. $\langle \text{cl} \hat{=} \text{cl} \rangle$: unattested

Turning to coordinate compounds, some English examples are given in 3.17.

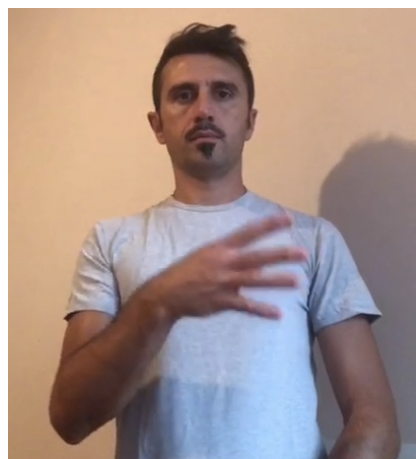
- (3.17) a. *fighter bomber*
 b. *actor author*
 c. *dancer singer* (Lieber and Stekauer 2011: 67)

Consider *dancer signer*, the meaning is that of a person that is at the same time a dancer and a signer.

A LIS example of this type is the sign ‘table’ shown in Figure 3.13:




(a) SASS-CL



(b) SASS-CL

Figure 3.13: ‘Table’

The sign for ‘table’ is made by two SASS classifiers expressed sequentially. Both members have  handshapes. Both signs are produced in neutral space. The first member (cf. 3.13(a)) has the palm oriented toward the addressee with a single downward movement, which refers to the vertical part of the grid. The second member, shown in 3.13(b), has the palm oriented toward the lateral plane. It moves horizontally to iconically represent the horizontal lines of a grid. The meaning of this sign is transparently derived by coordinating the meanings of the two members.

The list of endocentric coordinate compounds in LIS is given below:

- (3.18) a. $\langle \text{core} \hat{=} \text{core} \rangle$: ‘parents’
 b. $\langle \text{core} \hat{=} \text{cl} \rangle$: unattested
 c. $\langle \text{cl} \hat{=} \text{core} \rangle$: unattested
 d. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘table’

English examples of exocentric coordinate compounds are show in (3.19).

- (3.19) a. *mother child*
 b. *North east*
 c. *mind brain* (Lieber and Stekauer 2011: 67)

Lieber and Stekauer 2011 consider *North East* (example 3.19 b) an exocentric because the whole compound does not refer to (some properties of) the North or to (some properties of) the East. To put it simply, *North East* means a mix of the two properties.

A LIS example of sequential exocentric coordinate compound is shown in 3.14(a), in 3.14(b) and in 3.14(c):

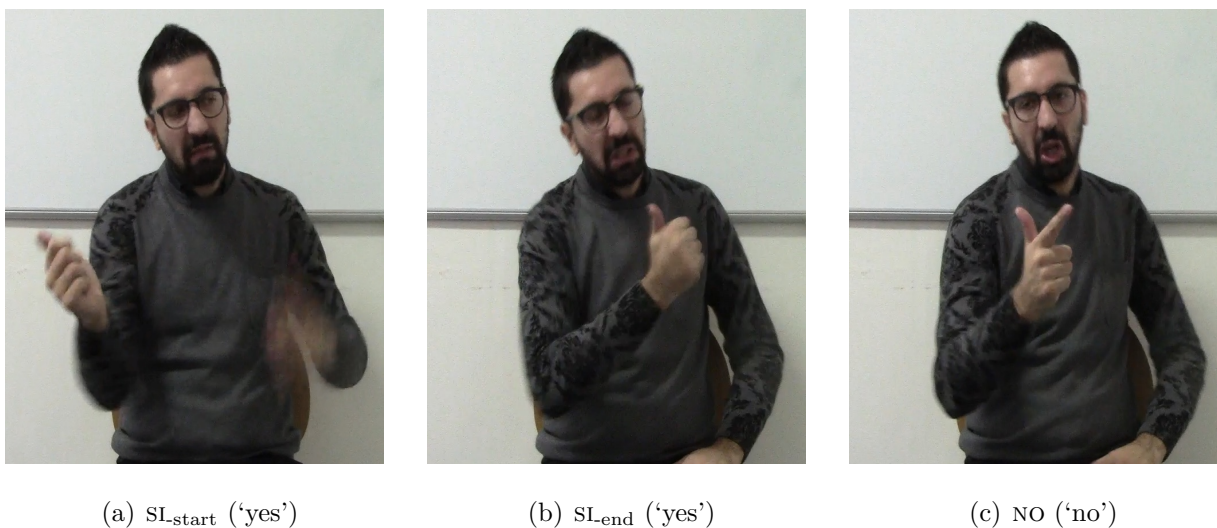








Figure 3.14: ‘Do something despite uncertainty or risk’

The first member of the compound is the sign for ‘yes’. It has  handshape and a complex movement. The distal movement is a wrist rotation, the proximal one is an arc movement. The citation form of the sign is quite different. The trilled wrist movement of the citation form

is reduced to zero in the compound and the  handshape of the citation form assimilates the unselected fingers resulting with a  handshape (i.e., the pinkie finger is extended in the citation form and unselected in the compound). The second member is the sign for ‘no’. It has  handshape. The movement is perpendicular to the one of the first member. Also in this case, the compound is slightly different from the citation form. The citation form has a  handshape and trilled wrist movement. In the compound form, the thumb remains selected due to assimilation. The resulting handshape is , as shown in (3.14(c)). The movement proximalizes from a trilling of the wrist to the elbow. The whole sign is an exocentric coordinate compound because the meaning is not compositional; it does not mean *yes or no*, but has an idiomatic meaning, describing a decision to do something despite uncertainty or risk. It could be used, for example, to describe the decision to go skydiving, despite hesitation about the safety, or the decision to go to a foreign country in which one doesn’t know the language.

This is the only type of sequential exocentric coordinate compound I have been able to find, as illustrated below.

- (3.20) a. $\langle \text{core} \hat{ } \text{core} \rangle$: ‘Do something despite uncertainty or risk’
 b. $\langle \text{core} \hat{ } \text{cl} \rangle$: unattested
 c. $\langle \text{cl} \hat{ } \text{core} \rangle$: unattested
 d. $\langle \text{cl} \hat{ } \text{cl} \rangle$: unattested

To sum up, for each syntactic category and possible combinations of native lexicon, I provided examples of endocentric and exocentric sequential compounds. The schema below, in [Table 3.2](#), summarizes the results.

For some categories (e.g., exocentric $\text{cl} \hat{ } \text{cl}$), I was not able to find examples. Given that sequential $\text{CL} \hat{ } \text{CL}$ compounds are rare, it seems likely that these are simply accidental gaps. It is of course possible that there is systematicity to these gaps, but I leave this as an open question for future research.

	Subordinate		Attributive		coordinate	
	Endo	Exo	Endo	Exo	Endo	Exo
Core+core	'heart attack'	unattested	unattested	'fall in love'	'parent'	'To go it blind'
Core+cl	'meat'	'computer'	unattested	'hard disk'	unattested	unattested
Cl+core	'refrigerator'	unattested	unattested	unattested	unattested	unattested
Cl+cl	unattested	unattested	unattested	unattested	'table'	unattested

Table 3.2: LIS schema of sequential compounds structure and lexicon

In the next section, I will focus on compounds made by two classifiers.

3.3.1.1.3 Classifier system and compounds

In the previous sections, I illustrated examples of classifier[^]classifier compounds. However, the typology of classifiers normally includes four categories in SL, as shown in (3.21):

- (3.21) a. Size And Shape Specifier classifiers
 b. Handling classifiers
 c. Limb/Body part classifiers
 d. Whole Entity classifiers

In principle, then, one would expect to find classifier compounds with all possible combinations. These are reported in Table 3.3.

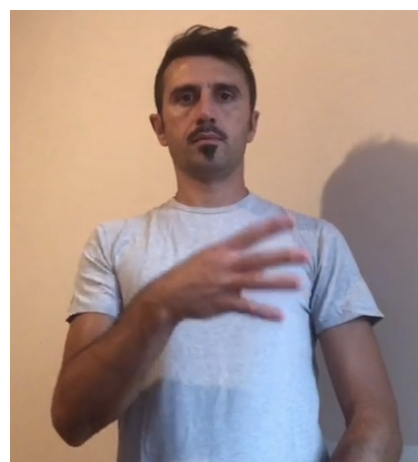
	SASS	Hlg	BP	WE
SASS	SASS [^] SASS	SASS [^] Hlg	SASS [^] BP	SASS [^] WE
Hlg	Hlg [^] SASS	Hlg [^] Hlg	Hlg [^] BP	Hlg [^] WE
BP	BP [^] SASS	BP [^] Hlg	BP [^] BP	BP [^] WE
WE	WE [^] SASS	WE [^] Hlg	WE [^] BP	WE [^] WE

Table 3.3: Potential combination of Classifiers

However, sequential compounds in which both members are classifiers are very hard to find in LIS. Indeed, we will see that in the case of classifier[^]classifier compounds the most natural realization for LIS is in simultaneous forms. However, some LIS examples of sequential compounds made with classifiers are shown in Figure 3.15 and Figure 3.16:



(a) SASS-CL



(b) SASS-CL

Figure 3.15: ‘Table’





(a) SASS-CL



(b) HDL-CL

Figure 3.16: ‘Driver’s license’

The description of ‘table/spreadsheet’ is already given in [Figure 3.13](#), so focus on the second example, ‘driver license’.

The first member is a SASS-classifier produced in neutral space. It is a symmetrical two-handed sign and it has a  handshape (cf. [3.16\(a\)](#)). It has a straight movement along the horizontal plane. It is used to refer to thin rettangular objects. The second member is a handling-cl with  handshape. Its movement mimic the use of a steering wheel (cf. [3.16\(b\)](#)).

A summary of the attested and unattested combinations is provided in [Table 3.4](#)

	SASS	Hlg	BP	WE
SASS	SASS $\hat{\wedge}$ SASS	SASS $\hat{\wedge}$ Hlg	SASS $\hat{\wedge}$ BP	SASS $\hat{\wedge}$ WE
Hlg	Hlg $\hat{\wedge}$ SASS	Hlg $\hat{\wedge}$ Hlg	Hlg $\hat{\wedge}$ BP	Hlg $\hat{\wedge}$ WE
BP	BP $\hat{\wedge}$ SASS	BP $\hat{\wedge}$ Hlg	BP $\hat{\wedge}$ BP	BP $\hat{\wedge}$ WE
WE	WE $\hat{\wedge}$ SASS	WE $\hat{\wedge}$ Hlg	WE $\hat{\wedge}$ BP	WE $\hat{\wedge}$ WE



Table 3.4: Attested combination of Classifiers

3.3.1.2 Simultaneous and semi-simultaneous compounds

In the next sections I illustrate examples of simultaneous compounds in LIS. I will use the same presentation structure of the previous sections: first I will introduce the syntactic typology (Section 3.3.1.2.1) and then the semantic one (Section 3.3.1.2.2).

3.3.1.2.1 Syntactic structure

In this section, I provide examples of LIS compounds in each of the three syntactic categories: subordinate compounds, attributive compounds, and coordinate compounds. For each category, I present the distribution of sequential compounds with respect to the morphological category of the two morphemes, core lexicon or classifier. Although [Vercellotti and Mortensen \(2012\)](#) do not discuss simultaneous compound in ASL, they report that such cases are attested. Some examples that I found are the signs for ‘vote’, ‘dance’, ‘register’, ‘credit-card’, ‘screwdriver’.

A LIS example of simultaneous compounds is the sign FORCHETTA (‘fork’, 3.17(a)), which is composed by an entity classifier (a  handshape) produced with the dominant hand and another entity classifier with a  handshape produced with the non-dominant hand (3.17(b)). The dominant hand represents the tool itself, while the non-dominant hand stands for the object that gets poked.



(a) WE-CL



(b) WE-CL

Figure 3.17: 'Fork'

The list of simultaneous subordinate compounds with respect to lexical type in LIS is given in (3.22). An interesting fact appears quite clearly, namely only classifiers are allowed in this configuration.

- (3.22) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\{ \text{core} \hat{=} \text{cl} \}$: unattested
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: 'washing-machine', 'compass', 'electric-socket', 'meat skewer'
 'pencil sharpener', 'fax', 'fork'

An example of an attributive simultaneous compound in LIS is the sign for ASTUCCIO 'pencilcase', illustrated in 3.18(a) and 3.18(b).





(a) HGL-CL



(b) SASS-CL

Figure 3.18: 'Pencil case'

The dominant hand is a handling classifier representing the zipper with a  handshape. The non-dominant hand is a SASS classifier which represents the case with a  handshape. The movement of the compound is the movement of the handling classifier, namely a straight path movement in the neutral signing space. It is an attributive compound because the handling classifier (the zipper) specifies a quality of the SASS classifier (the case).

A list of simultaneous attributive compounds in LIS is given in (3.23).

- (3.23) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\{ \text{core} \hat{=} \text{cl} \}$: unattested
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘i-phone’, ‘pencil case’, ‘copy machine’

An example of simultaneous coordinate compound in LIS is the sign SALAME² ‘salami’, shown in 3.19(a) and 3.19(b).





(a) WE-CL



(b) HGL-CL

Figure 3.19: ‘Salami’

The dominant hand is an entity classifier for sharp objects. The  handshape represents a blade and the wrist rotation movement indicates the act of cutting. The non-dominant hand is handling classifier for medium size cylindric objects (i.e., the salami) with a  handshape. It is a coordinate compound because both members are verbs that could be treated as ‘take-and-slice’.

²There is another possible analysis of the classifier in 3.19(b). It could be analyzed as a SASS-CL. If so, the whole compound cannot be a coordinate compound anymore. The SASS-CL would be categorized as noun and the entity in 3.19(a) as a verb. The result would be a subordinate compound.

The list of simultaneous coordinate compounds in LIS is given in (3.24). Interestingly, there is only one combination attested, namely the Classifier[^]Classifier, the other combinations at present are unattested in LIS.

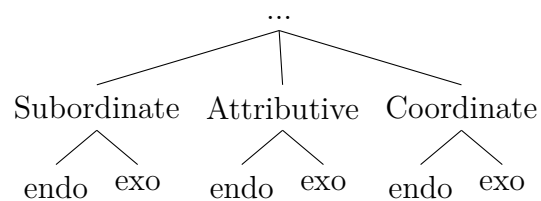
- (3.24) a. $\langle \text{core}^{\wedge} \text{core} \rangle$: unattested
 b. $\{ \text{core}^{\wedge} \text{cl} \}$: unattested
 c. $\langle \text{cl}^{\wedge} \text{cl} \rangle$: ‘salami’

To conclude this section, although simultaneous compounds are possible with all syntactic structures, the attested lexical combinations are selectively reduced. In particular, it seems that core lexical items do not participate in the creation of simultaneous compounds.

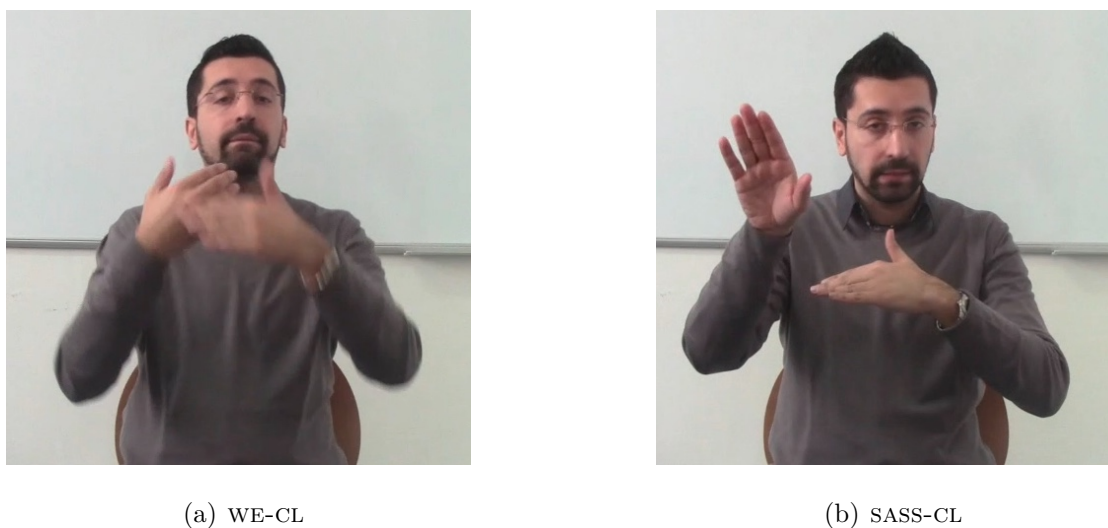
3.3.1.2.2 Semantic structure

Following the same rationale as the previous section, I will now turn to the semantic properties by illustrating endocentric and exocentric compounds for each of the syntactic structures. The general schema is illustrated below:

(3.25)




A simultaneous subordinate endocentric compound in LIS is the sign FAX, shown in [Figure 3.20](#).



(a) WE-CL

(b) SASS-CL

Figure 3.20: ‘Fax’

The LIS sign FAX is composed by two classifiers expressed simultaneously (one by each hand). Both hands have the same shape, namely a  handshape.

The non-dominant hand is a SASS classifier which identifies the box containing the machine (a fax in this case). It has no movement and it is produced in neutral space.³ It is a highly reduced form of BOX. The dominant hand is an entity classifier for ‘paper’. The hand moves below the non-dominant hand mimicking a sheet of paper coming out of a fax machine. The head of whole compound is the classifier spelled-out on the non-dominant hand and the meaning is ‘machine that forges papers’.

The list of simultaneous subordinate endocentric compounds in LIS is given in (3.26):



- (3.26) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\{ \text{core} \hat{=} \text{cl} \}$: ‘update’, ‘to touch’
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘fax’, ‘pencil case’, ‘i-pad’, ‘electric socket’

An example of subordinate exocentric compound in LIS is the sign AUTORIZZAZIONE ‘authorization’, shown in 3.21(a) and 3.21(b):

³The same classifier is productively used in other compounds like WASHING-MACHINE, FRIDGE, OWEN and other pieces of furniture.



Figure 3.21: ‘Authorization’

In this sign, the dominant hand has a close fist handshape, , and represents a handling classifier (the stamp). The movement is a repeated shifted short movement that contacts the palm of the non-dominant hand. The non-dominant hand is an entity classifier for flat objects representing the surface where the stamp applies with a  handshape. The literal meaning of ‘putting a stamp on a paper’ is shifted to a generalized meaning for ‘authorize’ or ‘authorization’, which is not transparent anymore. Notice that the sign STAMP has a different phonological make-up from its citation version. In particular it only has a single movement rather a repeated movement.

The list of exocentric subordinate compounds is given in (3.27):

- (3.27)
- | | |
|-----------------|--|
| a. <core+core>: | unattested |
| b. {core+cl}: | unattested |
| c. <cl+cl>: | ‘certificate’, ‘doctor’, ‘authorization’ |

The LIS sign for ASTUCCIO, ‘pencil case’, shown above in 3.18(a) and 3.18(b) is an example of an endocentric attributive compound. The example is repeated here in Figure 3.22. The head of the compound is represented by the non-dominant hand (the case), while the dominant hand specifies one attribute (the zipper). It is endocentric because its meaning is transparent and compositional.



(a) HGL-CL



(b) SASS-CL

Figure 3.22: ‘Pencil case’

The list of endocentric attributive compounds is given in (3.28)

- (3.28) a. $\langle \text{core} + \text{core} \rangle$: unattested
 b. $\{ \text{core} + \text{cl} \}$: unattested
 c. $\langle \text{cl} + \text{cl} \rangle$: ‘pencil case’

An example of LIS simultaneous attributive exocentric compound is the sign RYANAIR, shown in Figure 3.23:





(a) WE-CL



(b) SASS-CL

Figure 3.23: ‘Ryanair’

The whole sign is the name of a European low cost airplane company, Ryanair. This example

is particularly interesting as both members of the compound are realized simultaneously on the same hand. In particular one part of the handshape identifies the classifier for airplanes, and another part identifies the adjective PICCOLO ‘little/small’, which is itself another classifier (see ? for an analysis of PICCOLO as a SASS classifier). The extended thumb and the pinkie finger produce a  handshape which is the classifier for airplanes, while the extended thumb and the index finger produce a  handshape which is the sign for PICCOLO. The movement of the sign is that of the adjective PICCOLO itself. The literal meaning of the sign could be roughly ‘cheap airplane’, which would be transparent if the referent were any low cost company. As it is the name of one particular company, it is clearly exocentric.

The list of attributive exocentric compounds in LIS is given below:

- (3.29) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\langle \text{core} \hat{=} \text{cl} \rangle$: Ryanair
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: unattested

Unfortunately, I was not able to find any case of simultaneous coordinated exocentric compound in LIS.

To conclude this section, endocentric and exocentric compounds are found in simultaneous constructions in LIS. A summary of the finding is schematically represented below:

	Subordinate		Attributive		coordinate	
	Endo	Exo	Endo	Exo	Endo	Exo
$\text{Core} \hat{=} \text{core}$	unattested	unattested	unattested	unattested	unattested	unattested
$\text{Core} \hat{=} \text{cl}$	‘update’	unattested	unattested	‘Ryanair’	unattested	unattested
$\text{Cl} \hat{=} \text{Cl}$	‘fax’	‘authorization’	‘pencil case’	unattested	‘salami’	unattested

Table 3.5: LIS schema of simultaneous compounds structure and lexicon

As a final point, I would like to stress the fact that simultaneous compounds can be constructed with all kinds of classifiers and not just with SASS. This is shown by the case of SALAME, where neither member is a SASS classifier.

3.3.1.2.3 Classifier system and compounds

As mentioned in the previous sections, there are four types of classifiers in SL. The typology is repeated here in (3.30).

- (3.30) a. Size And Shape Specifier classifiers
 b. Handling classifiers
 c. Limb/Body part classifiers
 d. Whole Entity classifiers

Notice that in the case of simultaneous compounds there is no temporal ordering of the two component words. The logically possible combinations are listed in Table 3.6.

	SASS	Hlg	BP	WE
SASS	SASS \wedge SASS			
Hlg	Hlg \wedge SASS	Hlg \wedge Hlg		
BP	BP \wedge SASS	BP \wedge Hlg	BP \wedge BP	
WE	WE \wedge SASS	WE \wedge Hlg	WE \wedge BP	WE \wedge WE

Table 3.6: Potential combination of Classifiers

All the logical combinations are attested; an example from each is reported in Table 3.7.

	SASS	Hlg	BP	WE
SASS	‘washing machine’			
Hlg	‘pencil case’	‘to sew, to cut food’		
BP	‘i-pad’	‘wedding’	‘doctor’	
WE	‘fax’	‘authorization’	‘to touch’	‘spoon’

Table 3.7: Attested combination of Classifiers

3.3.1.3 Nativized Loan Compounds

Beside the situation of village sign languages, signers are always a minority immersed in a speaking environment. This is also true for Italian Deaf people, who use LIS but are also in

contact with Italian either in the written form or via lipreading in interactions with hearing people. This permanent contact situation, reinforced by the education system, opens the possibility that the lexicon of LIS (and sign languages in general) may be influenced by the spoken language used in the dominant community. This is expected to be visible also in the case of compounds. In particular, there is the possibility that some LIS compounds could be a calque from Italian compounds (i.e. a direct word-by-word translation of a compound). In addition, sign languages have an independent system to borrow lexical items from spoken languages, namely via fingerspelling or initialization. This non-native system, too, opens the possibility of borrowing or creating new compounds. Finally, there is also the possibility of mixed combinations of native and non-native lexical items to create new compound forms. While [Quer et al. \(2016\)](#) only distinguish between fully faithful loan compounds (calques) and modified loans, I will adopt this partition but will also expand it by including which particular type of lexical entry (native vs. non-native) is used in the LIS compound.

An important aspect to highlight here is that while it is extremely likely that the lexicon of LIS is influenced by Italian, it is also true that it is largely independent from it. A solid argument to prove this comes from compounds. In particular, there are compounds in Italian that are not compounds in LIS, there are compounds in LIS that are not compounds in Italian and concepts that are represented by independent compounds in the two languages. Of course there are also cases in which the Italian compound is borrowed in LIS. This is summarized in the examples below.

(3.31) **Compound in Italian but not in LIS**

a. ITA: *treno ad alta velocità* (compound) vs. LIS: SASS-CL (not compound)

(3.32) **Compound in LIS but not in Italian**

a. LIS: MAMMA[^]PAPÀ (compound) vs. ITA: *genitori* (not compound)

(3.33) **Compound in both languages but unrelated**

a. ITA: *portafoglio* (compound) vs. LIS WE-CL[^]HGL-CL (compound)

(3.34) **Calque**

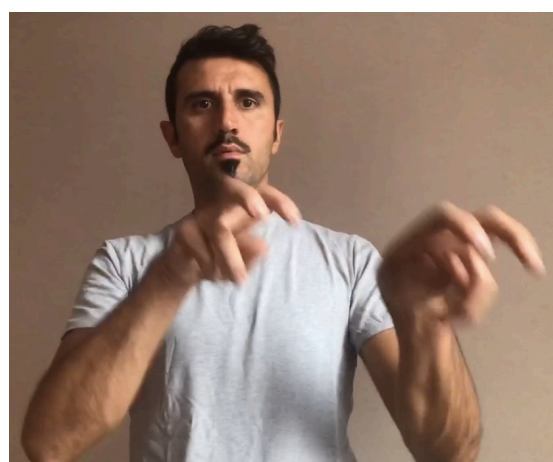
a. LIS: PESCE[^]SPADA (compound) = ITA: *pescespada* (compound)

However, there are also cases in which Italian has a blended form, while LIS offers a full

compound. An example is the sign for *agriturismo*/TOURISM \hat{A} AGRICULTURE (‘farm holiday’). The Italian word *agriturismo* is composed by an affixoid ‘agri-’ clipped from *agricoltura* (‘agriculture’), and *turismo* (‘tourism’). The LIS counterpart TOURISM \hat{A} AGRICULTURE is a nativized compound in which i) both the sign AGRICULTURE and TOURISM are used without any clipping, ii) the order of the two members is inverted with respect to the Italian sequence, iii) the mouthing that co-occurs with the compound keeps the Italian order “agriturismo”, so while signers produce the manual sign for TOURISM, they pronounce the Italian affixoid “agri” and while they sign AGRICULTURE they pronounce the Italian word “tourism”.



(a) TURISMO/VIAGGIARE (‘tourism’)



(b) AGRICOLTURA (‘agriculture’)

Figure 3.24: ‘Farm holiday’

3.3.2 Non-native combinations

Fingerspelling (and initialization) is used to borrow words from spoken languages, but signs can also be borrowed from other sign languages. Both are clearly non-native ways to expand the vocabulary of a sign language. In the case of compounds, this opens the following possibilities:



	Fingerspelling	Other SL	Name-sign
fingerspelling	fingerspelling \hat{A} fingerspelling	fingerspelling \hat{A} other SL	fingerspelling \hat{A} Name-sign
other SL	other SL \hat{A} fingerspelling	other SL \hat{A} other SL	other SL \hat{A} Name-sign
Name-sign	Name-sign \hat{A} fingerspelling	Name-sign \hat{A} other SL	Name-sign \hat{A} Name-sign

Table 3.8: Potential combinations of stems from non-native lexicon

Of these options, only one is attested in LIS, namely the $\text{fingerspelling} \hat{\text{fingerspelling}}$ option. This is summarized in Table 3.9:

	Fingerspelling	Other SL	Name-sign
fingerspelling	$\text{fingerspelling} \hat{\text{fingerspelling}}$	$\text{fingerspelling} \hat{\text{other-SL}}$	$\text{fingerspelling} \hat{\text{Name-sign}}$
other SL	$\text{other-SL} \hat{\text{fingerspelling}}$	$\text{other-SL} \hat{\text{other-SL}}$	$\text{other-SL} \hat{\text{Name-sign}}$
Name-sign	$\text{Name-sign} \hat{\text{fingerspelling}}$	$\text{Name-sign} \hat{\text{other-SL}}$	$\text{Name-sign} \hat{\text{Name-sign}}$

Table 3.9: Attested combinations of stems from non-native lexicon

Two examples of this kind are the signs $\text{SABATO} \hat{\text{DOMENICA}}$ (‘weekend’) and $\text{LUNEDÌ} \hat{\text{VENERDÌ}}$ (‘weekday’). Both compounds are made by combining initializations. In $\text{SABATO} \hat{\text{DOMENICA}}$, the first member is the fingerspelled letter ‘S’ () , while the second member is the letter ‘D’ () stemming from *sabato* (‘Saturday’) and *domenica* (‘Sunday’), respectively. The relevant example is shown in 3.25(a) and 3.25(b).





(a) S_{FS} (‘saturday’)



(b) S_{FS} (‘sunday’)

Figure 3.25: ‘Weekend’

The sign for *weekday* is a compound made by the initialized signs for LUNEDÌ (‘Monday’) and VENERDÌ (‘Friday’), respectively  and  (3.26(a) and 3.26(b)).




(a) L-FS ('monday')



(b) V-FS ('friday')

Figure 3.26: 'Weekday'

Notice that it is likely that the signs for 'Monday' and 'Friday', like the other signs for the days of the week, might have entered the lexicon of core signs, still as initialized forms, though.

A case of simultaneous combination of initialized forms is the sign DVD. This is already an acronym in spoken Italian borrowed from English (Digital Video Device). It is a symmetric two-handed sign with  handshape as shown in Figure 3.27:



(a) D-FS-(V)-D-FS

Figure 3.27: 'DVD'

While in the case of SABATO[^]DOMENICA and LUNEDÌ[^]VENERDÌ we are clearly dealing with compounds, this is less clear in the case of DVD, where the initialized forms are already part



of an acronym which in turn is likely to be a direct calque from Italian. Notice further that the central letter of the acronym is not fingerspelled but it is iconically represented by the intersection of the two hands, as indicated in [Figure 3.27](#).

To conclude, although although they are attested, non-native combinations do not seem to be very productive in LIS. One possible explanation could be due to the fact that and that maybe the role of initialization is limited LIS and that fingerspelling is rarely used to create neologisms.

Other interesting compound found in LIS is the sign for ‘Thailand’ which is illustrated in [Figure 3.28](#) below:



Figure 3.28: ‘Thailand’

The first member is a loan word: the word for ‘Thai’, in Thai Sign Language (ThSL) (cf. [3.28\(a\)](#)). Its sign is expressed with a  handshape. The movement is downward on the vertical plane departing in contact of nose and ends in neutral signing space. The second member of the compound is a gesture part which represents the action of the hands throughout the Thai dance. The gesture use both hand with a  handshape and a zigzag alternated movement from close to the body to ipsi-lateral area.

As told, it is interesting because the compound itself is combined by a member that is borrowed by other sign Language and by a gesture.

Summing up Section [3.3.2](#), it is demonstrated that only one combination of non-native lexicon items is attested in LIS, namely, a fingerspelling[^]fingerspelling compound. But also

observed one compound that combines a foreign loan sign with a gesture. Considering that **gestures** are not treated in the current model of sign language lexicon (Brentari and Padden 2001), I assume the gesture itself is part of the non-native lexicon in LIS and in Sign Language in general. In the next section, I will examine compounds that mix the native and non-native lexicons.

3.3.3 Combinations with native and non-native lexicon

In the previous section, I illustrated the properties of compounds made of either native or non-native lexical items in LIS. In this section I focus on mixed forms in which one of the two members of the compound is a native item and the other is a non-native item. The combinatorial options are given in Table 3.10, while those attested in LIS are given in Table 3.11.

	Core	Cl	Fs	Other SL(O-SL)	Name-sign(NS)
Core	Core [^] Core	Core [^] Cl	Core [^] Fs	Core [^] O-SL	Core [^] NS
Cl	Cl [^] Core	Cl [^] Cl	Cl [^] Fs	Cl [^] O-SL	Cl [^] NS
Fs	Fs [^] Core	Fs [^] Cl	Fs [^] Fs	Fs [^] O-SL	Fs [^] NS
O-SL	O-SL [^] Core	O-SL [^] Cl	O-SL [^] Fs	O-SL [^] O-SL	O-SL [^] NS
NS	NS [^] Core	NS [^] Cl	NS [^] Fs	NS [^] O-SL	NS [^] NS

Table 3.10: Potential combinations of mixed lexicon

	Core	Cl	Fs	(Other SL) O-SL	Name-sign (NS)
Core	Core [^] Core	Core [^] Cl	Core [^] Fs	Core [^] O-SL	Core [^] NS
Cl	Cl [^] Core	Cl [^] Cl	Cl [^] Fs	Cl [^] O-SL	Cl [^] NS
Fs	Fs [^] Core	Fs [^] Cl	Fs [^] Fs	Fs [^] O-SL	Fs [^] NS
O-SL	O-SL [^] Core	O-SL [^] Cl	O-SL [^] Fs	O-SL [^] O-SL	O-SL [^] NS
NS	NS [^] Core	NS [^] Cl	NS [^] Fs	NS [^] O-SL	NS [^] NS

Table 3.11: Attested combinations of mixed lexicon

3.3.3.1 Compounds with fingerspelled components

One example of mixed fingerspelling[^]core lexical item is the sign CULTURA ('culture') illustrated in Figure 3.29.

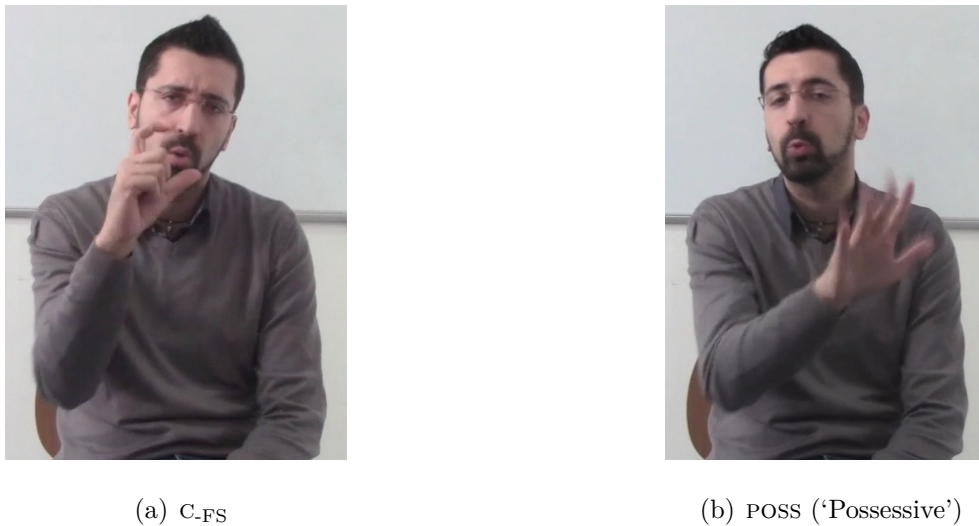




Figure 3.29: 'Cultura'

The first member is the fingerspelled letter for C, (cf. 3.29(a)). It refers to 'culture'. The  handshape is located in neutral space without movement. The second sign is the sign for possessive marker. It has a  handshape, shown in 3.29(b). The sign is located in neutral space; it has repeated short straight movements toward addressee.

Compounds with fingerspelling parts can be either assimilated to core lexical signs (i.e., native-like) or maintain the status of foreign lexical items (i.e., they are loan-like), (Quer et al. 2016: 206). In the case of native-like compounds, the nativization process may include several phonological processes which could include: truncation, assimilation, dropping, etc. An example of this type is the TÌD example shown in section 2.2 and repeated here in (3.35).

(3.35) A-L[^]SOUND ('Alarm') (TÌD)
(Quer et al. 2016: 206)

Unfortunately, I was not able to find any examples of this type for LIS.

As for loan-like compounds, the integrity of the original signs and fingerspelled forms is preserved. Two ASL examples of this type, shown in section 2.2, are repeated here in (3.36).

- (3.36) a. DEAD[^]E-N-D (‘deadend street’)
 b. B-E-L-L[^]BOY (‘bellboy’)

Two LIS examples of this type are given in (3.37).

- (3.37) a. D-T-S[^]BP CL (‘TTY’)
 b. D-V-D[^]SASS CL (‘DVD’)

The LIS loan-like compound DTS, ‘TTY’, is shown in Figure 3.30:



(a) D-FS



(b) T-FS




(c) S-FS



(d) BP-CL

Figure 3.30: ‘TTY’

The sign refers to a device used by deaf people to communicate via written text. The first member of the compound is composed by the acronym DTS (“Dispositivo Telefonico per Sordi”, a telephone device for deaf people, i.e., TTY) which is represented by the three fingerspelled

letters D-T-S (cf. 3.30(a), 3.30(b), 3.30(c) respectively). The second member of the compound, which is shown in 3.30(d), is a limb/Body Part classifier which represents the action of the hands typing on a keyboard. It is a symmetrical sign with a  handshape and a trilled movement of the fingers. Both LIS examples are slightly different from the ASL case in that while in the case of English-ASL pairs both lexical items are compounds, the LIS examples are compound forms only in LIS, while in Italian they are just acronyms.

Two examples of simultaneous compounds of the fingerspelling^classifier type are the sign LEGGE for ‘law’ and LETTERATURA for ‘literature’. Since the two examples are very similar, I will only describe one of them, the sign for ‘law’ which sign is illustrated in Figure 3.31 below:





(a) L-FS



(b) WE-CL

Figure 3.31: ‘Law’

The dominant hand is an initialized form representing the first letter of Italian word *legge* with a  handshape. The non-dominant hand is a whole-entity classifier which represents a book with a  handshape. The initialized form is produced in front of the hand and moves towards it with a repetition.

An example of fingerspelled simultaneous compound is a variant of the sign DVD, shown in Figure 3.27 and repeated here in Figure 3.32:



(a) D-FS-(V)-D-FS

Figure 3.32: ‘DVD’

3.4 Linguistic properties of LIS compounds

In [section 3.3](#), I illustrated the various combinations of compound forms in LIS. The typology of attested forms is repeated here:

- (3.38)
- a. core[^]core → MAMMA[^]PAPÀ ‘parents’
 - b. core[^]cl → MEMORIA[^]SASS-CL ‘hard disk’
 - c. cl[^]core → HDL-CL[^]FREDDO ‘refrigerator’
 - d. cl[^]cl → SASS-CL[^]HDL-CL ‘dishwasher’

In this section I will investigate phonological, prosodic, syntactic and semantic properties of these combinations.

3.4.1 Phonological characteristics

Overall, the sign language lexicon is made of prosodically short signs. Beside forms containing repetitions, signs are usually monosyllabic ([Brentari, 1998](#)). Therefore, word-internal phonological processes are very hard to find. Compounds offer the possibility to investigate some of these. Here I discuss two phenomena that are widespread in compounds: handshape assimilation in sequential compounds and hand-dropping in simultaneous compounds.



Consider first the sign *IGNORANTE* ('stupid') which is made by a pointing sign to the head and the sign *EXHAUST*. In its citation form, the sign *HEAD* has a  handshape, but in the compound form assimilation from the second member of the compound produces a  handshape.



Figure 3.33: 'Ignorant'

A phenomenon that often affects simultaneous compounds is that of hand-dropping. This is illustrated here by the sign *LAVATRICE* ('dishwasher'). The dominant hand produces a SASS classifier indicating the drum, while the non-dominant hand represents another SASS classifier used to define furniture. The sign for 'furniture' is a symmetrical two-handed sign as illustrated in [Figure 3.34](#).

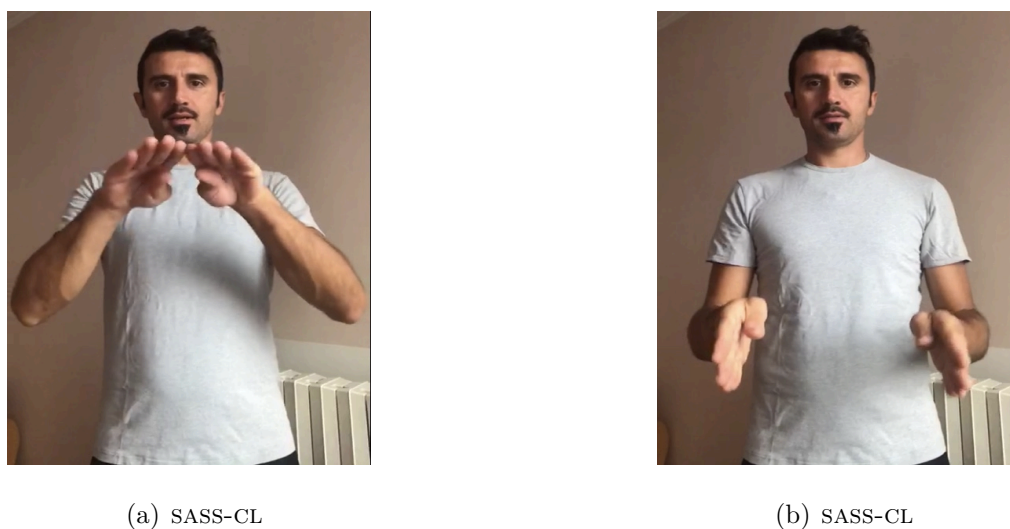


Figure 3.34: 'Furniture'

In the compound, the sign for ‘furniture’ is heavily reduced: the dominant hand is dropped (together with the movement). This phenomenon is obligatory in all simultaneous compounds in which the second member is a two-handed sign and it is intrinsically different from the more typical phenomenon of weak-hand dropping in sign language, which is normally optional and regulated by prosodic factors (e.g., speed of articulation).

The second member of ‘dishwasher’ is a SASS classifier, and it keeps the circular movement as illustrated in [Figure 3.35](#) below:



Figure 3.35: SASS-CL

When used in the compound form, it is produced below the non-dominant hand and the orientation of the hand is toward the lateral plane rather than the vertical plane, as shown in [Figure 3.36](#) below.



Figure 3.36: SASS-CL[^]SASS-CL
‘Washing machine’

3.4.2 Prosodic characteristics

One phonological process that affects the prosodic structure of compounds has been discussed at length in ?. The observation is that very often the movement component in compound forms is different from the movement component of the citation forms. This phenomenon has been discussed in ASL, Klima and Bellugi 1979a, as either movement reduction or as emerging from blocking epenthesis (Brentari 1998). For LIS, ? showed that most of these cases emerge from a process that blocks a process of epenthesis that would otherwise insert a repeated short movement. The most interesting case is the one offered by MAMMA[^]PAPÀ ('parents'). In both members of the compound the repeated movement of the citation forms disappears and the transition movement between the two handshapes is reanalyzed as the movement of the compound form. The images are given in 3.37(a) and 3.37(b).



(a) MAMMA ('mom')



(b) PAPÀ ('dad')

Figure 3.37: 'Parents'

3.4.3 Syntactic properties

In this section I discuss four syntactic properties of compounds: i) inseparability between the two constituents, ii) substitution, iii) productive recursion and iv) inversion of word order.

For obvious articulatory reasons, inseparability is only testable with sequential compounds. Although they are made by two "independent" units, compounds behave like a single constituent. This means that no other element can be inserted between the two members of a compound. I illustrate this property with the sign ELETTRICITÀ[^]BP-CL ('computer'), shown

in 3.38(a) and 3.38(b).



(a) ELETTRICITÀ ('electricity')



(b) BP-CL

Figure 3.38: 'Computer'

Since the compound is made by a noun ('electricity') and a classifier verb BP-CL ('to-type'), I tested two kinds of insertions: a nominal modifier (e.g., new, beautiful, three) and an adverb (e.g., fast, slow). No modifier is allowed to break constituency between the two stems. Notice that 'fast' and 'slow' can modify either a verb or a noun. In this specific case, the only reading admitted is the one in which they modify the entire compound (i.e., a *fast/slow computer*).

- (3.39) a. ✓(NUOVO / BELLO / TRE / VELOCE / LENTO) ELETTRICITÀ[^]BP-CL
 new beautiful three fast slow electricity[^]type
- b. ✓ELETTRICITÀ[^]BP-CL (NUOVO / BELLO / TRE / VELOCE / LENTO)
 electricity[^]type new beautiful three fast slow
- c. *ELECTRICITY (NUOVO / BELLO / TRE / VELOCE / LENTO) BP-CL
 electricity new beautiful three fast slow type

Another way to test compound constituency is via substitution. The test consists in replacing the whole compound or parts of the compound with another phrase of the same morphosyntactic category. When the item tested is indeed a compound, the substitution produces acceptable strings only if the constituent replaced is the whole compound, proving that it counts as a single "word/sign". In the case of 'computer', the compound itself is a noun, so it should alternate with other noun phrases. In the example in (3.40), the sign 'computer' is used in a simple declarative sentence.

- (3.40) IX-1 ELETTRICITÀ[^]BP-CL TRE VENDERE
 I electricity[^]type three sell
 ‘I sell three computers’

The phrase structure is given in (3.41).

- (3.41) [[IX-1]_{NP} [[[ELETTRICITÀ[^]BP-CL]_{NP} [TRE]_{DP}]_{DP} [VENDERE]_{VP}]_{VP}]_{IP}

By replacing the sign ‘computer’ with the sign ‘apple’ (i.e. MELA) in (3.42), we prove that the two members of ‘computer’ count as one lexical item at the morphosyntactic level.

- (3.42) [[IX-1]_{NP} [[[MELA]_{NP} [TRE]_{DP}]_{DP} [VENDERE]_{VP}]_{VP}]_{IP}

The contrast between (3.43) and (3.44) shows that it is not possible to replace only the first member, ‘electricity’, of the whole sign ‘computer’.

- (3.43) [[IX-1]_{NP} [[[ELETTRICITÀ]_{NP} [BP-CL]_{VP}]_{NP} [TRE]_{DP}]_{DP} [VENDERE]_{VP}]_{VP}]_{IP}

- (3.44) *[[IX-1]_{NP} [[[APPLE]_{NP} [BP-CL]_{VP}]_{NP} [TRE]_{DP}]_{DP} [VENDERE]_{VP}]_{VP}]_{IP}

The unacceptability of the example in (3.44) is explained because ‘apple’ can replace only the whole noun phrase while the sign for electricity is only a part of that NP.

The same results obtains once we try to substitute the second member. For instance, in (3.45) we replaced the verb BP-CL with the verb TOCCARE (i.e. ‘to touch’).⁴

- (3.45) *[[IX-1]_{NP} [[[ELETTRICITÀ]_{NP} [TOCCARE]_{VP}]_{NP} [TRE]_{DP}]_{DP} [VENDERE]_{VP}]_{VP}]_{IP}

Another property of compounds is that the sequential order of the two members cannot be inverted. We illustrate this property for LIS with the sign MEMORIA[^]SASS-CL, ‘hard disk’. The order of the two members is strictly fixed as shown in (3.46).

- (3.46) a. MEMORIA[^]SASS-CL
 b. *SASS-CL[^]MEMORIA

Inverting the two members is either unacceptable or produces another meaning (Lieber and Stekauer 2011: 236). Notice that inversion is not allowed even in coordinate compounds where the two parts belong to the same syntactic category, as shown in (3.47). This sharply contrasts with phrasal coordination, where the order between two conjuncts can be freely inverted.

⁴Notice that ELETTRICITÀ, ‘electricity’, is a semi-productive stem for compounds, so I have to be careful to find a good replacement that does not generate another compound in LIS and that is still semantically compatible.

(3.47) a. MAMMA[^]PAPÁ

mom dad

‘Parents’

b. *PAPÁ[^]MAMMA

Phrasal coordination is expressed via body posture in LIS. Torso orientation identifies two spatial locations where each conjunct is signed. In coordinated compounds, there is no overt non-manual component. As a point of comparison, this is also different from spoken Italian, where some coordinated compounds (e.g., *mangia ϵ bevi*) allow the overt conjunction *e* (and).⁵

If the compounding operation is lexically productive, recursivity is also expected. Some examples of recursivity are shown in (3.48) (the original head of the compound is highlighted in blue).

(3.48) a. FABBRICA PRODUZIONE SPAZZOLA SCARPE MONTAGNA FALLIMENTO

firm production brush shoes mountain bankrupt

‘The factory that produces for hiking boots brushes, is reduced to bankruptcy’

b. MARCA CL CASSETTO ARMADIO LEGNO SCARSO

brand drawer wardrobe wood bad

‘The brand that makes wooden tapes is poor’

c. CERNIERA TASCA BORSA PELLE COCCODRILLO ROTTO

zip pocket bag skin crocodile broken

‘The zipper of the crocodile leather bag pocket is broken’

d. BARATTOLO VETRO MARMELLATA CILIEGIA ROTTO

jar glass jam cherry broken

‘The glass jar of cherry jam is broken’

Finally, compounds are opaque with respect to syntactic operations. This means that extraction of one member is predicted to be impossible. In a sense, this is a variant of the substitution test. Rather than substituting a member of a compound with another lexical item, it is replaced with a *wh*-pronoun. While *wh*-signs can easily target the entire compound, they cannot target either member. The contrast between (3.49b) and (3.49c)-(3.49d) shows that it is not possible to extract only one of the elements of a compound is composed.

⁵Interestingly, space is used to coordinate items in hypernyms (see below).

- (3.49) a. $[[IX-1]_{NP} [[[[HDL-CL]_{NP} \hat{[FREDDO]}_{AP}]_{NP}] [VENDERE]_{VP}]_{VP}]_{IP}$
 I refrigerator sell
 ‘I sell refrigerators.’
- b. $[[IX-1]_{NP} [[[[HDL-CL]_{NP} \hat{[FREDDO]}_{AP}]_{NP}] [VENDERE]_{VP}]_{VP}]_{IP} [QUALE]_{NP}]_{CP}$
 I refrigerator sell what
 ‘What do I sell?’
- c. $*[[IX-1]_{NP} [[[[HDL-CL]_{NP} \hat{[FREDDO]}_{AP}]_{NP}] [VENDERE]_{VP}]_{VP}]_{IP} [QUALE]_{NP}]_{CP}$
- d. $*[[IX-1]_{NP} [[[[HDL-CL]_{NP} \hat{[FREDDO]}_{AP}]_{NP}] [VENDERE]_{VP}]_{VP}]_{IP} [COME]_{AP}]_{CP}$

To conclude, I showed that typical syntactic tests to identify compounds in spoken languages can be used to identify compounds also in LIS.

3.4.4 Semantic properties

In the previous sections I illustrated cases of exocentric compounds. Exocentricity is the result of a process of semantic shift according to which the literal/compositional meaning of a compound is lost. In this section I illustrate a case in which a compound is still ambiguous between the literal meaning and shifted meaning.

A case of semantic shift is illustrated by the sign $SCARPE \hat{GOMMA}$, literally “shoes rubber”. This compound is ambiguous between a compositional reading in which the sign $GOMMA$, ‘rubber’, is interpreted as the material out of which the shoes are made, and a shifted reading in which the whole compound means ‘gym shoes’. The images of the compound are given in 3.39(a) and 3.39(b).



(a) SCARPE ('shoe')



(b) GOMMA ('rubber')

Figure 3.39: 'Gym shoes'

3.5 Analysis

In the previous sections I illustrated the typology of LIS compounds by looking at native, non-native and mixed combinations. I illustrated the main linguistic properties of LIS compounds. In this section I will address the formal derivation of sequential and simultaneous compounds in LIS. For concreteness I will use the framework of Distributed Morphology (DM) ([Halle and Marantz, 1993](#)).

Sequential compounds will be derived in a straightforward way by applying standard DM derivations, such as the one proposed in [Harley \(2009\)](#). However, something different must be offered for the derivation of simultaneous compounds. Indeed, even if the mechanism that is ultimately responsible for the sequential vs. simultaneous status of the compound is phonological, the morphosyntactic derivation must distinguish somehow the object that is sent to PF. In this respect, I will adopt [Snyder \(2001\)](#)'s proposal that some compounds are generated by merging two bare roots. In particular, I will associate sequential compounds to derivations in which a root is merged with a categorized form ([Harley, 2009](#)), while simultaneous forms are generated by merging two roots. Finally, I will also provide a derivation of hypernym compounds.

3.5.1 Derivation of sequential compounds

In this section I illustrate with an English example how compound forms are derived in DM, then I will show how this derivation applies straightforwardly to LIS sequential compounds.

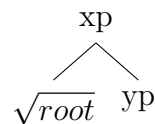
Harley (2009) proposes the following principle guiding the derivation of compounds:

- (3.50) ‘[Compounds] ... are constructed when phrasal elements Merge with a Root before that Root is itself Merged with a categorizing terminal node’.

(Harley 2009: 8)

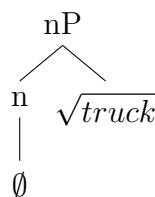
The global configuration is illustrated in (3.51). The root element \sqrt{root} is not yet assigned a categorizing terminal node when it merges with the phrasal node (yP). The result of the merge is the whole compound form xP.

(3.51)



To illustrate, I present here the step-by-step derivation of the English compound *truckdriver* (see Harley 2009 for more examples). The first step of the derivation is the creation of the phrasal unit containing the nominal element *truck*. This is done by merging the root \sqrt{truck} with the empty category node ‘n’.⁶

(3.52)



This process of categorization is required by the Categorization Assumption defined in (3.53):

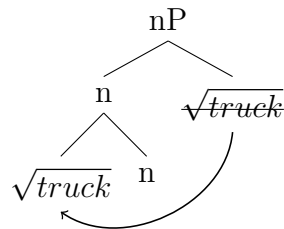
- (3.53) ‘Roots cannot appear without being categorized; Roots are categorized by combining with category-defining functional heads’

(Embick and Noyer 2007: 296)

⁶We adopt the convention of indicating inside terminal nodes the phonological material that will be inserted by Vocabulary Insertion rules.

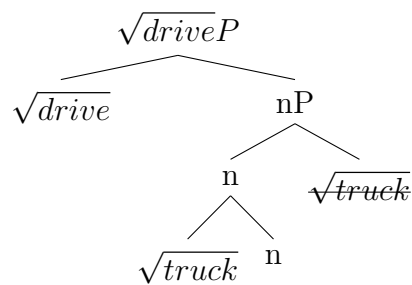
After this first merge operation, the root moves inside the head of the nominal phrase as illustrated in (3.54).

(3.54)



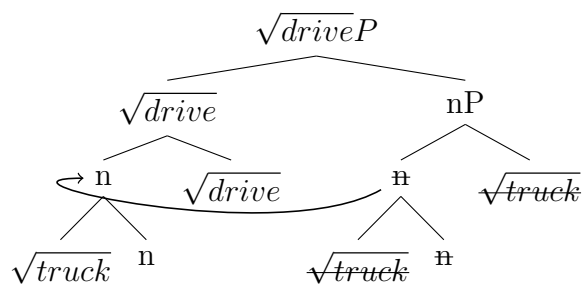
In the following step of the derivation, the nP merges with the root \sqrt{drive} before it is assigned a syntactic category.

(3.55)



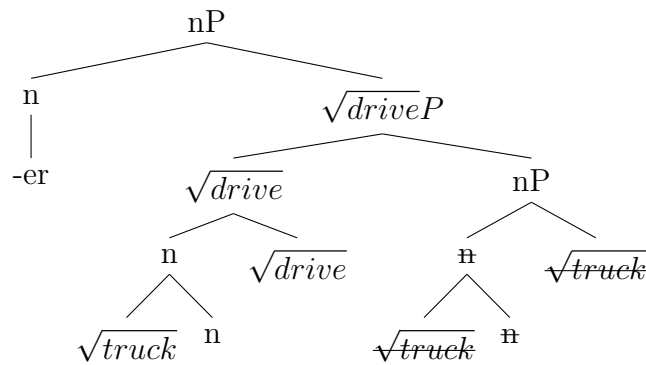
Then, the head of the complement, i.e., the nP , moves to the new root to create a more complex head, as illustrated below:

(3.56)



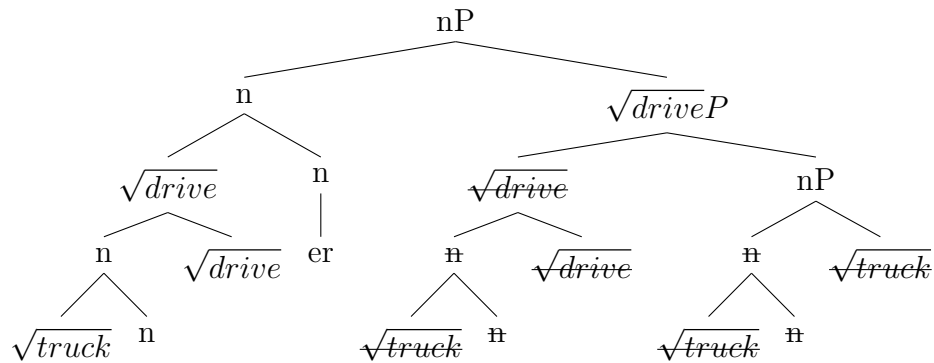
Now the categorization of the complex root may happen by merging the little ‘n’ heading the morpheme “-er”, as illustrated below:

(3.57)



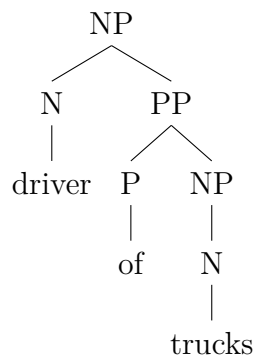
This process is then followed by movement of the complex root $\sqrt{\text{drive}P}$ inside the head of little n generating the final compound *truckdriver*. This is illustrated below:

(3.58)



Although it is not strictly speaking relevant for the following discussion, movement of [$\sqrt{\text{truck}P}$] n] can be blocked, at least in English, without crashing the derivation. This happens when a PP is merged. The head of the PP is realized by the preposition “of”, as shown below. Some natural English alternations between a compound and non-compound form include the pairs *moonlight* vs. *light of the moon* and *water cycle* vs. *cycle of water*.

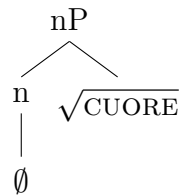
(3.59)



Now I am ready to illustrate the derivation of sequential compounds in LIS. I will use the compound CUORE[^]ESPLOSIONE (‘heart-attack’).

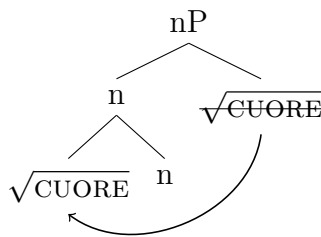
The first step of the derivation, shown in (3.60), is the creation of the phrasal unit containing the nominal element CUORE (‘heart’). This is done by merging the root $\sqrt{\text{CUORE}}$ with the empty category node ‘n’.

(3.60)



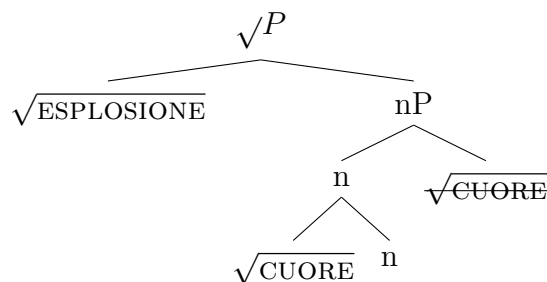
Then, the root moves inside the head of the nominal phrase as illustrated in (3.61).

(3.61)



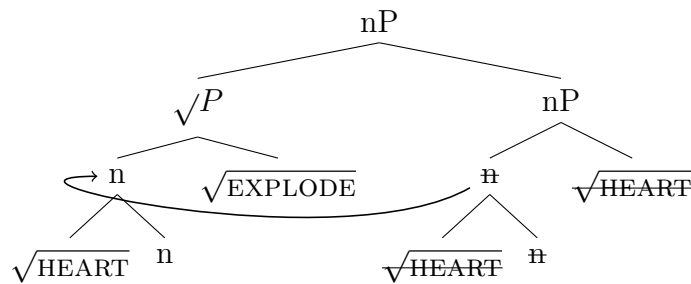
In the following step of the derivation, the n merges with the root $\sqrt{\text{ESPLOSIONE}}$ (‘explode’) before it is assigned a syntactic category.

(3.62)



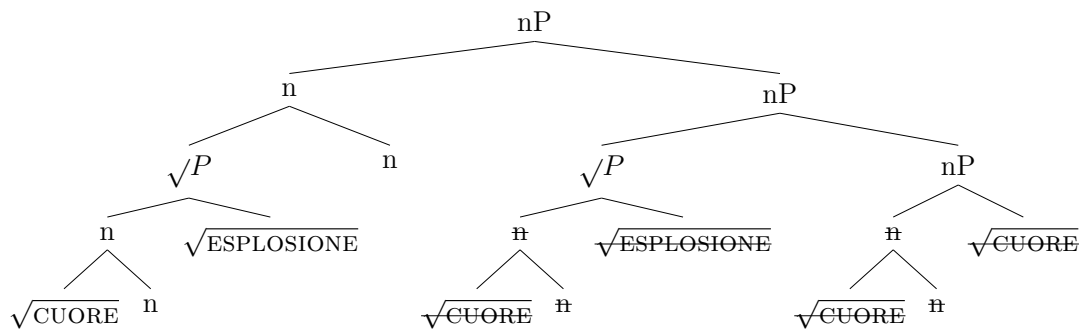
Then, the head of the complement, i.e., the nP, moves to the new root to create a more complex head, as illustrated in(3.63):

(3.63)



The last step of derivational process is that the whole big root, \sqrt{P} is merged with a nominal functional head, n , and is categorized as a noun, as illustrated in (3.64):

(3.64)



To conclude, the derivation of sequential compounds in LIS is identical to the derivation of sequential compounds in spoken languages.

3.5.2 Derivation of simultaneous compounds

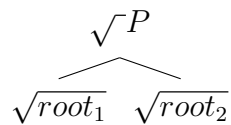
Extending the derivation of sequential compounds to simultaneous compounds is not immediately straightforward. The reason is that if exactly the same derivation applies then the phonological component would not be able to distinguish between those structures that should be interpreted as sequential compounds from those that should be interpreted as simultaneous compounds. In particular, if only one derivation is possible only two possibilities should be available:

- Compounds are all linearized sequentially
- Compounds are all linearized simultaneously

Neither option is satisfactory as both are empirically inadequate. One step towards a possible solution would be to let the grammar generate compounds at least in two slightly different

ways. One derivation would be mapped to sequential compounds, the other to simultaneous compounds. In what follows, I propose that the classical derivation of compounds in DM (Harley, 2009) is the one that generates sequential compounds; while simultaneous compounds are derived by allowing two roots to merge together before assigning a syntactic category to either root. In other words, the first step of the derivation of simultaneous compounds should yield a representation like the following:

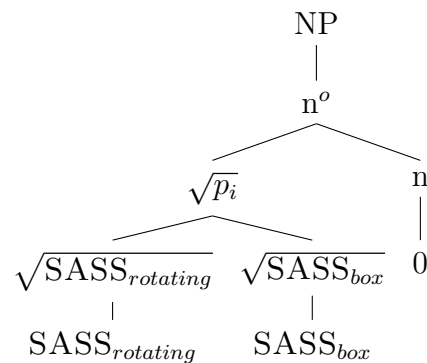
(3.65)



This possibility has been proposed on different grounds in Snyder (2001) for one particular category of English compounds.

The example in (3.66) shows how this can apply to the LIS compound washing machine. The roots $\sqrt{SASS_{rotating}}$ and $\sqrt{SASS_{box}}$ merge together to create a big root, $\sqrt{P_i}$; which is then categorized as a noun.

(3.66)



Of course this optionality of merging two roots has to be further constrained at least in LIS, because it is not the case that any compound is offered the possibility of a simultaneous realization. Indeed, we have seen in the previous sections that only classifiers can generate simultaneous compounds. Apparently, then, the lexicon of LIS restricts the availability of root-root derivations to classifiers only. At this point the generalization can be stated in two ways, either as a general requirement on classifier+classifier combinations or as an option open to classifier+classifier combinations. This is illustrated below:

- Classifier[^]classifier compounds **must** be generated simultaneously
- Classifier[^]classifier compounds **can** be generated simultaneously

Clearly, the first option seems to be, *prima facie*, empirically wrong, as there are (very few) examples of sequential classifier[^]classifier compounds in LIS. More research is needed to see whether those few cases can be explained in terms of principled exception (thus maintaining the stronger claim), or whether the weaker claim should be used.

In the remaining of this section I offer a step-by-step derivation of simultaneous compounds in LIS.

The derivation of simultaneous compounds in SL requires a dedicated procedure in which two roots are allowed to merge together before they are assigned the syntactic category. This procedure is lexically restricted to classifiers. This proposal is only a first step towards a complete solution as there are still several open issues. To mention two of them, it is left open how the phonological component maps the two roots to the two hands; and it is left open to evaluate whether the four classes of classifiers can freely generate simultaneous compounds or whether there are further restrictions in this respect.

3.5.3 Derivation of hypernym compounds

LIS has two types of coordinated compounds: those that are made of exactly two members (e.g., MAMMA[^]PAPÀ ‘parents’) and those that contain at least three members (AUTO[^]MOTO[^]BUS[^]VARIO, ‘vehicle’), which I labeled hypernyms, following Lepic (2016)’s terminology. There are at least two main reasons to treat the two kinds of compounds differently: namely, hypernyms allow the overt realization of the coordination (using non-manual markers) and allow the use of an overt compound marker (e.g. VARIO). These are summarized in [Table 3.12](#).

	Coordinated Compounds	Hypernym
Overt Coordination	*	yes (non-manual)
Overt Compound Marker	*	optional (VARIO)

Table 3.12: Differences between coordinated and hypernym compounds

Two-member coordinated compounds can be easily derived by using the asymmetric deriva-

tion proposed in Harley (2009). In this respect coordinated compounds are not different from other sequential compounds. A similar derivation, however, does not extend to hypernym compounds. The reason is that there is no “syntactic space” to host either the (non-manual) coordination marker or the compound marker. The only functional projections allowed in Harley’s type of derivations are those assigning the morphological category (e.g., *n*, *v*, etc.). None of these are suited to host coordination markers (which are generally assumed to be of an independent category) nor compound markers. Notice further that the presence of other functional projections in the derivation would block the movement of complex heads (see for instance the case of “of” insertion in English).

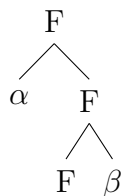
However, hypernym compounds can be derived adapting Di Sciullo (2005)’s proposal. The core of her proposal relies on the assumption in (3.67):

(3.67) ‘A compound includes a minimal functional (F) tree.’

(Di Sciullo 2005: 16)

This assumption boils down to a “quasi-syntactic” derivation, very similar to the derivation that generates ‘of’ insertion in English, as shown in (3.68):

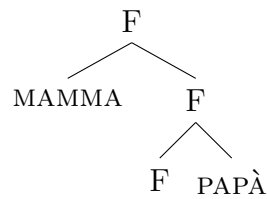
(3.68)



The functional projection F provides the semantic relation between the constituents of the compound. The head could be filled by a conjunction (AND), disjunction (OR) and other operators (e.g., an operator that Di Sciullo calls SORT). Functional elements could be expressed, as in *bed-and-breakfast*, or not, as in *mother-child*.

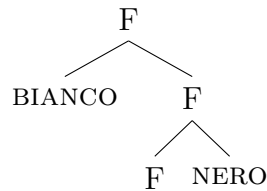
This derivation can straightforwardly apply both to coordinated compounds and hypernyms in LIS. Coordinated compounds like MAMMA[^]PAPÀ (‘parents’) can be then derived in two ways: either following Harley’s proposal or following Di Sciullo’s one. The latter is illustrated in (3.69):

(3.69)



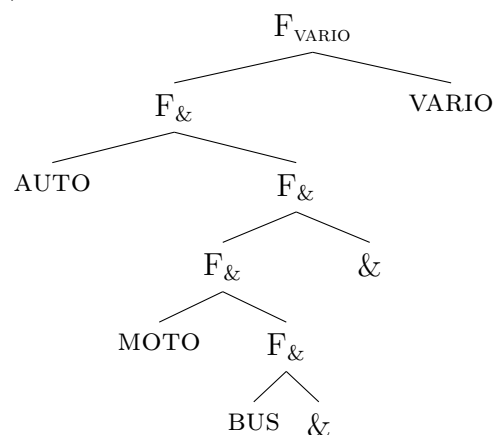
In this second derivation, however, some stipulations must be done to accommodate the fact that no functional element (either manual or non-manual) is allowed to appear.⁷ A similar derivation can account for disjunctive compounds as in (3.70).

(3.70)



The derivation of hypernym compounds in LIS must proceed according to Di Sciullo's proposal as functional material is overtly expressed and Harley's derivation does not allow functional projections to be inserted between roots. Furthermore, since hypernym compounds may show both coordination and compound markers, there is the need of more than one functional projection. The structure of the hypernym $\text{AUTO} \wedge \text{MOTO} \wedge \text{BUS} \wedge \text{VARIO}$ ('vehicle') is provided in (3.71). Notice The head of the conjunction ('&'), is overtly realized by signing each member of the compound in a different spatial location.

(3.71)



⁷In the case of a derivation using Harley's system, one must stipulate that the semantic relation is inferred somehow pragmatically.

3.5.4 Summary of formal accounts

LIS shows evidence for three different types of compounds: sequential compounds, simultaneous compounds and hypernyms. Each has specific properties and poses various challenges for a unified formal derivation. In particular, Harley's type of derivation i) prohibits insertion of functional projections other than category projections, and ii) forces early insertion of category projections which would make the derivation immediately asymmetric. Snyder's type of derivation seems to be even stricter in that not even category projections are allowed. Di Sciullo's derivation is the most liberal one and in principle could be applied to derive all types of compounds attested in LIS. However, blind application of the latter to all compounds would clearly overgenerate structures never attested in LIS. In order to avoid this overgeneration, further stipulations would need to be added in order to separate out sequential, simultaneous and hypernym compounds. In this chapter, I opted for a different approach. I proposed three different derivations, one for each type of compound. An asymmetrical derivation is all that is needed to derive sequential compounds, whose linear order follows directly from the syntactic relation between the head and the other member. This derivation also extends to two-member coordinated compounds. A symmetrical root-root derivation is needed for simultaneous compounds in order to allow the phonological component to produce the two members of the compound at the same time. Finally, a "quasi-syntactic" derivation is needed for hypernyms in order to accommodate the fact that overt conjunction is obligatory and the compound marker is also optionally visible. Notice that two-member conjunct compounds can be derived either via an asymmetric derivation or via the "quasi-syntactic" derivation (if some stipulation is added to prevent coordination to be overtly realized).

3.6 Conclusions

In this chapter, I presented an extensive overview of compounds in LIS. I showed that the mechanism of compounding is fairly productive in LIS and that compounds can be found with basically all types of lexical material (core signs, classifiers, initializations, etc.). However, not all combinations are equally attested across the typology of compounds. In particular, only classifiers are allowed to produce sequential compounds. I then focused on the linguistic

properties of compounds in LIS, describing phonological, prosodic, syntactic and semantic processes that may appear in compounds. Finally, I offered a detailed formal analysis of how the various forms can be derived within derivational approaches to morphology.

Chapter 4

Compounds in French Sign Language

4.1 Introduction

In the previous chapter, I described and analyzed compounds in LIS. In this chapter I will do the same for LSF. The description will be based on traditional classifications of compounds in spoken and signed languages.

The rest of the chapter is divided as follows: In [section 4.2](#), I describe the methodology used to collect the data. [Section 4.3](#) illustrates the typology of compounds in LSF. In [section 4.4](#), I focus on the tests used to identify compounds. In [section 4.5](#), I provide a formal account of compounds in LSF within the framework of Distributed Morphology (DM). [Section 4.6](#) concludes the Chapter.

4.2 Methodology

The methodology I adopted is very similar to the one used in [chapter 3](#) to study compounds in LIS. In the first step, I created a list of possible compounds in LSF based on my knowledge of LSF as well as LSF online dictionaries (e.g., www.elix-lsf.fr, www.spreadthesign.com, www.sourds.net and www.sematos.eu/lsf.html). Unlike the study on from the study on LIS, I couldn't use corpus data as I have no access to annotated LSF corpora. I also could not rely on my intuition as native signer, as LSF is not my native language. After the preliminary selection, I then conducted fieldwork with LSF informants. Thus, the list I created at first was extended with the help of LSF informants in order to verify whether all combinations among

the various lexical categories (native and non-native signs) were attested or not. The fieldwork component of this part of my dissertation has been particularly intensive and productive.

4.2.1 Informants

Data have been collected from five Deaf informants who are native signers of LSF: Thomas Lèveque, Laurène Loctin, Delphine Kholoukhoev and Yohan Marcelino. Thomas Lèveque is from Bourdeaux and moved to Paris when he was 25 year old. He is an LSF actor working at the International Visual Theatre in Paris. Laurène Loctin is from the Haute-Garonne region, and moved to Paris few years ago. She is journalist working for an LSF media company, Media-PI. Delphine Kholoukhoev is from the Île de France's area who works for an LSF instructor in schools, and Yohan Marcelino is a computer scientist from Saint Etienne. All of four informants were recruited by the Institut Jean-Nicod. This variation in the origin and background of the informants produced some interesting geographical variation. In particular I found both cases in which the same concept is expressed by two independent compounds (e.g., in the case of 'hard disk'), and cases in which one concept is associated to a compound for some informants and to a phrasal description for others (e.g., 'LS teach'). Other Deaf friends also helped me in finding other compounds.¹

4.2.2 Data collection

Data collection was conducted by using the elicitation method only. The elicitation method is the same one that was used for LIS (see Section 3.2.2 which presents a detailed description of the methodology). The main strategy I used was to let the compounds emerge as spontaneously as possible by directing a simple conversation towards particular topics where specific compounds were expected to emerge. Once a potential compound was produced I asked the informant to repeat it and I recorded it. Then, the potential compound was played back to the informant to ask information about the meaning. In the subsequent sessions I applied standard prosodic, morpho-syntactic and semantic tests for compounding. Finally, by analyzing the videos of the signs I investigated the prosodic and phonological processes typically found in SL compounds

¹I want to thank Angélique Blanc, Yann Cantin, Damien Ducasse, Ludovic Ducasse and many other people with whom I discussed my data.

(e.g., assimilation, movement reduction, non-dominant hand dropping, etc.). Following this procedure, I collected one hundred and eighty nine compounds in LSF.

4.3 Toward a typology of compounds in LSF: sign combinations

In this section, I will show which combinations of signs are attested in LSF. As for LIS, some of them are traditionally defined as compounds in the literature, others are not analyzed as compounds in mainstream approaches, and yet others have not even been recognized as possible compounds. In what follows I will assume the traditional division of the SL lexicon as proposed in [Brentari and Padden \(2001\)](#).

In the next sections, I present compounds in the native lexicon, [Section 4.3.1](#), compounds in the non-native lexicon in [subsection 4.3.2](#) and, finally, mixed forms in [subsection 4.3.3](#). For each section, I distinguish between sequential and simultaneous compounds, and within each group I first present a syntactic typology and then a semantic typology. I will then discuss in a separate section some aspects relative to compounds that are made with two classifiers. The discussion flow is summarized by the schema in [\(4.1\)](#).

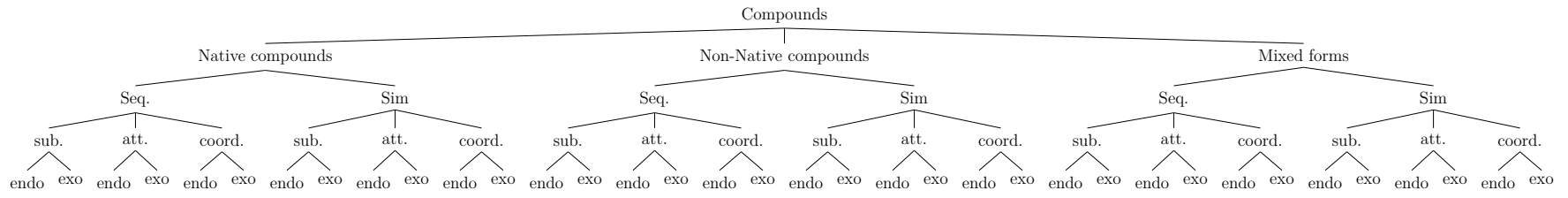


Figure 4.1: General Schema

4.3.1 Combinations of native lexicon

The possible combinations within the native lexicon are summarized in [Table 4.1](#).

	Core	Classifier
Core	Core $\hat{}$ Core	Core $\hat{}$ Classifier
Classifier	Classifier $\hat{}$ Core	Classifier $\hat{}$ Classifier

Table 4.1: Combinations of native lexicon

I now present one example for each of combinations in [Table 4.1](#). The first case is represented by the sign for ‘suicide’, shown in [Figure 4.2](#).






(a) POINTING_{-forehead}



(b) MOI-MEME (‘myself’)

Figure 4.2: ‘Suicide’

This sign is composed by two core lexical members, the first one, in [4.2\(a\)](#), is a pointing sign towards the forehead. It has a  handshape. The second one is the first person inflected reflexive pronoun (cf. [4.2\(b\)](#)). It has a  handshape and a movement localized at the level of the elbow. When expressed as a single sign, the LSF reflexive pronoun has a  handshape with a repeated movement. Two phonological processes apply to the second member of the compound. The first one is preservative assimilation of the thumb from the first member (i.e., the thumb is unextended). The second one is reduction of elbow movement, from two movements to a single movement.

The combination Core[^]Classifier sign is shown by the sign for ‘laptop’ illustrated in [Figure 4.3](#):





(a) INFORMATIQUE (‘Electronic’)



(b) WE-CL

Figure 4.3: ‘Laptop’

The first member of the compound is the sign for ‘electronic’ and is a core lexical sign (cf. [figure 4.3\(a\)](#)). It is a symmetric two-handed sign with a  handshape. It has a single downward movement in the neutral space. The second member is a whole entity classifier (cf. [4.3\(b\)](#)). It represents a whole object, a laptop in this case. Both hands have a  handshape. The non-dominant hand serves as place of articulation and is oriented with the palm facing down. The dominant hand lays on top of the non-dominant hand at the beginning of the sign. A wrist movement then places it perpendicular to the non-dominant hand.

The classifier[^]core lexical item combination is also attested in LSF. The example discussed here is the sign for ‘hard disk’, shown in [Figure 4.4](#):





(a) SASS-CL



(b) DUR ('hard')

Figure 4.4: 'Hard disk'

The first member is a SASS classifier that represents the form of a rectangular object (cf. figure 4.4(a)). It is a symmetrical two handed sign with a  handshape, articulated in the neutral space. The two hands start next to each other and then move further away on the horizontal plane. The second member is the core lexical sign HARD. It has a  handshape and a wrist rotation movement (which is reduced with respect to the citation form). The sign is articulated on the non-dominant hand which has the same handshape.

Combinations between two classifier signs are also attested, as shown by the sign 'fax' in Figure 4.5:




(a) SASS-CL



(b) WE-CL

Figure 4.5: 'Fax'

The whole compound is composed by two classifiers expressed simultaneously. The dominant hand is a whole entity classifier representing the paper in the fax machine. It has a  handshape and the movement is toward the addressee. The non-dominant hand is SASS classifier that represents the flat top part of the object (i.e., the fax); it has the same handshape as the dominant hand, and no movement. The peculiarity of this compound is that the two classifiers are identical in shape but belong to two different categories.

As in the case of LIS, there are several potential combinations between classifiers, which also are expected to interact with sequentiality. These facts will be addressed in the next sections.

SLs offer the possibility of expressing the two members of a compound sequentially or simultaneously. Very briefly, sequential combinations of native lexicon are those cases in which the two members of the compound are produced one after the other, like in the examples up to now, except for the [Figure 4.5](#). In the next two sections, I will first focus on the properties of sequential compounds and then on those of simultaneous compounds.

4.3.1.1 Sequential compounds

An example of sequential combinations is shown by the sign ‘hypothesis’ in [Figure 4.6](#).



(a) POINTING_{-nose}



(b) CŒUR (‘heart’)

Figure 4.6: ‘Hypothesis’

The first member is a pointing sign to the nose without movement (cf. [4.6\(a\)](#)). Its meaning is related to the nose. The second one is the sign for CŒUR ‘heart’ (cf. [4.6\(b\)](#)). It has a handshape with movement from neutral signing space to the chest around of heart space once.

This is different from the citation form of CŒUR, which has a repeated movement.

4.3.1.1.1 Syntactic structure

In this section, I discuss cases of subordinate, attributive and coordinated sequential compounds.

An LSF example of a subordinate compound is the sign for ‘mental processing’ in [Figure 4.7](#):

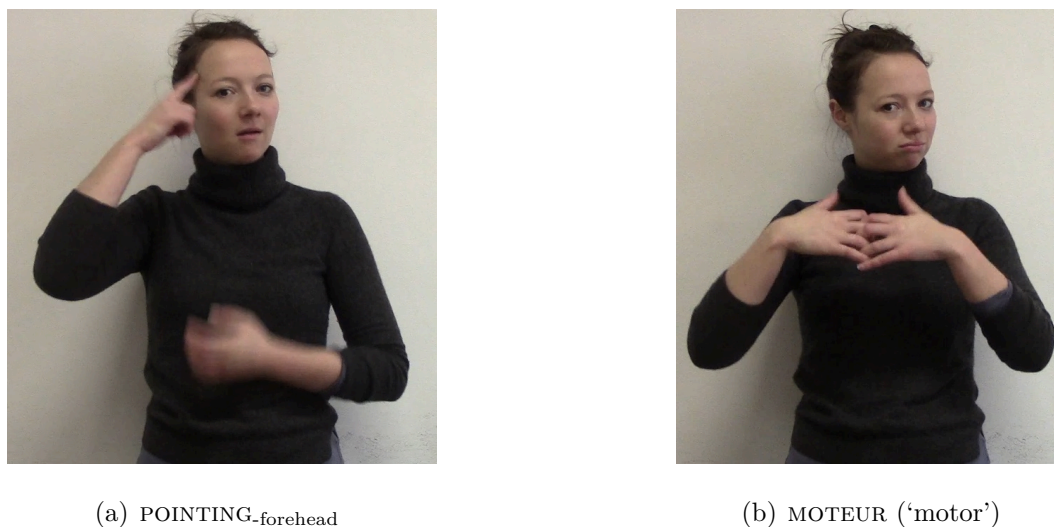



Figure 4.7: ‘Mental processing’

The first member of compound is a pointing sign realized on the forehead without movement (cf. [4.7\(a\)](#)). Its meaning is related to the functioning of the brain. The second member of compound is a symmetric two-handed sign with a  handshape (cf. [4.7\(b\)](#)). The fingers are intertwined and the movement is trilled. Its meaning is related to the functioning of objects.

Examples of subordinate combinations are given in [\(4.1\)](#):

- (4.1)
- a. core[^]core: ‘mental processing’
 - b. core[^]cl: unattested
 - c. cl[^]core: ‘black board’
 - d. cl[^]cl: ‘calendar’, ‘keyboard’

An LSF example of an attributive compound is the sign for ‘grandfather’ shown in [Figure 4.8](#):

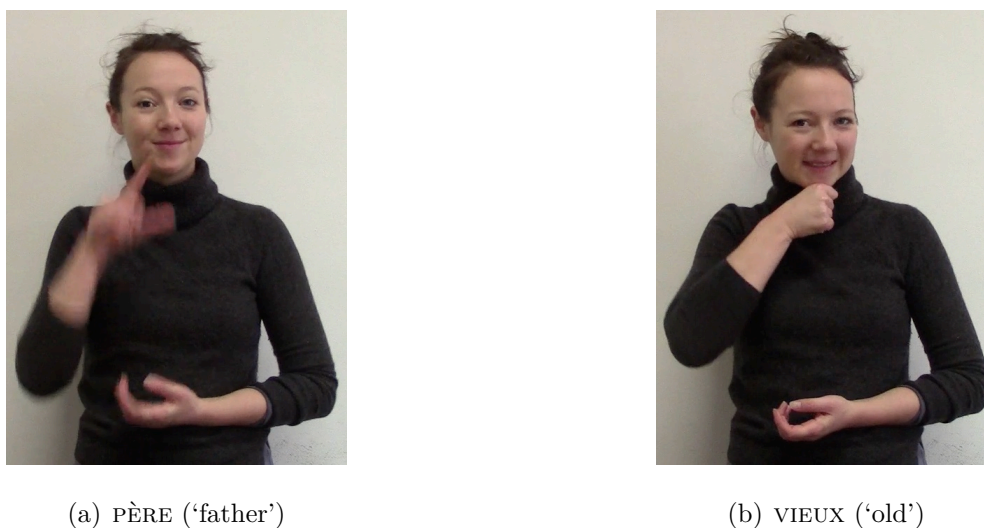



Figure 4.8: ‘Grand-père’

The first member is the sign PÈRE (‘father’). It has an  handshape with finger contact as movement. Unlike the citation form, the movement is not repeated. The sign is produced next to the mouth. The second member is the sign VIEUX (‘old’). It has a closed fist handshape located at the chin with a reduced downward movement. The head of compound is PÈRE and the second member is an adjunct, hence its attributive nature.²

Examples of attributive combinations in LSF are given in (4.2).





- (4.2) a. $\text{core} \hat{=} \text{core}$: ‘grandfather’
 b. $\text{core} \hat{=} \text{cl}$: ‘ignorant’
 c. $\text{cl} \hat{=} \text{core}$: ‘hard disk’
 d. $\text{cl} \hat{=} \text{cl}$: unattested

An LSF example of coordinated compound is the sign ‘digital’ shown in Figure 4.9:

²Notice that there is another variant for *grandfather*, which is glossed here as GRAND $\hat{=}$ PÈRE-2. This form is also a compound. However, it is a clear calque from spoken French and will be discussed in section 4.3.1.3.



Figure 4.9: ‘Digital’

The first member is the sign ZÉRO. It has a  handshape and is produced in neutral space without movement (in the citation form the sign has a single elbow movement toward the addressee). The second member is the sign UN (the digit *one*). It has a  handshape, produced in neutral space with no movement. The movement of the compound is produced by the handshape change from  to . The handshape change is normally repeated two or three times.

I have only been able to find two sequential coordinate compounds. These are listed in (4.3).

- (4.3) a. NUMERIQUE
 ‘digital’
 b. PARENTS
 ‘parents’

Hypernym compounds are also found in LSF. An example is the sign for clothes in [Figure 4.10](#).



(a) T-SHIRT



(b) PULL ('Sweater')



(c) COL-ROULÉ ('Turtleneck')








(d) PANTALON ('Trousers')



(e) VARIE ('Several')

Figure 4.10: 'Clothes'

This sign is made by combining five lexical signs. The first four are nouns referring to clothes (t-shirt, sweater, turtleneck and trousers), the last one is the adjective 'several'. The sign T-SHIRT is a two-handed sign with a  handshape. The two arms cross each other iconically identifying short sleeves. The second element is the sign PULL. It has a  handshape with a tracing downward movement along the torso. The third element of the compound is the sign COL-ROULÉ. It is a two-handed sign with  handshapes. The non-dominant hand remains fixed on the torso, while the dominant hand located above it moves upward to the neck. The fourth element is the sign PANTALON. It is a symmetric two-handed sign with a  handshape.

handshape. It has a repeated forward movement, the first movement is from the contralateral side, the second one is from the ipsilateral side. The last sign of whole hypernym is the sign VARIE, a symmetrical two-handed sign with  handshape; it has a complex movement: the local movement is a handshape change, while the proximal movement is an outward straight movement on the horizontal plane.

Other hypernyms are given in (4.4):

- (4.4) a. TOURNEVIS[^]SCIE[^]MARTEAU[^]VARIE
 SCREWDRIVER[^]SAW[^]HAMMER[^]SEVERAL
 ‘Utensils’
- b. T-SHIRT[^]PULL[^]COL-ROULÉ[^]PANTALON[^]VARIE
 T-SHIRT[^]SWEATER[^]TURTLENECK[^]TROUSER[^]SEVERAL
 ‘Clothes’
- c. VOITURE[^]MOTO[^]VÉLO[^]VARIE
 CAR[^]MOTORBIKE[^]BIKE[^]SEVERAL
 ‘Vehicles’
- d. INFORMATIQUE[^]TÉLÉ[^]JEUX[^]VARIE
 DIGITAL[^]TELEVISION[^]GAME[^]SEVERAL
 ‘Electronic devices’

All hypernym compounds I have been able to find always have the sign VARIE to close the sequence, which is analyzed as a hypernym marker, similarly to LIS.

In this section I showed that LSF compounds have all possible syntactic combinations: subordinate, attributive and coordinate. In addition to these, hypernym compounds are also found. In section 4.3.1.1.2, I will address the semantic properties of LSF compounds.

4.3.1.1.2 Semantic structure

In this section, I consider the semantic properties of sequential combinations. The semantic typology of compounds distinguishes between endocentric and exocentric compounds. The former have a clear compositional meaning derived either by the head-complement or head-adjunct relation or by the coordination relation; while the latter are opaque in the sense that

the meaning cannot be immediately derived by combining the meaning of the members.

LSF has compounds whose meaning is derived compositionally, by transparently combining the meaning of the two members like in the English compound *taxi driver*.

An LSF example of a compositional subordinate compound is the sign for ‘mental processing’ already discussed in [Figure 4.7](#) and repeated here in [Figure 4.11](#):



(a) POINTING-forehead



(b) MOTEUR ('motor')

Figure 4.11: ‘Mental processing’

The first member of the compound is a pointing sign towards the head/mind/brain, while the second member means “functioning”. The whole compound means *mental processing* (lit. ‘brain functioning’).

A list of sequential subordinate endocentric compounds is offered in (4.5).

- (4.5)
- | | | |
|----|-------------------------|---------------------|
| a. | core [^] core: | ‘mental processing’ |
| b. | core [^] cl: | unattested |
| c. | cl [^] core: | unattested |
| d. | cl [^] cl: | ‘calendar’ |

As for exocentric compounds like the English, *pickpocket*, or COMPUTER in LIS, an LSF example is the sign POINTING-nose[^]CŒUR which means ‘hypothesis’ ([4.12\(a\)](#) and [4.12\(b\)](#)).



Figure 4.12: 'Hypothesis'

The first sign is a pointing sign toward the nose, while the second is the sign for *heart*. However, the meaning of the compound does not relate to noses or smelling, nor is it related to feelings connected to the heart. The meaning 'hypothesis', then, cannot be inferred compositionally by combining the two members.

A list of sequential subordinate exocentric compounds is offered in (4.6).



- (4.6)
- | | | |
|----|-------------------------|--------------|
| a. | core [^] core: | 'hypothesis' |
| b. | core [^] cl: | unattested |
| c. | cl [^] core: | unattested |
| d. | cl [^] cl: | unattested |

Let's now turn to sequential attributive endocentric compounds, like the English *blackboard*. An LSF example is the sign POINTING_{-forehead}[^]PETIT which means 'ignorant' (4.13(a) and 4.13(b)).

(a) POINTING_{-forehead}

(b) PETIT ('small')

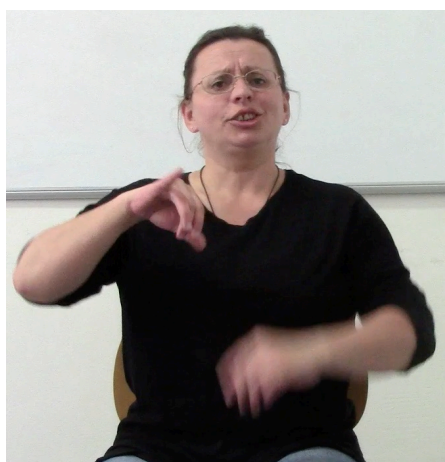
Figure 4.13: 'Ignorant'

The meaning of the compound can be derived by combining the meaning of the two members. The pointing sign towards the head refers to the mind/brain which is then modified by the adjective 'small'. The first member of the compound has a  handshape produced on the forehead without movement. Notice that the handshape of the pointing sign is different from the standard pointing sign because of the extended thumb. This extension is the result of assimilation from the handshape of the second member. The second member has a  handshape and it shows handshape change (closure). Unlike the citation form, the sign PETIT is not produced in neutral space but next to the forehead because it assimilates the place of articulation from the first member of the compound. The head of the compound is the pointing sign, while the adjective functions as an attribute, literally "small brain".

A list of sequential attributive endocentric compounds is offered in (4.7).

- (4.7)
- | | | |
|----|-------------------------|------------|
| a. | core [^] core: | 'ignorant' |
| b. | core [^] cl: | unattested |
| c. | cl [^] core: | unattested |
| d. | cl [^] cl: | 'calendar' |

An LSF example of a sequential attributive exocentric compound is given in [Figure 4.14](#):





(a) JEUNE ('Young')



(b) FILLE ('Lady')

Figure 4.14: 'Maiden'

The first member of the compound is the sign JEUNE, 'young' (4.14(a)). It has a  handshape, it is articulated on the torso and it has an upward movement. The second member of the compound is the sign FILLE, 'lady' (4.14(b)). It has a  handshape, it is articulated on the cheek and it has an downward movement.

The semantic relation between two elements and the meaning of the compound is unclear. If processed literally it would mean "young lady". This could well be the original meaning of the compound.

However, semantic shift has drifted the meaning to the specialized meaning of "maiden".

A list of sequential attributive exocentric compounds is offered in (4.8).

- (4.8)
- | | | |
|----|-------------------------|--|
| a. | core [^] core: | 'maiden', 'grand mother', 'grand father' |
| b. | core [^] cl: | unattested |
| c. | cl [^] core: | unattested |
| d. | cl [^] cl: | 'keyboard' |

Turning to coordinate compounds, an example of an endocentric compound in LSF is the sign PÈRE[^]MÈRE, 'parents' (Figure 4.15).





(a) PÈRE ('father')



(b) MÈRE ('mother')

Figure 4.15: 'Parents'

The first member of the compound is the sign PÈRE 'father'. It has a  handshape, located at the cheek with no movement. The second member of the compound is the sign MÈRE 'mother'. It has a  handshape with a short movement toward the cheek. In their citation forms, both signs have a repeated movement which is reduced to zero. The transition movement between the two members is reanalyzed as the articulatory movement of the whole compound. The meaning of the compound is "parents" and is compositional (father[^]mother).³

Unfortunately, I have only been able to find this one example of coordinated compounds in LSF.

An example of a sequential coordinate exocentric compound in LSF is the sign ZÉRO[^]ONE, 'digital' in [Figure 4.16](#), already introduced in [Figure 4.9](#).

³Notice that earlier stages of the compounding process are still attested in the lexicon. Some informants produce a version of PARENTS in which part of the movement component of FATHER are retained.



Figure 4.16: 'Digital'

It is an exocentric compound because the meaning of the compound cannot be derived by combining the meaning of the two members.

To summarize, for each syntactic category and possible combination of native lexicon, I described examples of endocentric and exocentric sequential compounds. Table 4.2 summarizes the results. For some categories (e.g., subordinate $\text{Core}^{\wedge}\text{cl}$), I was not able to find examples. It is left open whether this is a case of an accidental lexical gap or whether there is some systematicity.

	Subordinate		Attributive		Coordinate	
	Endo	Exo	Endo	Exo	Endo	Exo
$\text{Core}^{\wedge}\text{core}$	'mental processing'	'hypothesis'	'ignorant'	'in my opinion'	'parent'	'digital'
$\text{Core}^{\wedge}\text{cl}$	unattested	unattested	unattested	unattested	unattested	unattested
$\text{Cl}^{\wedge}\text{core}$	'blackboard'	unattested	unattested	'hard disk-1'	unattested	unattested
$\text{Cl}^{\wedge}\text{cl}$	unattested	unattested	'calendar'	'keyboard'	unattested	unattested

Table 4.2: LSF schema of sequential compounds structure and lexicon

In the next section, I will focus on compounds made by two classifiers.

4.3.1.1.3 Classifier system and compounds

This section is intentionally separate because SL classifiers have their own internal classification, as shown in (4.9):

- (4.9) a. Size And Shape Specifier classifiers (SASS)
 b. Handling classifiers (Hlg)
 c. Limb/Body part classifiers (BP)
 d. Whole Entity classifiers (WE)

Since combinations between classifiers are quite productive in LSF, thus it worth addressing which particular combinations are attested. The logical possibilities are given in [Table 4.3](#).

	SASS	Hlg	BP	WE
SASS	SASS \wedge SASS	SASS \wedge Hlg	SASS \wedge BP	SASS \wedge WE
Hlg	Hlg \wedge SASS	Hlg \wedge Hlg	Hlg \wedge BP	Hlg \wedge WE
BP	BP \wedge SASS	BP \wedge Hlg	BP \wedge BP	BP \wedge WE
WE	WE \wedge SASS	WE \wedge Hlg	WE \wedge BP	WE \wedge WE

Table 4.3: Potential combinations of Classifiers

The list in (4.10) summarizes the combinations I have been able to find in LSF. Despite the fact that [Table 4.3](#) offers many possible combinations, only a few are in fact attested. This could be due in part to a methodological problem (i.e., I was not able to find these forms during my field work sessions). However, I believe that it is more likely due to the fact most of these options are realized as simultaneous compounds, like in the case of LIS. Although hard to find, sequential combinations of classifiers are attested. I have found two compounds and a hypernym.

- (4.10) a. CLAVIER SASS \wedge BP
 ‘keyboard’
 b. CALENDRIER WE \wedge WE
 ‘calendar’
 c. VÊTEMENT (hyponym)
 ‘clothes’

The first compound is the sign SASS-CL \wedge LPB-CL, ‘keyboard’ (in [4.17\(a\)](#) and in [4.17\(b\)](#)).





(a) SASS-CL



(b) LPB-CL

Figure 4.17: ‘Keyboard’

The sign *CLAVIER*, ‘keyboard’, is made by the combination of two classifiers: the first one is a SASS classifier, a symmetrical  handshape sign with a single outward movement on the horizontal plane. The meaning refers to shape of object, i.e., the flat shape of a keyboard. The second member is Limb/Body Part classifier. Again it is a symmetrical two-handed sign with a  handshape and trilled movement of all selected fingers. Syntactically, it establishes an attributive relation between the head (the SASS classifier) and how it is used (by typing on it with the fingers). Its meaning refers to the action of typing. The meaning is transparent as it can be inferred by combining the meaning of the two classifiers.

A summary of the attested and unattested combinations is provided in [Table 4.4](#).

	SASS	Hlg	BP	WE
SASS	SASS $\hat{\wedge}$ SASS	SASS $\hat{\wedge}$ Hlg	SASS $\hat{\wedge}$ BP	SASS $\hat{\wedge}$ WE
Hlg	Hlg $\hat{\wedge}$ SASS	Hlg $\hat{\wedge}$ Hlg	Hlg $\hat{\wedge}$ BP	Hlg $\hat{\wedge}$ WE
BP	BP $\hat{\wedge}$ SASS	BP $\hat{\wedge}$ Hlg	BP $\hat{\wedge}$ BP	BP $\hat{\wedge}$ WE
WE	WE $\hat{\wedge}$ SASS	WE $\hat{\wedge}$ Hlg	WE $\hat{\wedge}$ BP	WE $\hat{\wedge}$ WE

Table 4.4: Attested combinations of Classifiers

In the next sections, I discuss simultaneous and semi-simultaneous compounds, where more combinations of the classifier $\hat{\wedge}$ classifier type are found.

4.3.1.2 Simultaneous and semi-simultaneous compounds

In this section, native simultaneous combinations are introduced. Since the basic concepts have been introduced in section 3.3.1.2, I will just present the main empirical findings for LSF.

Simultaneous combinations are made by two elements (stems or lexemes) or reduced elements produced simultaneously by the two hands. It worth noticing that processes of phonological reduction like those observed with sequential compounds are more pervasive in the case of simultaneous compounds.

Differently from simultaneous compounds in LIS, which are only of the classifier^classifier type, more options are available in LSF. The syntactic and semantic properties of these compounds are discussed in the next sections.

4.3.1.2.1 Syntactic structure

The first case is that of subordinate simultaneous compounds. Unlike sequential compounds, where each image corresponded to a sign, in the case of simultaneous compounds, the two images represent the initial and final instants of the compound.

An LSF examples of these is the sign for MODÈLE, shown in Figure 4.18.





(a) MODÈLE_start



(b) MODÈLE_end

Figure 4.18: ‘Model’

The element expressed by the non-dominant hand is an entity classifier for flat objects. It has a  handshape, as shown in 4.18(b) and refers to the source of the copy. The dominant hand has a  handshape which moves from the non-dominant hand outward. It carries the

meaning of ‘copy’. The second member of compound is the head and takes the first member as one of its argument (the other argument being the result of the copy).⁴

Examples of simultaneous subordinate combinations in LSF are provided in (4.11):

- (4.11) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\{ \text{core} \hat{=} \text{cl} \}$: ‘relay’
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘tea’

Moving to simultaneous attributive compounds, an LSF example is the sign for ‘relay’,⁵ shown in Figure 4.19.





(a) RELAY_{-start}



(b) RELAY_{-end}

Figure 4.19: ‘Relay’

The non-dominant hand produces the sign for ‘screen’. It has an  handshape and is produced in neutral space without movement. It is a SASS-CL representing objects with a rectangular shape. The dominant hand produces the sign for ‘interpret(er)’. It has a  handshape with a single circular movement of the wrist and it is produced in neutral space. There is contact between the two hands. Both members are two handed-signs when used outside

⁴Given that source and result are the two arguments of COPIER, there could in principle be another meaning associated to this compound, namely that of the resulting object. This seems indeed the meaning of the nominalized version of the same sign in LIS, but not in LSF. I assume that both readings are in principle available and that one gets lexicalized in the language. Indeed LIS has a different sign for ‘model’. Furthermore, notice that there is in principle another way to derive this compound which is to assume that the object classifier is head of the compound and the verb COPIER an adjunct. The meaning would be an object that is copied. Under this derivation the compound would be attributive in nature.

⁵This example is also discussed in Makouke (2016).

the compound; there is dominant hand drop in the case of ‘screen’ and non-dominant hand drop in the case of ‘interpreter’. Crucially, the non-dominant hand of the compound (which produces the concept of screen) now also serves as location for the ‘interpreter’. Syntactically, it is an attributive compound, because the morpheme INTERPRÈTE, which is head of whole compound, takes the classifier as an adjunct: an interpreting service that uses long-distant communication tools.

Another example is the sign of ‘yogurt’, shown in [Figure 4.20](#):





(a) YAOURT_{-start}



(b) YAOURT_{-end}

Figure 4.20: ‘Yogurt’

Phonologically, the non-dominant hand has  as its handshape, produced in neutral space without movement ([4.20\(b\)](#)). The dominant hand has a  handshape produced first in contact with the left hand ([4.20\(a\)](#)), then in contact of mouth ([4.20\(b\)](#)). Its movement is repeated and circular between the two locations. Both members are classifiers; the non-dominant hand is a SASS-CL showing the size of object (a cup in this case); the dominant hand, instead, is a HANDLING-CL for small objects (a spoon in this case). The whole compound literally means ‘yogurt’. It is an attributive compound because the head of the combination is the HANDLING-CL and takes the SASS-CL as its adjunct, which provides information about the size of the cup.

Other compounds of this type are listed in (4.12):

- (4.12) a. $\langle \text{core} \hat{\text{core}} \rangle$: unattested
 b. $\{ \text{cl} \hat{\text{core}} \}$: unattested
 c. $\langle \text{cl} \hat{\text{cl}} \rangle$: ‘yogurt’, ‘bottle’

An example of simultaneous coordinate compound in LSF is the sign for CAFÉ SIGNES ‘Coffee sign’, illustrated in Figure 4.21:

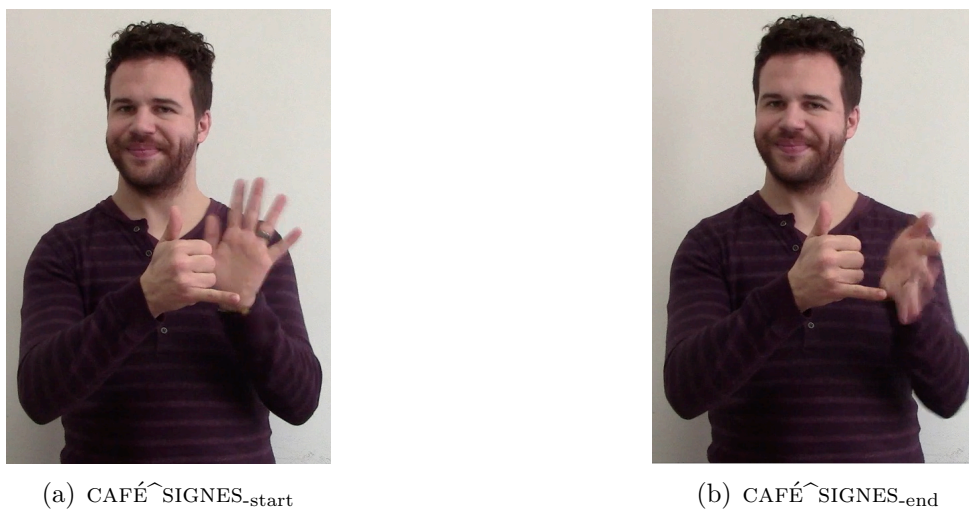




Figure 4.21: ‘Coffee sign’

The sign refers to events in coffee bars where both deaf and hearing people can sign. It identifies a place that is Deaf-friendly. From a linguistic perspective, simultaneous coordinate compounds are very rare (Meir et al. 2010: 309). LSF is not an exception, but this example is even more rare because both signs are core lexical items rather than classifier signs.

The member produced with the dominant hand has a  handshape. It is articulated in neutral space with a repeated wrist rotation. The meaning is the verb ‘to sign’ (4.21(a), 4.21(b)). The non-dominant hand has a , and is produced in neutral space without movement. Its meaning is ‘coffee’. The citation form of ‘to sign’ is produced with both hands with an alternate movement. The citation form for ‘coffee’ involves the non-dominant hand as location for the sign. The dominant hand produces a repeated circular movement on top of the non-dominant hand. There are four phonological processes affecting the compound: First, the dropping of the non-dominant hand for both members. Second, the independent sign for ‘coffee’ is shifted to

the non dominant hand. Third, the original movement of sign for ‘coffee’ is deleted; fourth, there is movement assimilation from the sign ‘to sign’ to the sign ‘coffee’.

Other examples of simultaneous coordinate compounds are given in (4.13).

- (4.13) a. $\langle \text{core} \hat{=} \text{core} \rangle$: ‘coffee sign’
 b. $\{ \text{core} \hat{=} \text{cl} \}$: unattested
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘competition’

In this section, I have shown the syntactic structure of simultaneous compounds. The semantic properties of LSF compound are discussed in the next section.

4.3.1.2.2 Semantic structure

Let’s turn to the semantics properties of simultaneous combinations. I will show here that there are endocentric and exocentric simultaneous compounds in each syntactic category.

An LSF example of a simultaneous subordinate endocentric compound is the sign for ‘model’, shown in Figure 4.18 and repeated here in Figure 4.22:



(a) MODÈLE_{start}



(b) MODÈLE_{end}

Figure 4.22: ‘Model’

It is an endocentric compound because the meaning can be derived by combining the two meanings of the two members: the act of copying and the object that is copied (i.e., the source).

Other examples of simultaneous subordinate endocentric compounds are given (4.14):

- (4.14) a. $\langle \text{core} \hat{=} \text{core} \rangle$: ‘model’, ‘to teach LSF’, ‘to teach using LSF’
 b. $\langle \text{core} \hat{=} \text{cl} \rangle$: ‘remember’, ‘information’
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘to dance’, ‘potato’

Exocentric compounds are compounds for which the relation of the meaning of each lexeme to the whole compound is opaque or unrelated. An example of a subordinate exocentric compound in LSF is the sign EXAMEN ‘exam’, shown in [Figure 4.23](#):

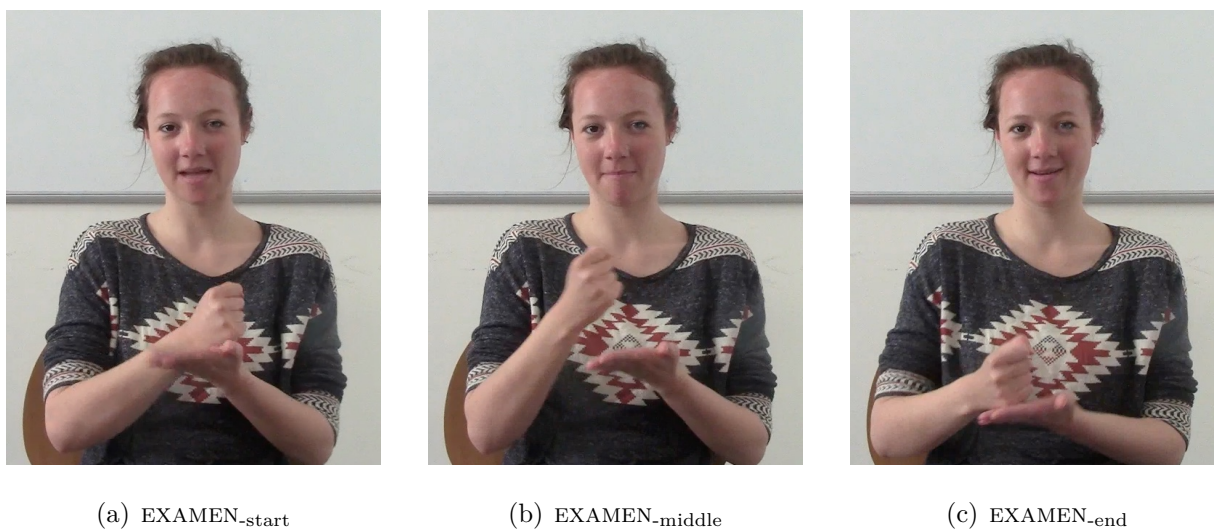




Figure 4.23: ‘Exam’

The LSF sign EXAMEN is composed by two classifiers. The first one on the non-dominant hand is an entity classifier for flat objects. It has a  handshape in neutral space without movement. Here it refers to paper. The second classifier expressed on the dominant hand is a handling classifier. Its meaning refers to holding or manipulating objects. It has a  handshape and is produced on the non-dominant hand a single arc movement as shown in [4.23\(a\)](#) - [4.23\(c\)](#). The meaning is “to stamp”. The whole sign is a simultaneous subordinate exocentric compound because even if in the past exams required stamps to be marked as passed, this is not the case anymore. Furthermore, it is not the case that any stamped document can be referred to by this sign, meaning that it specialized with the particular lexical use of ‘exam’.

A list of exocentric subordinate compounds is given in [\(4.15\)](#):

- (4.15) a. $\langle \text{core} \hat{=} \text{core} \rangle$: 'to send'
 b. $\{ \text{core} \hat{=} \text{cl} \}$: 'art', 'relay', 'month', 'symbol'
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: 'nursery school'

Moving on to attributive compounds, a simultaneous attributive endocentric compound in LSF is the sign AUBERGINE, 'eggplant':





(a) AUBERGINE_{start}



(b) AUBERGINE_{end}

Figure 4.24: 'Eggplant'

This simultaneous compound is composed of two classifiers, a handling classifier on the non-dominant hand and a SASS classifier on the dominant hand, as shown in Figure 4.24. The non-dominant hand has a  handshape and no movement and represents the stem of the eggplant. The dominant hand has a  handshape, with a complex movement: distal movement is an handshape change, while the proximal is a straight movement. This complex movement produces the size and shape of the eggplant itself.



A list of simultaneous attributive endocentric compounds in LSF is given in (4.16):

- (4.16) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\{ \text{core} \hat{=} \text{cl} \}$: unattested
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: 'eggplant'

Let's now move to attributive exocentric compound like *Ryanair* in LIS. One LSF example is the sign REFRIGERATEUR ('refrigerator'), illustrated in Figure 4.25 below:

(a) RÉFRIGÉRATEUR_{start}(b) RÉFRIGÉRATEUR_{end}

Figure 4.25: ‘Refrigerator’

The whole sign is composed by two classifiers; the non-dominant hand has a  handshape which is treated as a SASS classifier. The dominant hand is an handling classifier with a  handshape and an arc-movement. Both signs are articulated in the neutral space. It is an exocentric compound because the relation between two members and the semantic of whole compound is opaque, as the meaning of *refrigerator* is quite specialized (as compared to any furniture with a handle).



A list of simultaneous attributive exocentric compounds in LSF is given in (4.17):

- (4.17) a. $\langle \text{core} \hat{=} \text{core} \rangle$: unattested
 b. $\{ \text{core} \hat{=} \text{cl} \}$: unattested
 c. $\langle \text{cl} \hat{=} \text{cl} \rangle$: ‘refrigerator’

Simultaneous coordinate compounds are found in LSF. An example of a simultaneous coordinate endocentric compound in LSF is the sign $\text{ENSEIGNER} \hat{=} \text{SIGNES}$ illustrated in Figure 4.26 below:

(a) $\text{ENSEIGNER} \hat{\text{SIGNES}}_{\text{start}}$ (b) $\text{ENSEIGNER} \hat{\text{SIGNES}}_{\text{end}}$

Figure 4.26: ‘SL teach’

The non-dominant hand has a  handshape and is produced in neutral space. Its meaning is *ENSEIGNER*, ‘to teach’. The dominant hand has a  handshape, and it is also produced in neutral space. Looking at the meaning, it could refer either to verb *SIGNER*, ‘to sign’ or to the noun *SIGNE* ‘sign’. Both handshapes are produced in neutral space next to each other. There is a repeated wrist movement on the dominant hand.⁶ The meaning is compositional: the sign *SIGNER* ‘to sign’ is used in LSF to the signing activity, while *ENSEIGNER* ‘to teach’ refers to the teaching activity. The whole compound refers to an activity of teaching using sign language.

A list of a simultaneous coordinate endocentric compounds in LSF is given in (4.18):



- (4.18) a. $\langle \text{core} \hat{\text{core}} \rangle$: ‘SL teach’
 b. $\{ \text{core} \hat{\text{cl}} \}$: unattested
 c. $\langle \text{cl} \hat{\text{cl}} \rangle$: ‘competition’

An LSF example of simultaneous coordinate exocentric compound is the sign *PSYCHOLOGIE* (i.e. ‘psychology’), shown in Figure 4.27:

⁶The citation form of both members, ‘to teach’ and ‘to sign’ is a two handed symmetric sign.

(a) PSYCHOLOGIE_{-start}(b) PSYCHOLOGIE_{-end}

Figure 4.27: ‘Psychology’

The whole sign is composed by two classifiers; the non-dominant hand has a  handshape, articulated in the neutral space without movement. It is a SASS classifier which stands for a part of the Greek letter Ψ . the dominant hand has a  handshape with a repeated movement towards the non-dominant hand until contact. This sign too is a SASS classifier indicating the vertical part of the Greek symbol. The whole compound means ‘psychology’ a meaning that cannot be derived by composing the meaning of the two classifiers. Indeed, the Greek letter is divided into two parts. The gesture of the signer iconically reproduces these two parts. However, the meaning is not the Greek letter but rather the concept of psychology.

A list of simultaneous coordinate exocentric compounds in LSF is given in (4.19):

- (4.19) a. $\langle \text{core} \hat{ } \text{core} \rangle$: ‘coffee sign’
 b. $\{ \text{core} \hat{ } \text{cl} \}$: unattested
 c. $\langle \text{cl} \hat{ } \text{cl} \rangle$: ‘psychology’

Summing up, LSF has endocentric and exocentric compounds both of the simultaneous and sequential type with different syntactic structures (subordinate, attributive and coordinated).

4.3.1.2.3 Classifier system and compounds

As for LIS, I treat the various combination of classifier $\hat{}$ classifier compounds separately. The general typology of classifiers is repeated in (4.20):

- (4.20) a. Size And Shape Specifier classifiers (SASS)
 b. Handling classifiers (Hlg)
 c. Limb/Body part classifiers (BP)
 d. Whole Entity classifiers (WE)

The logical combinations are given in Table 4.5:

	SASS	Hlg	BP	WE
SASS	SASS $\hat{}$ SASS			
Hlg	Hlg $\hat{}$ SASS	Hlg $\hat{}$ Hlg		
BP	BP $\hat{}$ SASS	BP $\hat{}$ Hlg	BP $\hat{}$ BP	
WE	WE $\hat{}$ SASS	WE $\hat{}$ Hlg	WE $\hat{}$ BP	WE $\hat{}$ WE

Table 4.5: Potential combinations of compounds with classifiers

The combinations attested in LSF are given in (4.6), followed by a list of examples.

	SASS	Hlg	BP	WE
SASS	‘Pantheon’			
Hlg	‘eggplant’	‘potato’		
BP	‘I-pad’	unattested	‘twins’	
WE	‘to dance’	unattested	unattested	‘competition’

Table 4.6: Attested combinations of compounds with classifiers

Not all of possible combinations are attested; the missing cases are BP $\hat{}$ Hlg, WE $\hat{}$ Hlg and WE $\hat{}$ LPB combinations. Although non-exhaustive, the list in (4.21) serves to show that the mechanism is quite productive in LSF.

- (4.21) **cl^hcl combinations:** ‘fax’, ‘refrigerator’, ‘eggplant’, ‘relay’, ‘potato’, ‘to dance’, ‘photocopy’, ‘scanner’, ‘twins’, ‘soup’, ‘Greek-Roman fight’, ‘i-pad-1’, ‘i-pad-2’, ‘bread’, ‘leek’, ‘milk’, ‘pantheon’, ‘competition’, ‘agreement’, ‘grapefruit’, ‘psychology’.

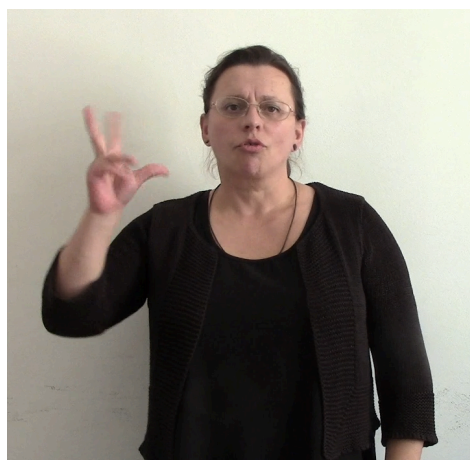
4.3.1.3 Nativized loan compounds

The community of signers is that of a minority language in continuous contact with the dominant language. As for LSF, contact phenomena with French are quite expected. In this section I will illustrate how these are also found in the compound system.

A list of French compounds that are also compounds in LSF is given in (4.22).

- (4.22) a. GRAND^hPERE-2
‘Grandfather’
b. DISK^hDUR
‘Hard disk’
c. JEUNE^hFILLE
‘Woman in the puberty period’

These are one-to-one nativized loan compounds because the structure and the meaning of each member of the compound are borrowed from French. The signs for DISK^hDUR and JEUNE^hFILLE have been described in the previous sections. I will describe here the sign for GRAND^hPERE-2.









(a) GRAND (‘big’)



(b) PÈRE (‘father’)

Figure 4.28: ‘Grandfather’

The first member of the compound in 4.28(a) has a  handshape with palm oriented toward the addressee. It is produced in neutral space close to cheek. It moves toward the ipsilateral side. Its meaning is ‘big’. With respect to the citation form, a few processes occurred: first there is non-dominant hand drop; second, the movement is reduced; third, the handshape shows a forward partial assimilation from a  handshape to a  handshape; fourth, place of articulation also is partially assimilated (next to the cheek rather than in the middle of the space). The second member in 4.28(b) has a  handshape produced next to the cheek. It has a handshape change co-occurring with wrist rotation. The sign is quite different from the citation form. The handshape has partial finger assimilation from  to . The transitional movement is reanalyzed as proximal movement to which a reduced handshape change is aligned.

DISK[^]DUR has already been described in Figure 4.4. This compound is quite interesting in that it is only a partial calque. The first member is SASS-cl describes objects with a box shape, like the shape of standard external hard-drives and not round objects like the first part of the French compound *disque*.

I have not been able to find simultaneous nativized loan compounds yet.

4.3.2 Non-native Combination

The non-native lexicon is composed of three subcategories: fingerspelled forms, signs borrowed from other SLs and Name-signs. These are described in detail in section 2.2.

The list of logically possible combinations is given in Table 4.7.

	fingerspelling	other SL	Name-sign
fingerspelling	fingerspelling [^] fingerspelling	fingerspelling [^] other SL	fingerspelling [^] Name-sign
other SL	other SL [^] fingerspelling	other SL [^] other SL	other SL [^] Name-sign
Name-sign	Name-sign [^] fingerspelling	Name-sign [^] other SL	Name-sign [^] Name-sign

Table 4.7: Potential combinations of compounds with non-native lexicon

Like in LIS, of these options only the fingerspelling[^]fingerspelling is attested in LSF. This is summarized in Table 4.8. Three examples of this kind are attested in LSF, listed in (4.23).

	fingerspelling	other SL	Name-sign
fingerspelling	fingerspelling [^] fingerspelling	fingerspelling [^] other SL	fingerspelling [^] Name-sign
other SL	other SL [^] fingerspelling	other SL [^] other SL	other SL [^] Name-sign
Name-sign	Name-sign [^] fingerspelling	Name-sign [^] other SL	Name-sign [^] Name-sign

Table 4.8: Attested combinations of compounds with non-native lexicon

- (4.23) a. S[^]D
 ‘weekend’
- b. L[^]V
 ‘working day’
- c. M[^]P
 ‘private message’ (i.e. ‘message privé’ in French)

The compounds are all made by initialized forms. For S[^]D and L[^]V the initialized formed corresponds to weekdays: S = *samedi* ‘Saturday’, D = *dimanche* ‘Sunday’; L = *lundi* ‘Monday’ and V = *vendredi* ‘Friday’. As for “M” and “P”, they correspond to the first letters of the French expression *message privé*. Although S[^]D and L[^]V have a corresponding compound in French, ‘jour ouvrable’ and ‘week-end’ respectively, neither is derived from French. M[^]P is a calque because in French, it is represented as an acronym way such as *mp*, although not a compound.⁷ I illustrate the sign S[^]D in Figure 4.29.



(a) S.FS



(b) D.FS

Figure 4.29: ‘Week-end’

⁷This point opens the issue of how to treat fingerspelled acronyms. In this thesis I assume they are assimilated to compounds, although more research is needed on this area.

Similarly to LIS, non-native combinations nevertheless do not seem to be very productive in LSF. One possible explanation could be due to the fact that the role of initialization is limited in LSF and that fingerspelling is rarely used to create neologisms.

4.3.3 Combinations with native and non-native lexicon

In this section I focus on mixed forms in which one of the two members of the compound is a native item and the other is a non-native item. The combinatorial options were already given in Table 3.10 and are repeated here in Table 4.9, while those attested in LSF are give in Table 4.10.

	Core	Cl	Fs	O-SL	Name-sign
Core	Core [^] Core	Core [^] Cl	Core [^] Fs	Core [^] O-SL	Core [^] Name-sign
Cl	Cl [^] Core	Cl [^] Cl	Cl [^] Fs	Cl [^] O-SL	Cl [^] Name-sign
Fs	Fs [^] Core	Fs [^] Cl	Fs [^] Fs	Fs [^] O-SL	Fs [^] Name-sign
O-SL	O-SL [^] Core	O-SL [^] Cl	O-SL [^] Fs	O-SL [^] O-SL	O-SL [^] Name-sign
Name-sign	Name-sign [^] Core	Name-sign [^] Cl	Name-sign [^] Fs	Name-sign [^] O-SL	Name-sign [^] Name-sign

Table 4.9: Potential combinations of mixed lexicon compounds

	Core	Cl	Fs	O-SL	Name-sign
Core	Core [^] Core	Core [^] Cl	Core [^] Fs	Core [^] O-SL	Core [^] Name-sign
Cl	Cl [^] Core	Cl [^] Cl	Cl [^] Fs	Cl [^] O-SL	Cl [^] Name-sign
Fs	Fs [^] Core	Fs [^] Cl	Fs [^] Fs	Fs [^] O-SL	Fs [^] Name-sign
O-SL	O-SL [^] Core	O-SL [^] Cl	O-SL [^] Fs	O-SL [^] O-SL	O-SL [^] Name-sign
Name-sign	Name-sign [^] Core	Name-sign [^] Cl	Name-sign [^] Fs	Name-sign [^] O-SL	Name-sign+Name-sign

Table 4.10: Attested combinations of mixed lexicon compounds

4.3.3.1 Compounds with fingerspelled components

Compounds with fingerspelling parts can be either assimilated to core lexical signs (i.e., they are native-like) or maintain the status of foreign lexical items (i.e., they are loan-like), (Quer et al. 2016: 206).

4.3.3.1.1 Native-like


In the case of native-like compounds, the nativization process may include several phonological processes which include: truncation, assimilation and dropping. An example from TİD (Turkish SL) is shown in (4.24).

(4.24) A-L[^]SOUND (‘alarm’) (TİD)
(Quer et al. 2016: 206)

An LSF examples of this kind of phenomena is the sign for USB, illustrated in Figure 4.30.



Figure 4.30: ‘USB’

It is a Fs[^]Core combination. It is composed by the reduced fingerspelling form for usb (only the first two letters are fingerspelled), followed by a handling classifier mimicking the gesture of plugging in a USB key. The classifier has a  handshape, and the movement is on the horizontal plane.

I only found this one case in LSF. It is left open to see whether this is due to some pressure to further reduce the first member to an initialized sign (i.e., with only the first letter fingerspelled), or whether this is an innovation in the language and that in the future more compounds of this form will be possible.

4.3.3.1.2 Loan-like

As for loan-like compounds, the integrity of the original signs and fingerspelled forms is preserved. Focusing on sequential compounds, two LIS examples of this type are shown in (3.37), repeated here in (4.25):

- (4.25) a. D-T-S[^]L/BP CL ('TTY')
 b. D-V-D[^]SASS CL ('DVD')

The LSF examples of this kind are listed in (4.26).

- (4.26) a. S-N-C-F[^]GARE ('SNCF')
 b. CHAÎNE[^]A-U-D-I ('Audi')

The LSF sign for SNCF is illustrated in Figure 4.31:

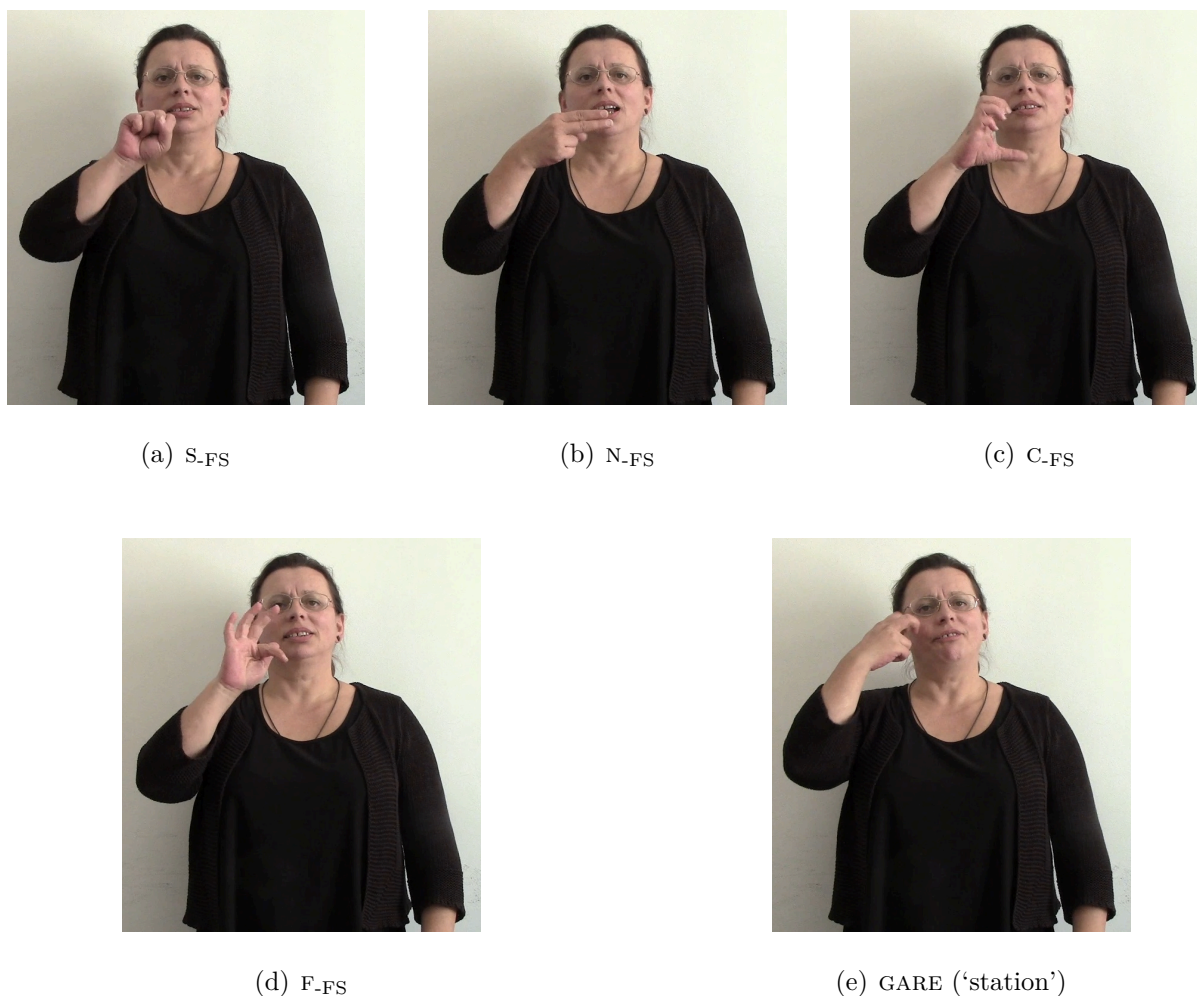



Figure 4.31: 'SNCF'

The first member corresponds to the fully fingerspelled word (which identifies the national train company in French). The second member is the core lexical sign for ‘station’. It has a  handshape, the movement is circular at the wrist level and it is produced next to the cheek. Unlike French, in LSF in addition to the fingerspelled form for the acronym, the sign for ‘station’ has to be added.

The sign for ‘Audi’, not illustrated here, is identical to ‘SNCF’, the only difference being the sequential order of the fingerspelled form in the compound.

Like in the case of nativized fingerspelled forms, here too I have been able to find just a couple of examples in LSF. Nevertheless, to the extent that we can make a generalization, it seems that, typologically, LSF is more similar to ASL where both orders ($F \hat{C}$ and $C \hat{F}$) are attested than to LIS where only one order is found ($F \hat{C}$).

Moving to simultaneous compounds, two LSF examples of this type are listed in (4.27).

- (4.27) a. $L \hat{W}E-CL$ (‘law’)
 b. $H \hat{S}P$ ORT (‘handisport’)

The sign for LOI (‘law’) is illustrated in [Figure 4.32](#).





(a) L-FS



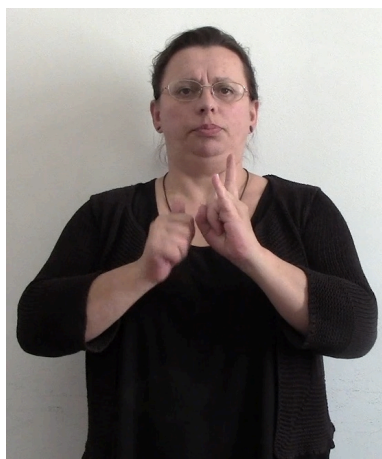
(b) WE-CL

Figure 4.32: ‘Law’

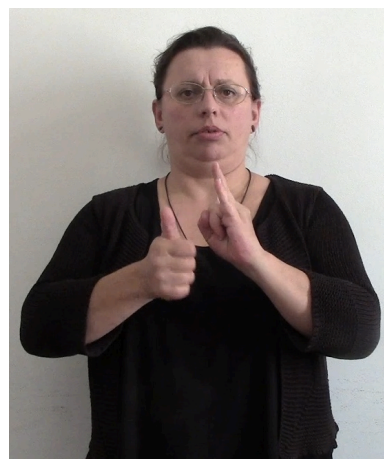
This is a simultaneous compound composed by a fingerspelled letter and a classifier. The non-dominant hand has a  handshape, articulated in the neutral space without movement. It is a whole entity classifier which represents flat object like a sheet. The dominant hand has

a  handshape with a repeated path movement towards the palm of the non-dominant hand. It is an initialized sign which represents the first letter of French loan word, *loi* (i.e. ‘law’).

The sign HANDISPORT (‘handisport’) is illustrated in [Figure 4.33](#).





(a) SPORT



(b) H-fs

Figure 4.33: ‘Handisport’

It is composed by a core lexical sign and a fingerspelled form. The non dominant hand has a  handshape and is expressed in the middle of neutral signing space without movement. It is an initialized sign and represents the initial letter of word ‘handicap’. The non-dominant hand has a  handshape, it is also expressed in the middle of neutral space. It has a repeated wrist movement. Its meaning is ‘sport’.⁸ The whole compound represents the concept of sports for people with disabilities.⁹

An LSF example of a compound made by a gesture and a borrowed form from another sign language is sign for ‘Thailand’, illustrated in [Figure 4.34](#).

⁸The citation form of the sign ‘sport’ in LSF uses both hands with same handshape and opposite wrist movement.

⁹As a point of comparison, while simultaneous compounds in LIS involve at least one classifier, simultaneous forms in LSF are also found with core lexical signs.

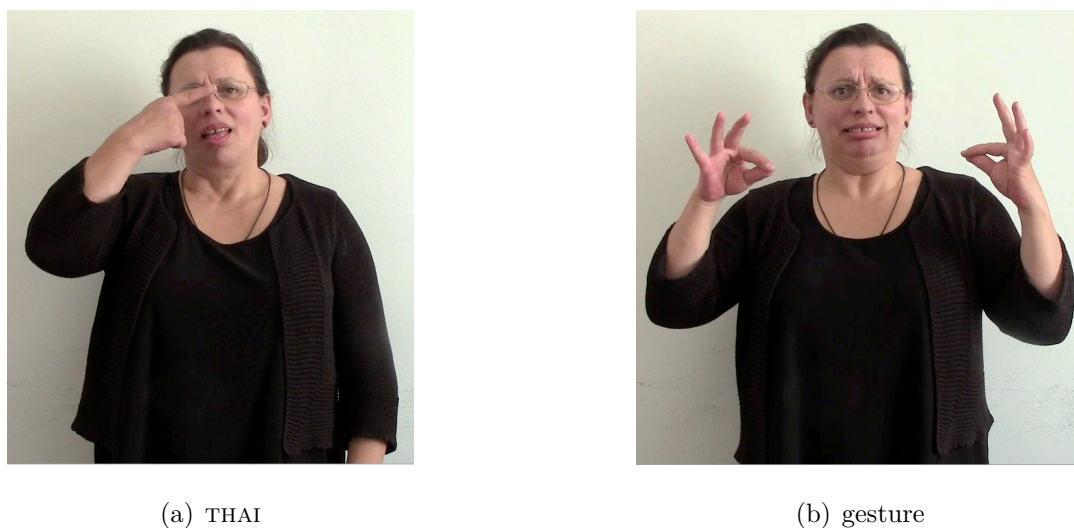




Figure 4.34: 'Thailand'

The first member of the compound is a one-handed sign. It has a  handshape and is produced on the nose with a wrist rotation movement. It is borrowed sign from Thai Sign Language (ThSL) where it is used to refer to the name of the country (Thailand). The second member has a  handshape produced with both hands next to the shoulders. It has an alternated repeated wrist rotation movement. It is a gesture that mimics with the hands the act of dancing.

4.4 Linguistic properties of LSF compounds

In [section 4.3](#), I illustrated the various combinations of compound forms in LSF. The typology of attested forms is repeated here:

- (4.28)
- a. $\text{core}^{\wedge}\text{core} \rightarrow \text{POINTING-FOREHEAD}^{\wedge}\text{MOI-MEME}$ 'suicide'
 - b. $\text{core}^{\wedge}\text{cl} \rightarrow \text{INFORMATIQUE}^{\wedge}\text{WE-CL}$ 'laptop'
 - c. $\text{cl}^{\wedge}\text{core} \rightarrow \text{SASS-CL}^{\wedge}\text{DUR}$ 'hard disk'
 - d. $\text{cl}^{\wedge}\text{cl} \rightarrow \text{SASS-CL}^{\wedge}\text{WE-CL}$ 'fax'

In this section I will investigate phonological, prosodic, syntactic and semantic properties of these combinations.

4.4.1 Phonological characteristics

The sign language lexicon is overall made of prosodically short signs. Beside forms containing repetitions, signs are most of the time monosyllabic (Brentari, 1998). Therefore, word-internal phonological processes are very hard to find. Compounds offer the possibility to investigate some of these. Here I discuss two phenomena that are widespread in compounds: handshape assimilation and hand-dropping processes. The former is often found in sequential compounds, while the latter is often found in simultaneous compounds. I illustrate them in turn.

Consider the sign *IGNORANT* which is made by a pointing sign to the head (‘head’) and the sign *PETIT* (‘small’) as illustrated in Figure 4.35.





(a) POINTING-head



(b) PETIT (‘small’)

Figure 4.35: ‘Ignorant’

Unlike the prototypical pointing sign which has a  handshape, here the pointing sign assimilates the thumb extension from the second member of the compound. In other words, the selected thumb of the sign *PETIT* () is anticipated in the first member of the compound.

A case of hand-dropping in simultaneous compounds is the sign for “SL teacher”, already presented in Figure 4.26 and repeated here in Figure 4.36.

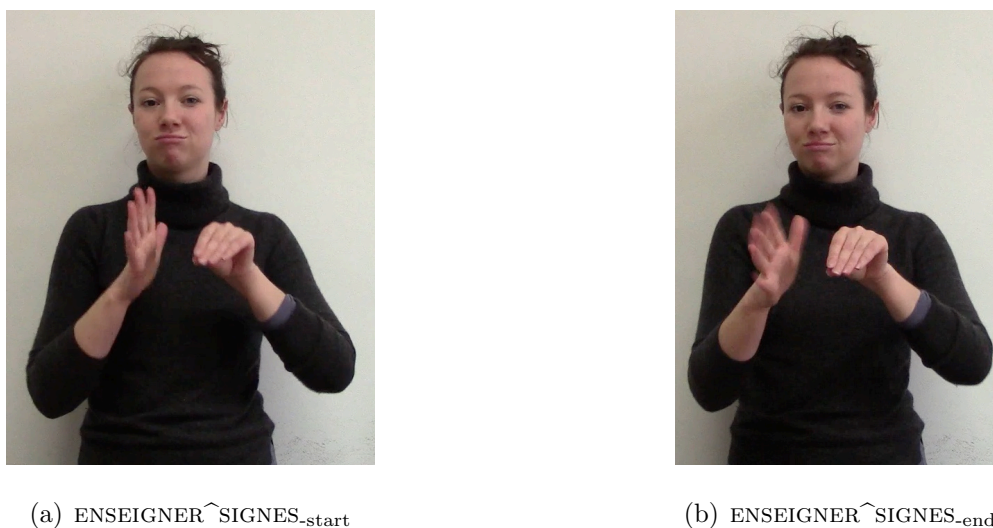


Figure 4.36: ‘SL teach’

Both members of the compound are two-handed signs in their citation form (*ENSEIGNER* and *SIGNER*). In the compound both undergo hand-drop. In *ENSEIGNER* it is the non-dominant hand that drops, while in *SIGNER* it is the dominant one.

By comparing LIS and LSF simultaneous compounds, we immediately observe a considerable difference. While in LIS only classifiers can produce simultaneous compounds, LSF has the possibility of generating them with core lexical signs. The examples I have been able to find are: *CAFE-SIGNES*, *ENSEIGNER-LA-LSF*, *ENSEIGNER-EN-LSF* and *ENSEIGNER^SIGNES*. Notice that these compounds are productively generated with the sign for *SIGNING*. Such a productivity can be tentatively explained by the fact that the process of sign language awareness is so advanced in France that many sign-related activities become regularly accessible both to Deaf and hearing communities. This might have boosted the process of creating new lexical items and the compounding process using *SIGNING*. In addition to that, the phonology of *SIGNING* is quite unmarked, making this sign a good candidate for a productive process. Notice however, that during the compounding process the phonology of the sign is subject to modification. In particular, as in many other simultaneous compounds, there is dominant-hand dropping. Furthermore, notice that while typical simultaneous compounds, especially those made with classifiers, are relatively fixed in terms of which hand carries which part of the sign, in the case of compounds made with *SIGNING* there is a relative amount of flexibility. The interesting cases are the signs *ENSEIGNER^LA^LSF* (‘to teach LSF’), *ENSEIGNER^EN^LSF* (to

teach (any subject) in LSF’) and $\widehat{\text{ENSEIGNER}}^{\text{LSF}}$ (a general term encompassing both other terms). The still images are given in [Figure 4.37](#), in [Figure 4.38](#) and in [Figure 4.39](#). All three compounds are made by the same members which are **ENSEIGNER** and **SIGNER**. The compounds in this triplet minimally differ in the location of the two hands in the signing space ([Figure 4.37](#) vs. [Figure 4.38](#)), and on which hand **SIGNING** is produced ([Figure 4.37](#), [Figure 4.38](#) vs. [Figure 4.39](#)).



(a)

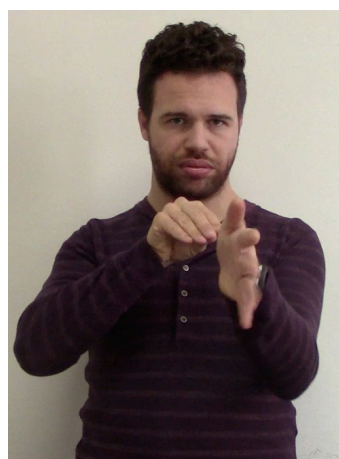


(b)

Figure 4.37: ‘To teach LSF’



(a)



(b)

Figure 4.38: ‘To teach in LSF’

(a) ENSEIGNER[^]SIGNES_{-start}(b) ENSEIGNER[^]SIGNES_{-end}

Figure 4.39: ‘SL teach’

4.4.2 Prosodic characteristics

One phonological process that affects the prosodic structure of compounds has been discussed at length in ?. The observation is that very often the movement component in compound forms is different from the movement component of the citation forms. This phenomenon has been discussed in ASL as arising either from movement reduction or from the blocking of epenthesis to insert a repeated short movement. For LIS, ? showed that most of these cases emerge from a process that blocks epenthesis to insert a repeated short movement. A clear example is the compound PÈRE[^]MÈRE (‘parents’). A similar phenomenon is found in the LSF compound for ‘parents’. Here too, in both members the repeated movement of the citation form of both members disappears, and the transition movement between the two handshapes is reanalyzed as the movement of the compound form. The images are given in [Figure 4.40](#).



(a) PÈRE ('father')



(b) MÈRE ('mother')

Figure 4.40: 'Parents'

4.4.3 Syntactic properties

I discuss here three syntactic diagnostics I used to identify compounds, namely: i) inseparability between the two constituents, ii) substitution, and iii) inversion.

The inseparability test can only apply to sequential compounds, as there is no way to introduce linguistic material between two items that occur simultaneously. I illustrate inseparability with the sequential compound $\text{PENSER} \hat{\text{DIFFÉRENT}}$ ('disagree'), shown in [Figure 4.41](#).



(a) PENSER ('to think')



(b) DIFFÉRENT ('different')

Figure 4.41: 'Disagree'

The compound is made by a pointing sign toward the head which refers to the verb PENSER

and the sign DIFFÉRENT. In the examples below, I tried to insert the dual pronoun DUAL-1PL, illustrated in Figure 4.42, between the two members of the compound.



Figure 4.42: DUAL-1PL

Word order is relatively flexible in LSF, as shown by (4.29a) and (4.29b) where DUAL-1PL is found before and after the compound. Nonetheless, when the pronoun occurs between the pointing sign and the adjective DIFFÉRENT, the sentence is unacceptable under the indented reading (cf. 4.29c).¹⁰

- (4.29) a. DUAL-1PL PENSER[^]DIFFÉRENT
 both-of-us think[^]different
 ✓‘The two of us disagree.’
 *‘You and I have different thoughts.’
- b. PENSER[^]DIFFÉRENT DUAL-1PL
 think[^]different both-of-us
 ✓‘The two of us disagree.’
 *‘You and I have different thoughts.’
- c. PENSER DUAL-1PL DIFFÉRENT
 think both-of-us different
 *‘The two of us disagree.’
 ✓‘You and I have different thoughts.’

¹⁰In (4.29c) the sign PENSER is produced in its citation form (it is otherwise unacceptable). Conversely, if PENSER is not reduced, (4.29a) and (4.29b) have the unacceptable reading ‘You and I have different thoughts’, further indicating that the examples in the text are processed as compounds.

The second property is the substitution of one part of the compound. If substitution is possible, this means that the member substituted is an independent word/sign instead being part of a compound.¹¹ Keeping ‘disagree’ as a baseline, I tried to substitute the first member with other pointing sign like SENTIR ‘smell’ (i.e., a pointing sign toward the nose). The examples in (4.30) show that replacing one member of the compound does not yield another well formed sentence. However, when the sign SENTIR is produced without reduction, as in (4.30c), the sentence becomes interpretable.

- (4.30) a. DUAL-1PL PENSER[^]DIFFÉRENT
 both-of-us think[^]different
 ✓‘The two of us disagree.’
- b. DUAL-1PL SENTIR[^]DIFFÉRENT
 both-of-us smell[^]different
 *‘The two of us smell differently.’
- c. DUAL-1PL SENTIR DIFFÉRENT
 both-of-us smell different
 ✓‘The two of us smell differently.’

A similar effect obtains when trying to substitute another element for the second element, for example, the sign MÊME (‘same’).¹² This is shown in (4.31).

- (4.31) a. DUAL-1PL PENSER[^]DIFFÉRENT
 both-of-us think[^]different
 ✓‘The two of us disagree.’
- b. DUAL-1PL PENSER[^]MÊME
 both-of-us think[^]same
 *‘The two of us agree.’
- c. DUAL-1PL PENSER MÊME
 both-of-us think same
 ✓‘The two of us had the same thoughts.’

¹¹Notice that the test applies straightforwardly to non-productive compounds, while its application to productive compounds is not immediate.

¹²The intended meaning would be *agree*. Notice that LSF has an independent sign AGREE. This might have blocked the existence of a compound form PENSER[^]MÊME in the lexicon.

The third diagnostic to identify compounds is the inversion of the two members. The rationale is the following: The sequential order the two members is mandatory in a compound. If inversion is not allowed, then the sign is a compound.¹³

The examples in (4.32) shows that the test is valid also for LSF. It is not possible to invert the order between the two members of PENSER[^]DIFFÉRENT.

- (4.32) a. ✓ PENSER[^]DIFFÉRENT
 think[^]different
 b. *DIFFÉRENT[^]PENSER
 different[^]think

The test also applies to coordinate compounds, where the syntactic equivalence between the two members should favor inversion. This is shown by the sign NUMERIQUE, ‘digital’ in (4.33).

- (4.33) a. ✓ ZÉRO[^]UN
 zero[^]one
 ‘Digital.’
 b. *UN[^]ZÉRO
 one[^]zero
 Intended: Digital.

In this section I showed that insertion, replacement and inversion are valid syntactic tests to identify compounds in LSF. These are the tests I used to validate all the compounds I found in LSF.

4.4.4 Semantics properties

At the semantic level, one of the properties of compounds is semantic shift (i.e., the re-use with a meaning that is different from the one that can be derived by combining the meaning of its two members). Like all tests of this kind, it only provides positive evidence. Namely, if a form has undergone semantic shift, it automatically counts as a compound. If a form only retains its compositional meaning, nothing can be said about its status as a compound (phonological and syntactic tests should be used to evaluate its status). In the previous sections I systematically integrated semantic shift in the general typology of compounds in LSF, distinguishing

¹³Notice that this test can only apply to sequential compounds.

between endocentric forms (i.e., compositional forms), and exocentric forms (i.e., forms that have undergone semantic shift) forms.

An example of a transparent/compositional/endocentric compound is the sign $\text{PÈRE} \hat{\text{MÈRE}}$, ‘parents’ (Figure 4.43), whose meaning is the coordination of PÈRE and MÈRE .



(a) PÈRE (‘father’)



(b) MÈRE (‘mother’)

Figure 4.43: ‘Parents’

A case of semantic shift is illustrated by the sign for ‘hypothesis’, in Figure 4.44.



(a) POINTING-NOSE



(b) CŒUR (‘heart’)

Figure 4.44: ‘Hypothesis’

The first member is a pointing sign, it refers to the nose (or activities in which the nose is involved). The second member is the sign HEART. This is a clear case of non-compositionality

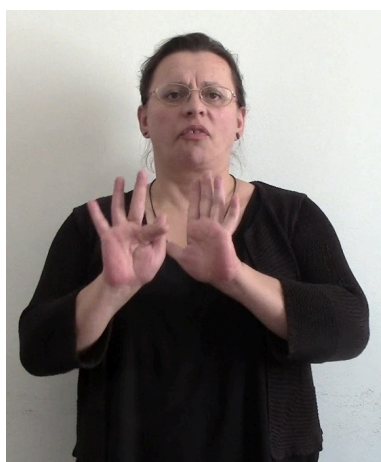
as neither the noun *hypothesis* nor the verb *hypothesize* has anything to do with the nose nor the heart.

4.5 Analysis

Overall, the typology of LSF compounds is not particularly different from that of LIS. At the macroscopic level three structures are found: sequential, simultaneous and hypernym compounds. Prima facie, may then extend the same analysis provided for LIS may extend to LSF. In particular, sequential compounds can be derived following [Harley \(2009\)](#), simultaneous compounds can be derived following [Snyder \(2001\)](#), while hypernym compounds can be derived following [Di Sciullo \(2005\)](#). From a technical point of view, there is no particular problem, as the three derivations nicely account for the facts.

However, some issues are raised by the variety of simultaneous compounds attested in LSF. While for LIS there is a clear division between what kind of items can form simultaneous compounds and what cannot (simultaneous compounds are basically limited to combination of classifiers in LIS)¹⁴, the situation is slightly more complicated for LSF. Indeed, simultaneous forms are found with any type of lexical item, including core lexical items (CAFE[^]SIGN) and initialized forms (H(ANDICAP)[^]SPORT, etc.). It is true that most of these forms are relatively new, and it is also likely that they are on-the-spot creations, rather than forms born spontaneous interaction within the community. Still, they seem to be productive and easily extend to related domains. This is true both for specialized domain and for less specialized domains. One example is the compound FONCTION ‘function’, shown in [Figure 4.45](#), which belongs to the domain of mathematics.

¹⁴One small exception are combinations between initialized forms and classifiers. The LIS signs for LAW and LITERATURE, for instance, involve an entity classifier and a fingerspelled letter.



(a) F-FS



(b) WE-CL

Figure 4.45: ‘Function’

Notice that this particular structure with the non-dominant hand serving as a classifier for a piece of paper (or any similar surface serving the purpose) is also found in the general lexicon for instance in the sign for LOI, ‘law’ (cf. [Figure 4.46](#)), indicating that the productivity of this type of compounds may not be limited to the domain of mathematics.



(a) L-FS



(b) WE-CL

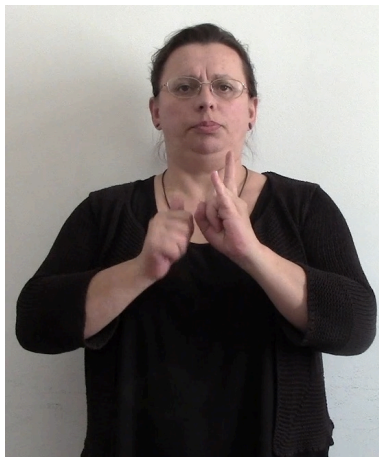
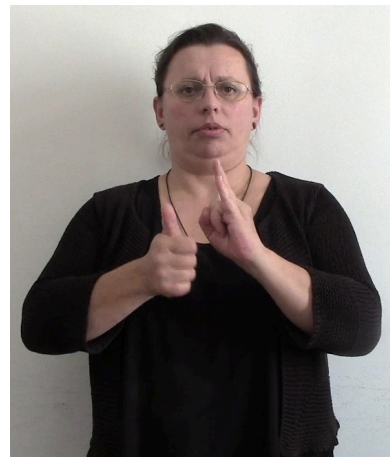
Figure 4.46: ‘Law’

In the non-specialized domain of everyday life, the initialized form “H” easily combines with other signs like HOUSE (cf. [4.47\(b\)](#)) or SPORT (cf. [4.48\(b\)](#)) to identify concepts or objects designed for people with disabilities.

(a) H_{FS}

(b) MAISON ('house')

Figure 4.47: 'handicapped housing' (French: 'MDPH')

(a) H_{FS}

(b) SPORT

Figure 4.48: 'Handisport'

The problem now is how to limit the generative power of sequential and simultaneous compounds. One way to clarify the issue is to think about the first steps of the derivation of compounds. While sequential compounds are generated by merging a root element with an element that already has its category label, simultaneous compounds are generated by merging two roots directly. The asymmetric derivation then naturally maps onto a sequential compounds, while the symmetric one maps onto simultaneous compounds. This possibility was limited to classifier signs in LIS, and considering how rare are simultaneous core lexicon compounds in SL in general, it is quite tempting to establish a cross-linguistic generalization.

However, LSF shows that such a potential generalization would be too strong. On the one hand, a simple categorical restriction on which item can enter a simultaneous combination cannot work as any member of the LSF lexicon can in principle be part of a simultaneous compounds (in LIS the distinction was between classifiers vs. other lexical items). On the other hand, a completely free optionality on the derivation (asymmetric or symmetric) would clearly overgeneralize as 1) non classifier[^]classifier simultaneous compounds are still not as productive as sequential compounds, and 2) we do not see the co-existence of sequential and simultaneous compounds. More precisely, we never see cases in which a single compound varies between a sequential and a simultaneous form. Elaborating a complete answer to this issue requires further research which I intend to do in the future. However, it is possible to sketch some possible solutions. There are two possible ways to go, which places the explanation in different parts of the grammar. One would be to try to use morpho-syntactic machinery to further distinguish between sequential and simultaneous compounds on one side and the various lexical categories on the other. In the end, this boils down to extending the solution offered for LIS to the peculiarities of LSF. Another way would be to let the morpho-syntactic module generate both sequential and simultaneous compounds, and then have a mechanism that filters out some derivations depending on specific morpho-phonological features or properties (e.g., having unmarked handshapes, being two handed, etc.). I will leave the implementation of these possibilities to future research.

4.6 Conclusions

In this chapter I illustrated the typology and the properties of LSF compounds. I have shown that LSF has sequential, simultaneous and hypernym compounds. However, Unlike LIS, simultaneous compounds seems to have less lexical restrictions in that there are also productive examples of simultaneous compounds being formed from two core lexical items. The morpho-syntactic generation of these compounds is similar to that of LIS, although more research is needed to establish how to filter out all potential simultaneous forms that are not attested.

Chapter 5

An experimental approach to LIS compounds

5.1 Introduction

Among the criteria to identify compounds, [Klima and Bellugi \(1979b\)](#) proposed phonological reduction. As they pointed out, there are three types of reduction: reduction on first member, reduction on second member and reduction on the transitional movement. An example of the first type from ASL is: FACE[^]STRONG, ‘to resemble’, in ([Klima and Bellugi 1979b: 217](#)). In this compound, the circular movement of the sign for FACE is reduced to zero and results in pointing toward the face of the signer.

A LIS example of this type of phonological reduction is found in the compound sign for ‘ignorant’, already shown in [Figure 3.2](#) and repeated here in [Figure 5.1](#):

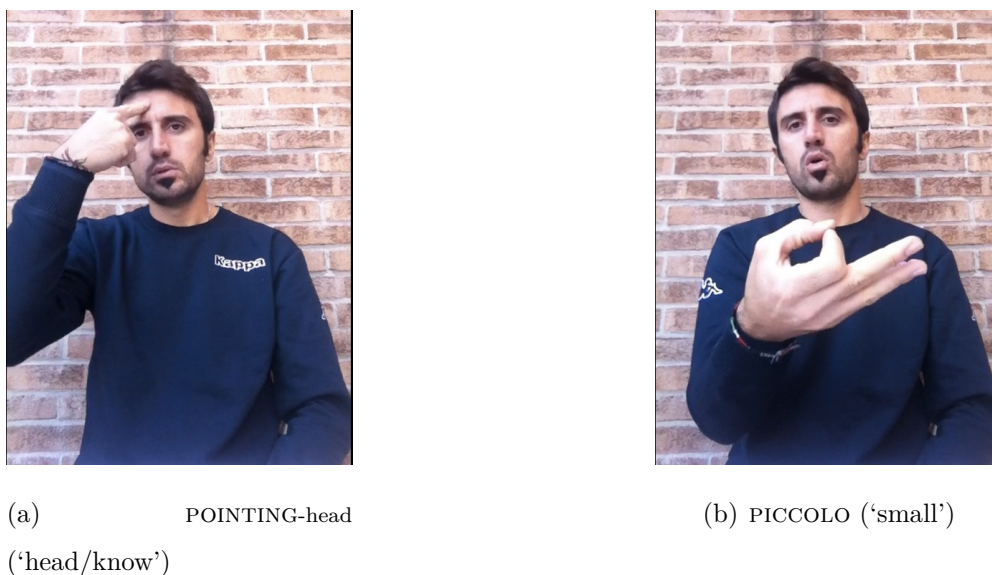


Figure 5.1: ‘Ignorant’

The citation form of the sign HEAD includes a repeated movement which is lost in the compound form for IGNORANT. The sign for HEAD then reduces to a pointing to the forehead.¹ Based on similar considerations about English, such as *chairman*, Klima and Bellugi (1979b) proposed phonological reduction as a sufficient condition to identify compounds. The immediate consequence of this move is that — just as *breakfast* is perceived as a single word in English — compounds involving reduction in LIS should be perceived as single signs. In this chapter, I experimentally test this prediction using LIS compounds that have clear phonological reduction.

The underlying hypothesis is that compounds with phonological reduction should be perceived as single signs and not as two separate signs. If, despite phonological reduction, signs are still computed as two independent units, then phonological reduction should not be considered as a sufficient condition to identify compounds in a particular language and possibly a fortiori in sign language in general.

Notice that SLs offer the possibility of having both sequential and simultaneous compounds. As discussed in chapter 3, simultaneous compounds in LIS are heavily phonologically so are good candidates to be perceived as single signs. Therefore, I compared simultaneous and sequential compounds.

The task was very simple: experimental participants watched sentences of various length,

¹Following Brentari (1998), Geraci (2009) analyzes these patterns as arising not from a process of reduction, but from a process of epenthesis that is blocked in the compound form.

and were asked to count the number of signs. Sentences may contain a simultaneous or sequential compound or no compound at all. There were at least four possible outcomes:

- Simultaneous and sequential compounds are treated similarly and counted as being a single sign.
- Simultaneous and sequential compounds are treated similarly and counted as being made of two signs.
- Simultaneous compounds are treated as single signs, sequential ones are counted as being made of two signs.
- Sequential compounds are treated as single signs, simultaneous ones are counted as being made of two signs.

There is the further possibility that the compounds within a given group are not all evaluated the same, with some being treated as single signs, and others being treated as two signs. We thus also investigated the degree to which there was variability between compounds within each of the two groups.

The results will show that there are differences between sequential and simultaneous compounds: the latter are ambiguously perceived as either being made up of two signs or by just one single sign, while simultaneous compounds are clearly perceived as single units. At least for LIS, phonological reduction can therefore not be on its own taken as a sufficient criterion to define sequential compounds.

The rest of the chapter is organized as follow: The methodology is explained in [section 5.2](#), the results appear in [section 5.3](#), and a discussion is offered in [section 5.4](#).

5.2 Methodology

The methodology of the study is presented in this section. Participants are described in [5.2.1](#), materials are presented in [5.2.2](#), and the procedure is explained in [5.2.3](#).

5.2.1 Participants

Recruiting Deaf participants is not an easy task, because the communities are small and normally spread over an entire country. In this study, participants were recruited via social media and via personal contacts. Only Deaf signers of LIS were recruited. Recruitment via social media was done by posting a video alert on Youtube and Facebook.²

The experiment was open for a month. During this period of time, sixty people participated in the experiment. We considered results from the nineteen participants who completed the task with more than 60% of correct answers in the control questions (see 5.2.3).

Metadata about participants was collected via a questionnaire collected right after the text. Of the nineteen participants, ten are men. Average age is 45 years (range 33-69). As for exposure to sign language, native signers are 45% (9), early-exposed signer are 25% (5), while late learners are 30% (6). As for education, 68% attended a Deaf school, while the rest attended mainstream schools.³ As for the geographic distribution, five (25%) participants grew up in the north of Italy, eight (40%) in the center, and seven (35%) in the south.

5.2.2 Materials

The goal of the experiment is to understand if phonological reduction is a sufficient criteria to determine a given linguistic item is perceived as a compound (i.e., one sign/word) versus two separate lexical units.

Two lists of compounds were created, one of simultaneous and one of sequential compounds, each with 12 members (24 total). All 24 compounds listed in Table 5.1 have undergone phonological reduction from their basic citational form. The group of simultaneous compounds only contains classifier^classifier forms, while the group of sequential compounds contains five tokens of lexical^lexical forms and seven tokens of lexical^classifier forms.⁴ The reason why we opted for this particular distribution in the latter group is that there are not enough compounds for

²The video can be found here: <https://youtu.be/nfAcFHGN5hw>

³By Deaf schools I consider those schools with classrooms composed by Deaf students only. By mainstream schools I consider those schools with hearing students excepts for (generally) one deaf student per class. For Deaf students in these classes, the law prescribes that additional help be provided (either with an interpreter or with a communication assistant, or a special teacher trained to work with children with disabilities). Unfortunately, this became reality only after the law 104/92 passed. Information about the language used by teachers was not collected.

⁴Here I included core signs, fingerspelled signs, initializations and abbreviations.

each type that could be considered sufficiently widely distributed across the country (i.e., to limit as much as possible the effect of geographical variation). While only few tokens exist of the classifier[^]classifier sequential type, no cases of lexical[^]lexical simultaneous compounds are attested in LIS (see Chapter 3). The list of all items is given in Table 5.1.

Lex [^] Lex		Lex [^] Cl		Cl [^] Cl	
Sequential	Simultaneous	sequential	simultaneous	sequential	simultaneous
		‘refrigerator’			‘I-Phone’
‘heart attack’		‘computer’			‘electric socket’
‘culture’		‘owen pasta’			‘pencil sharpener’
‘to fall in love’		‘corrector’			‘xerox’
‘psychology’		‘hard disk’			‘compass’
		‘meat’			‘washing machine’
		‘TTY’			‘pencil case’
					‘pen’
					‘fax’
					‘fork’
					‘salami’
					‘meat skewer’

Table 5.1: LIS target compounds

Then, I constructed 24 target sentences each containing a compound. The sentences are of different length (from 3 to 6 signs). Each compound is used only once.

In addition to target sentences, I also created two sets of baselines/fillers where no compounds are used. The first set of baselines contains sentences that are 3 to 6 signs long. The second set of baselines contains sentences that are 4 to 7 items long. The first baseline sentences have same length as if the compound in target sentences is computed as a single sign. The second baseline sentences are one sign longer sentences, to match target sentences in case the compound is computed as made of two separate signs. For the second group of base-line sentences, the “additional” sign creates a coordinated phrase (notice that coordination is produced by juxtaposition in LIS).

Thus for each target sentence I created two “fillers/baselines” which can be considered as minimal pairs. The paradigm for sentences of 3-4 signs is illustrated in (5.1).

- (5.1) a. CAT THOMAS FALL-IN-LOVE target (2 signs + 1 compound)
 ‘Thomas has fallen in love with cats.’
- b. CAT THOMAS CURE baseline-1 (3 signs)
 ‘Thomas takes care of cats.’
- c. CAT THOMAS CUDDLE PLAY baseline-2 (4 signs)
 ‘Thomas cuddles and plays with cats.’

In order to push participants to not simply count the number of signs, but also to process and understand the sentences, an attention task was included in the design. Subjects were asked to answer control questions that randomly appeared during the test phase. These questions could only be answered if the participant paid attention to the content of the previous sentence. An example is given in (5.2). The question was asked in LIS and participants had to provide the answer by typing on the keyboard.

- (5.2) a. CAT THOMAS CUDDLE PLAY
 ENTER NUMBER OF SIGNS:
- b. Who does Thomas play with? (control question asked in LIS)
 ENTER ANSWER FOR THE QUESTION:

To conclude, the materials are made of 72 stimuli: 24 target sentences (12 with simultaneous and 12 with sequential compounds), 24 baseline-1 (as if compounds are counted as single signs), 24 baseline-2 (as if compounds are counted as two separate signs) and 12 control questions. The list of all items is provided in Appendix 1, section 5.6.

5.2.3 Design

The experiment was fully accessible to Deaf people who are signers of LIS. It was created with the online Qualtrics platform (www.qualtrics.com). The general structure of the design is illustrated in section 5.2.3.1, while in section 5.2.3.2 I explain how I solved the issue of resizing videos within Qualtrics.

5.2.3.1 General structure

The general structure of the test is illustrated in Figure 5.2. After the instructions, there was a trial phase with 8 items (5 trial sentences and 3 control questions). After the trial phase the real test started, with the 72 items and 12 control questions in a random order. Finally, a short questionnaire collected metadata about the participants.

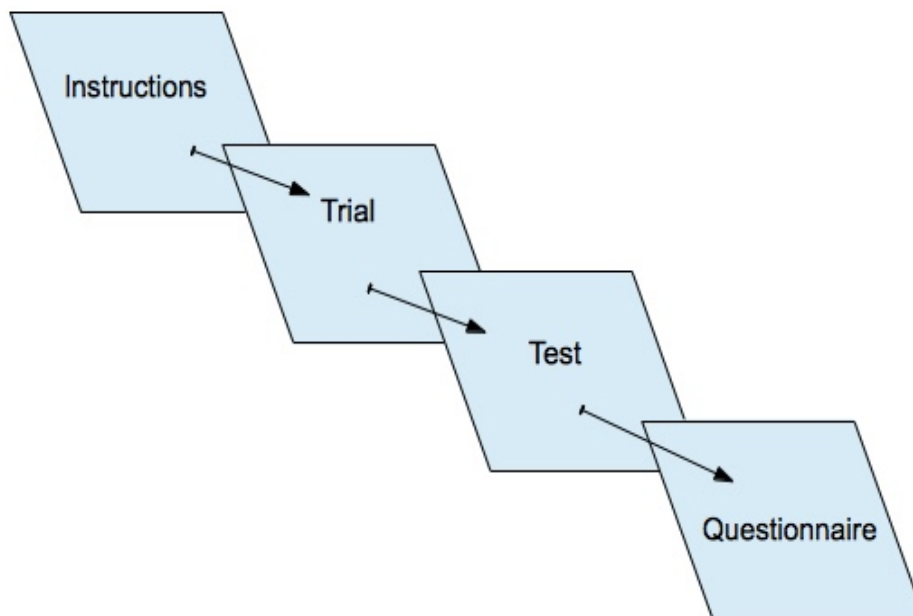


Figure 5.2: Design timeline

Instructions were provided with a video in LIS and its translation in Italian. Recruitment was done via social media. I made a movie to introduce myself and briefly describe the goal of the experiment. This included information about who could participate, the average length of the experiment and the gain for LIS research. At the end of the description, the link to the experiment was given.

The trial section started with a video description and instructions of the test and then presented the 8 trial items. After a repetition of the instructions, the test items appeared in a random order. The questionnaire to collect metadata was included at the end of the test. The metadata collected came from the following questions:

- (5.3) a. You attended elementary school with: deaf , hearing

- b. At what age did you start signing?
- c. Gender:
- d. Write the province in which you grew up:
- e. Is your father deaf?
- f. Is your mother deaf?
- g. In which year were you born?

Questions (a), (c), (e) and (f) had a multiply choice answer; for the others, the participants had to write the answer with the keyboard. The experiment concluded with a video in which I thank the participant.

Beside the counting request, Italian was also used in the control questions (see [section 5.6](#) where the English translations are also provided).

5.2.3.2 Non-standard operation in Qualtrics

The Qualtrics workspace is shown in [Figure 5.3](#), where it is possible to see the various blocks used to generate the test.

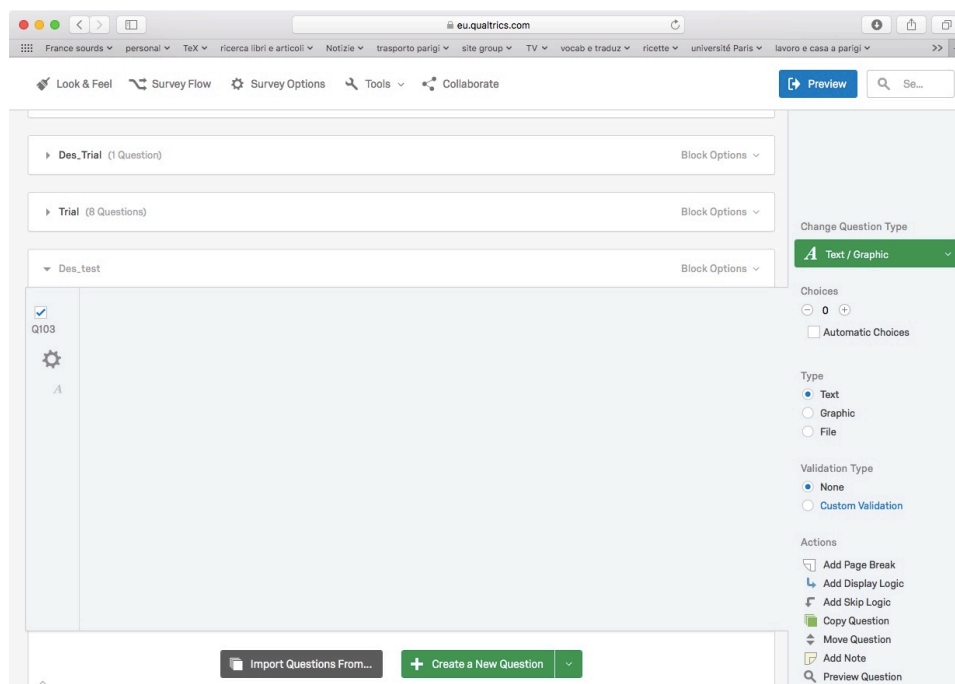


Figure 5.3: Qualtrics workstation

Figure 5.4 shows an example of one test item. The video with the LIS sentence appeared in the middle of the screen. Below this, there was the question participants had to answer in Italian (‘How many signs are there in the sentence you just saw?’). Below the question, there was the space where participants could type their responses. The red button let the participants move to next item.

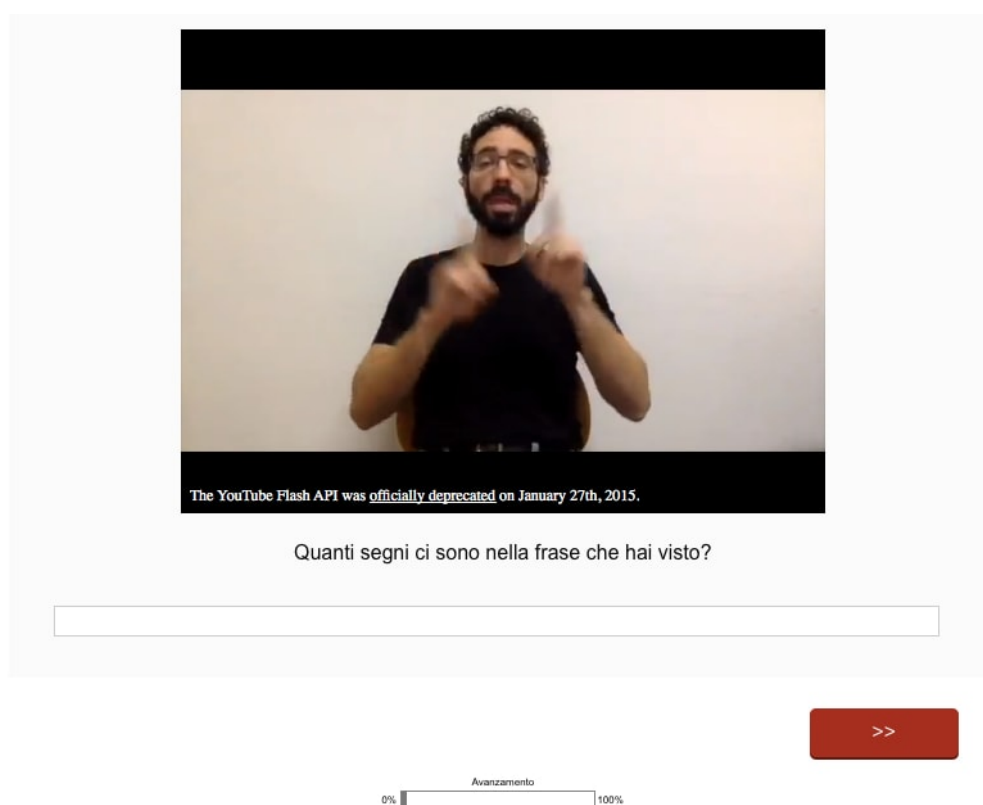


Figure 5.4: qualtrics window

This was the procedure I adopted to create the experiment is standard in Qualtrics. However, at the time of the experiment, it was not easy to embed video clips of the size needed for the experiment. I would like to describe here the procedure I used to adapt the size of videos in Qualtrics.

The default size for videos, once uploaded on Qualtrics, is 320:180. This was too small for the experiment, as the hands couldn't be processed effectively. To enlarge movie size, it is necessary to go to the *html* view and modify the parameters of movie size. However, this move may result in lower video quality, as after uploading videos on Qualtrics some compression is automatically made (to save space and guarantee streaming). This solution was not optimal, so

I decided to upload movie clips on a dedicated YouTube channel, which guarantees reasonable quality. The link to the video was then manually embedded on the *html* of the Qualtrics experiment. In this case it is possible to modify the size of the clip without losing quality. While this procedure guarantees a reasonable quality of the videos, it forces the test to be run with a fast Internet connection.

The part of the *html* code that was used is given in (5.4).

```
(5.4) <div style="text-align: center;"><embed class="qmedia" height="377"
      pluginspage="http://adobe.com/flashplayer/" quality="best"
      src="https://www.youtube.com/v/frLMr7vFue0?modestbranding=0-
      &amp;amp;autohide=1&amp;amp;showinfo=0&amp;amp;controls=0&amp;amp;rel=0"
      width="502" wmode="transparent" /><br />
```

5.3 Results

The results of descriptive and predictive analyses are given in this section.

5.3.1 Descriptive statistics

The original dataset included 1368 tokens. After removing some null responses (NAs) and three non-numeric responses (in two cases participants wrote a string in Italian, probably the answer to a previous control question; in one case they provided an alternative between two possible answers, i.e., “5-6”), the dataset included 1358 tokens. Our goal was to test whether [Klima and Bellugi \(1979b\)](#)’s claim that phonological reduction is a sufficient criterion to determine compounds in ASL is also valid for LIS. The hypothesis is that compounds should be counted as one single sign rather than as two signs in our task. In other words, all things being equal, if compounds are treated as single units at the sign level a sentence containing two lexical sign plus a compound should be counted as a sentence with 3 signs. The alternative hypothesis is that the very same sentence is counted as having 4 signs. This is illustrated in (5.5):

- | | | |
|-------|--|---------|
| (5.5) | a. Hyp. 1 compounds = 1 sign: CAT THOMAS FALL-IN-LOVE | 3 signs |
| | b. Hyp. 2 compounds = 2 signs: CAT THOMAS FALL-IN-LOVE | 4 signs |

Following this rationale, accuracy on a given hypothesis was calculated as the percent of sentences whose reported length matched the predicted length on that hypothesis.

When accuracy was computed according to the first hypothesis (i.e., the ASL criterion extending to LIS), the percentage of accuracy was quite high in the case of simultaneous compounds, but was at chance for sequential compounds. This is illustrated in Table 5.2, where the distribution of the baseline is also given.⁵

	Match	Mismatch
Accuracy Seq.	50%	50%
Accuracy Sim.	79%	21%
Baseline	75%	25%

Table 5.2: Accuracy of sequential and simultaneous compounds according to Hyp. 1

When accuracy was computed according to the second hypothesis, the percentage of match lowered both in the case of simultaneous compounds (as expected, given results from Table 5.2) and for sequential compounds. This is illustrated in Table 5.3, where the distribution of the baseline is also given.

	Match	Mismatch
Accuracy Seq.	40%	60%
Accuracy Sim.	8%	92%
Baseline	75%	25%

Table 5.3: Accuracy of sequential and simultaneous compounds according to Hyp. 2

Klima and Bellugi (1979b)'s phonological criterion to identify compounds in ASL easily extends to the case of simultaneous compounds of LIS. The situation of sequential compounds is more complex. In particular, it appears that *neither* of the two hypotheses perfectly predict the experimental results. In the next section, I will thus investigate the factors that lead to categorization of sequential compounds as one word or two words. In the rest of the chapter, I will only consider accuracy as counted under Hypothesis One.

⁵The distribution of the baseline collapses both Baseline 1 (3-6 sign per sentence) and Baseline 2 (4-7 signs per sentence). This is possible as the accuracy is very similar between the two baselines, as also tested during the logistic regression (see section 5.3.2).

Interestingly, none *Exposure to LIS*, *School Type*, *Gender* or *Age* seem to have an effect on the distribution of accuracy. This is shown in the tables and plots below.

Accuracy/ LIS Exp.	Native	Non-Native
match	72%	71%
mismatch	28%	29%

Table 5.4: Accuracy & LIS Exposure: Native = at least one Deaf parent

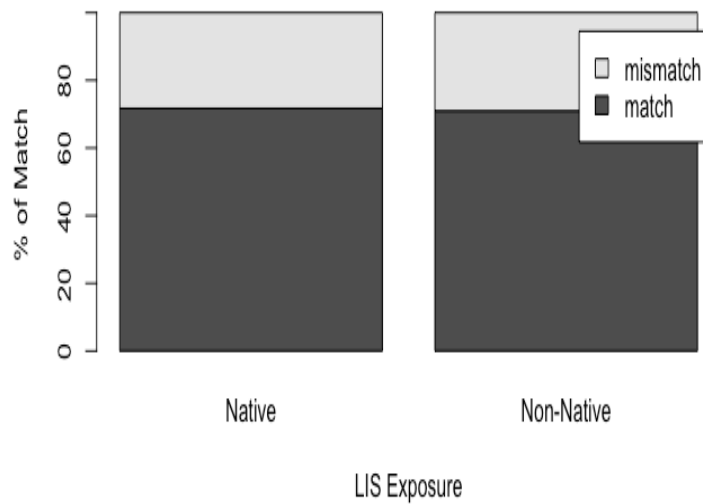


Figure 5.5: Accuracy & LIS Exposure

Accuracy/ School	DEAF	MAINSTREAM
match	72%	69%
mismatch	28%	31%

Table 5.5: Accuracy & School Type

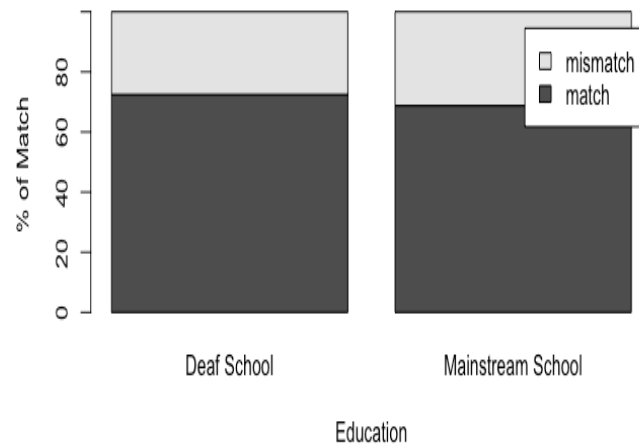


Figure 5.6: Accuracy & School Type

Accuracy/gender	F	M
match	72%	71%
mismatch	28%	29%

Table 5.6: Accuracy & Gender

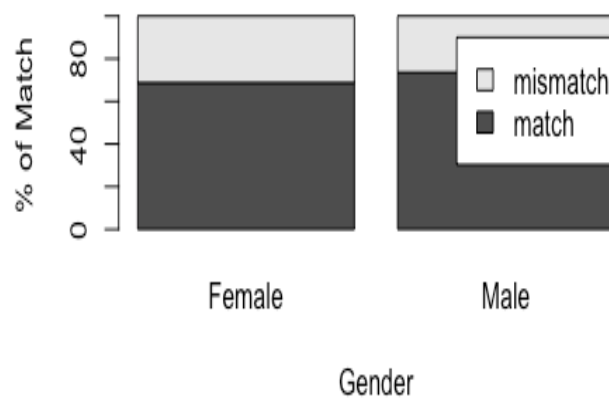


Figure 5.7: Accuracy & Gender

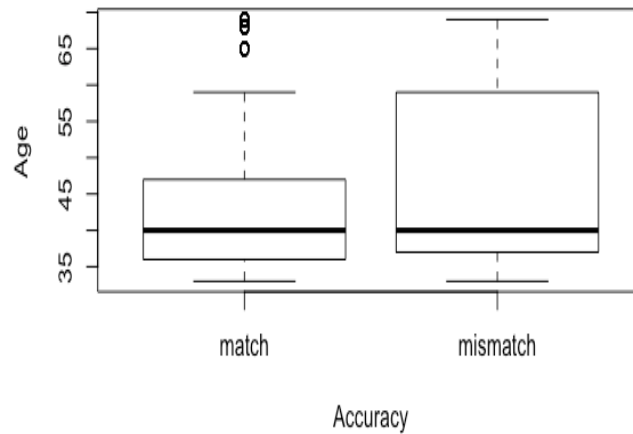


Figure 5.8: Accuracy & Age

5.3.2 Predictive Statistics

In order to further analyze the data, I conducted a mixed model logistic regression with participant and item as random factors. With a step-up procedure I tested for main effects and interactions for the following dependent variables:

- Stimulus Type (3 levels): Sequential, Simultaneous and Baseline
- Stimulus Length: from 3 to >6 signs per sentence⁶
- LIS Exposure: Native, Non-Native
- School Type: Deaf School, Mainstream School
- Gender: Male, Female
- Age

Of all these potential predictors, I found a main effect of *Stimulus Type*, *Length* and its interaction. Outliers (<2 *Standard Deviation*) were removed (38 datapoints, 2.8% of the total). The graph of the interaction is given in [Figure 5.9](#), where it is shown that simultaneous compounds have a virtually identical behavior as the baseline, while sequential compounds behave in a

⁶Values of baseline sentences with 6 and 7 signs were collapsed.

radically different way. In particular, as the length of stimuli increases, accuracy decreases for baseline and simultaneous compounds while it slightly increases with sequential compounds.

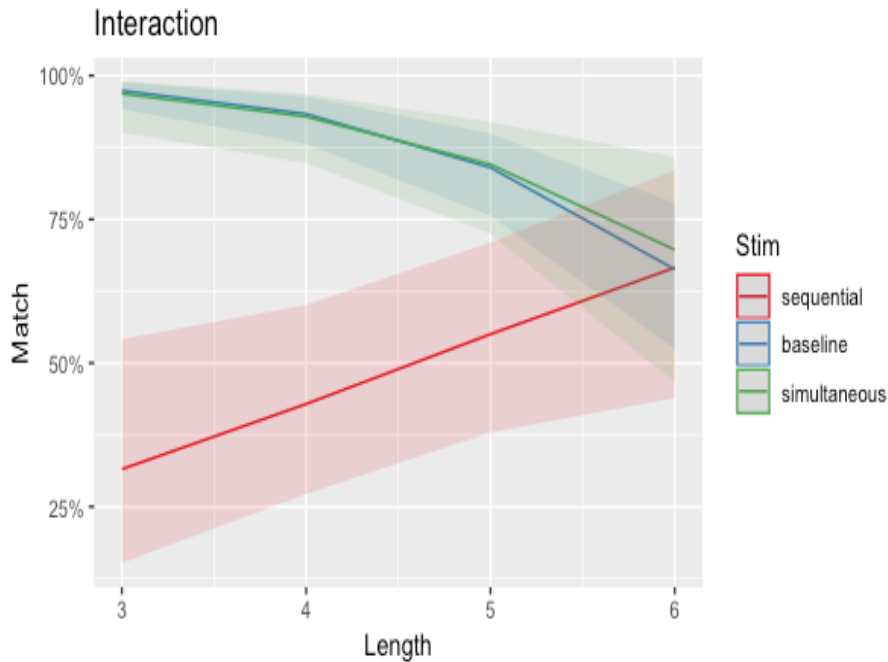


Figure 5.9: Mixed model: Interaction Plot

This difference is statistically significant, as shown in [Table 5.7](#).

Fixed Effects	Estimate	Std. Error	z value	P value
Length	0.488	0.227	2.148	.03
Baseline	8.805	1.334	6.597	< .001
Simultaneous	8.272	1.730	4.780	< .001
Length*Baseline	-1.469	0.274	-5.350	< .001
Length*Simultaneous	-1354	0.358	-3.777	< .001

Table 5.7: Fixed effect values: Underlying level = Sequential compounds.

Model Info: AIC=1242, BIC 1283.5, Loglik = -613, Number of Observation = 1321.

The results of this statistical analysis basically confirm what has been observed with the descriptive statistics. There is a significant difference in accuracy between sentences containing sequential compounds and the rest of the stimuli. This difference in accuracy seems also to spread across items of various length. This seems to be quite puzzling as normally performance

decreases with longer items, as is the case of the baseline sentences and the sentences with simultaneous stimuli. In order to further explore the possible sources of this difference I plotted the percentage of accuracy for items containing sequential compounds (see [Figure 5.10](#)). The graph shows that there are certain sequential compounds that show a very high level of accuracy (CULTURE, FALL-IN-LOVE, PARENTS and PSYCHOLOGY), while the others have very low accuracy. This contrasts with the distribution of accuracy in simultaneous compounds, which is overall high, as shown in [Figure 5.11](#).

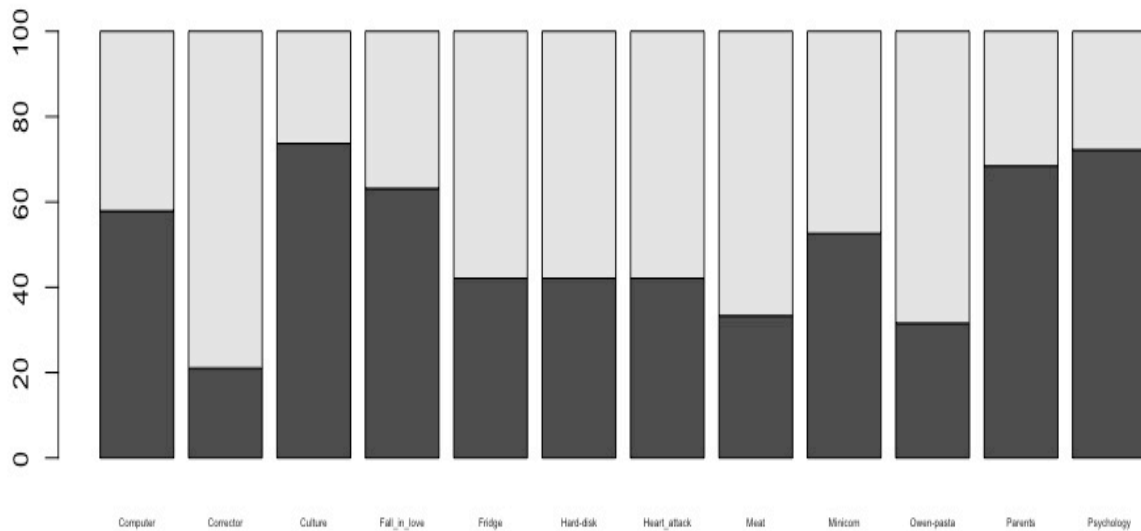


Figure 5.10: Accuracy by Item: Sequential compounds

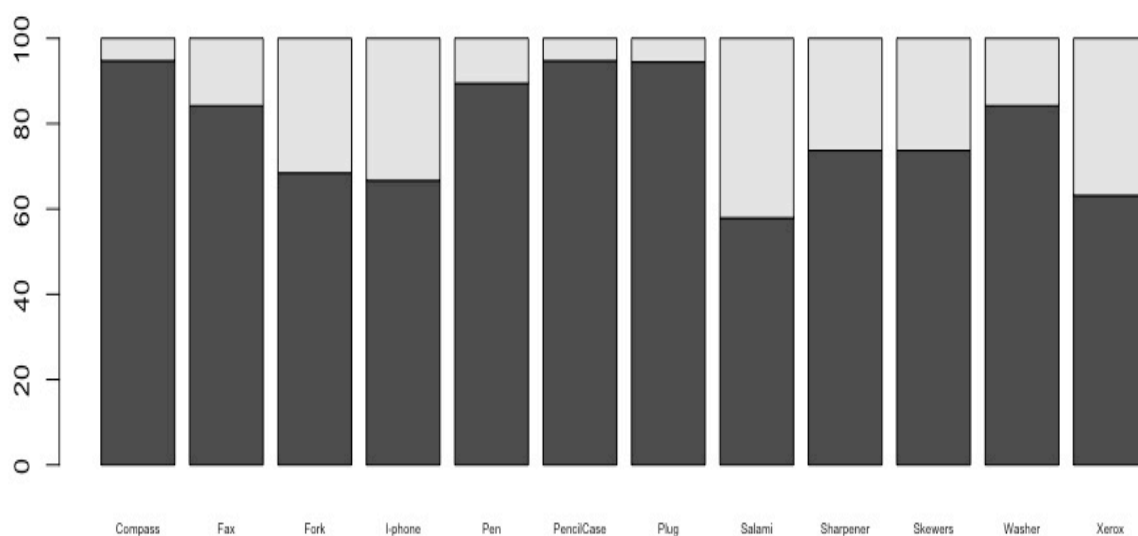


Figure 5.11: Accuracy by Item: Simultaneous compounds

The contrast emerges even more clearly if we look at the plot of sequential compounds against stimulus length. The results are shown in [Figure 5.12](#). Compounds with very low accuracy (e.g., CORRECTOR (21%) and MEAT (31%) are found in sentences of 3 signs, while items with a relatively high level of accuracy like PSYCHOLOGY (68%) are found in sentences with 6 signs.

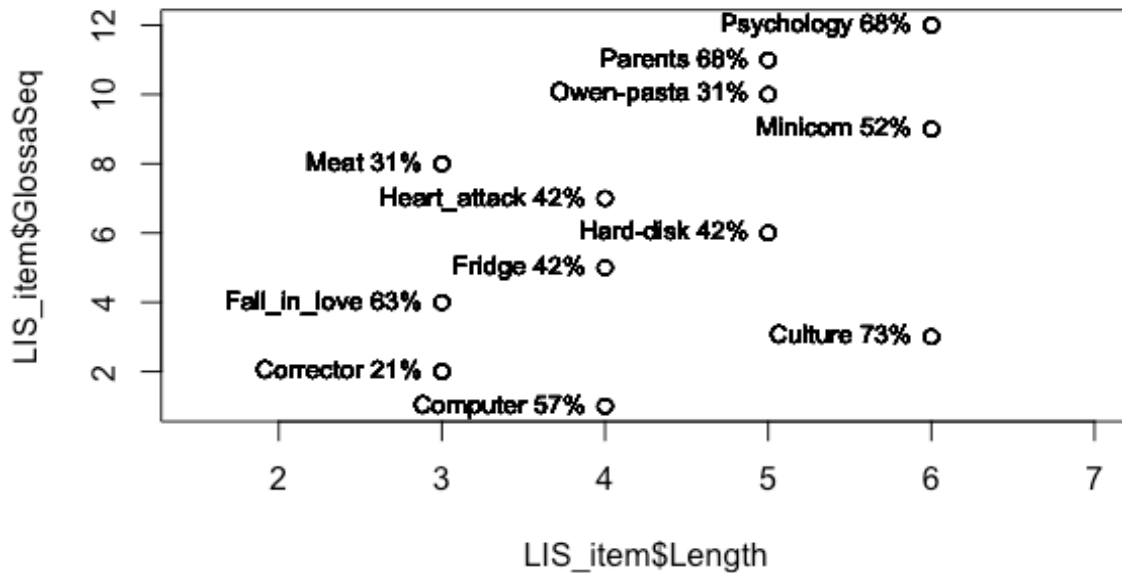


Figure 5.12: Accuracy by Item: Sequential compounds against sentence length

While sequential compounds show a very high level of variability (ranging in accuracy between 21% and 73%), simultaneous compounds are much more uniform, as shown in the plot of compounds against length in [Figure 5.13](#). In this case, overall accuracy is higher, the range is smaller (between 57% and 94%) and accuracy decreases with item length.

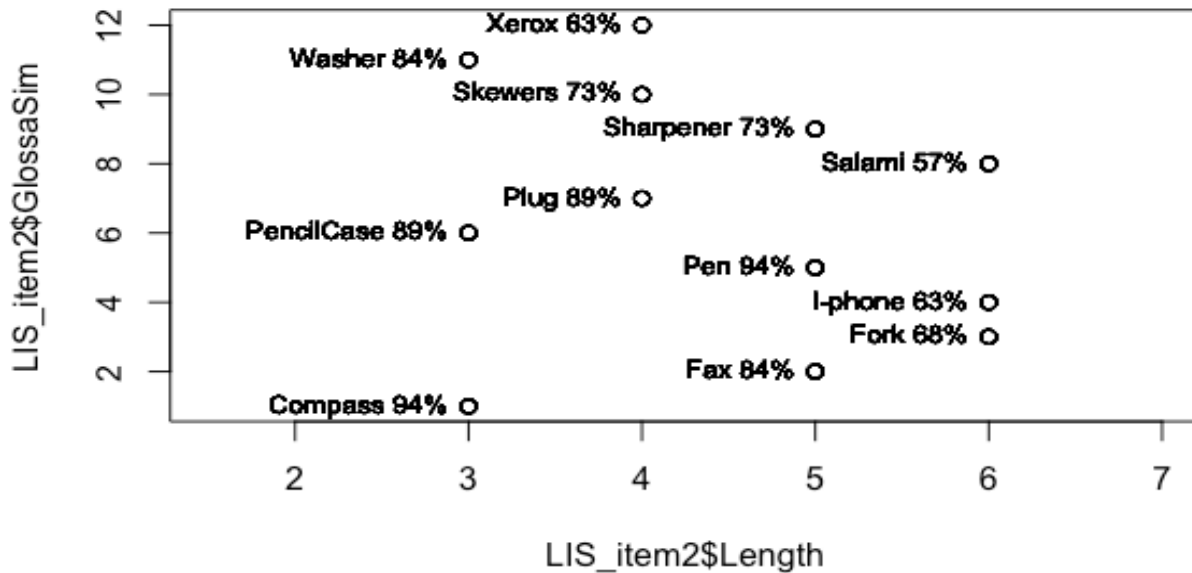


Figure 5.13: Accuracy by Item: Simultaneous compounds against sentence length

5.4 Discussion

Phonological processes affecting compounds (reduction, stress patterns, assimilation, etc.) are a sufficient criterion to identify compounds. Klima and Bellugi (1979b) claimed the same for ASL compounds, where phonological reduction is taken as a sufficient condition to identify compounds in ASL. I tried to test whether the same criterion applies to LIS. This seems to be the case for simultaneous compounds, which are treated in an identical way as standard lexical signs. However, once we look at sequential compounds, results are much less clear. In particular, this class of compounds seems to be much less homogeneous. Some forms like CULTURE, PARENTS and PSYCHOLOGY are perceived as single lexical units; others are perceived as clearly separate signs (e.g., CORRECTOR, OWEN-PASTA and MEAT). There is also a group of signs that stays somewhat in the middle. Notice that in each group we find both presumably recent and old concepts. The take-home message for sequential compounds, then seems to be that some forms are perceived as a single lexical unit, while others are not and phonological reduction does not seem to be a crucial factor.

5.5 Conclusion

In this Chapter, I investigated whether phonological reduction is a sufficient condition to identify compounds in LIS. The criterion was first proposed for ASL in [Klima and Bellugi \(1979b\)](#). The logic of the criterion is the following: phonological reduction enhances the perception that a form is a single lexical unit, hence the compound is treated as a single sign. Experimental results have shown that phonological reduction is a valid criterion for simultaneous compounds in LIS, but cannot be used for sequential compounds, where some reduced forms are perceived as single signs, but others are not.

5.6 Appendix 1

List of stimuli and glosses of the sentences used in the LIS experimental test.

List of paradigms with sequential compounds as targets:

Sequential compounds					
Type	Glosses			Length	
Target	BIANCO ^{HLG-CL}		IX-POSS-3	SPARIRE	3
Baseline-1	LIBRO		IX-POSS-3	SPARIRE	3
Baseline-2	CARTA DI CREDITO	PORTAFOGLIO	IX-POSS-3	SPARIRE	4
Translation	‘His/her {corrector, book, credit card and wallet} is/are missing’				

Table 5.8: Sequential compound: ‘corrector’, length: 3

A control question is associated to the item in **Target**.

The question asked in LIS is: *What disappeared?*

Sequential compounds					
Type	Glosses			Length	
Target	THOMAS	GATTO	CUORE ^{OBIETTIVO}		3
Baseline-1	THOMAS	GATTO	CURARE		3
Baseline-2	THOMAS	GATTO	COCCOLARE	GIOCARE	4
Translation	‘Thomas {fell in love, cuddles, cuddles and plays} (with) the cat’				

Table 5.9: Sequential compound: ‘fall in love’, length: 3

A control question is associated to the item in **Baseline-2**.

The question asked in LIS is: *With whom did Thomas play and cuddle?*

Sequential compounds					
Type	Glosses			Length	
Target	MEAT ^{WE-CL}		SPESSO	SPECIALE	3
Baseline-1	LEGNO		SPESSO	SPECIALE	3
Baseline-2	PAVIMENTO	CEMENTO	SPESSO	SPECIALE	4
Translation	‘Thick {meat, wood, cement floor} is excellent’				

Table 5.10: Sequential compound: ‘meat’, length: 3

Sequential compounds						
Type	Glosses				Length	
Target	ELETRRICITÀ ^{BP-CL}	MARIA	RIPARARE	ABILE	4	
Baseline-1	STATUA		MARIA	RIPARARE	ABILE	4
Baseline-2	MOTO	BICICLETTA	MARIA	RIPARARE	ABILE	5
Translation	‘Maria can repair the {laptop, statue, motorcycle and bike}’					

Table 5.11: Sequential compound: ‘computer’, length: 4

A control question is associated to the item in **Baseline-1**.

The question asked in LIS is: *Who can repair the statue?*

Sequential compounds						
Type	Glosses				Length	
Target	HDL-CL ^{FREDDO}		GIOVANNI	COMPRARE	FATTO	4
Baseline-1	REGALO		GIOVANNI	COMPRARE	FATTO	4
Baseline-2	FORMAGGIO	PROSCIUTTO	GIOVANNI	COMPRARE	FATTO	5
Translation	‘Giovanni bought (a) {refrigerator, present, cheese and ham}’					

Table 5.12: Sequential compound: ‘refrigerator’, length: 4

Sequential compounds						
Type	Glosses				Length	
Target	IERI	MATTINA	ANNA	HEART ^{EXPLODE}	4	
Baseline-1	IERI	MATTINA	ANNA	LAVORO	4	
Baseline-2	IERI	MATTINA	ANNA	NAUSEA	VOMITO	5
Translation	‘Yesterday morning, Anna (had) {(a) heart attack, worked, morning sickness}’					

Table 5.13: Sequential compound: ‘heart attack’, length: 4

A control question is associated to the item in **Target**.

The question asked in LIS is: *When did Silvana have a heart attack?*

Sequential compounds							
Type	Glosses					Length	
Target	ITALIA	3-POSS	DOMENICA	PASTA [^] FORNO	MANGIARE	5	
Baseline-1	ITALIA	3-POSS	DOMENICA	TAGLIATELLE	MANGIARE	5	
Baseline-2	ITALIA	3-POSS	DOMENICA	FORMAGGIO	PROSCIUTTO	MANGIARE	6
Translation	‘On Sunday, Italians eat {oven pasta, tagliatelle, cheese and ham}’						

Table 5.14: Sequential compound: ‘oven pasta’, length: 5

A control question is associated to the item in **Baseline-2**.

The question asked in LIS is: *On Sunday, What kind of food Italians eat?*

Sequential compounds							
Type	Glosses					Length	
Target	GIOVANNI	MAMMA [^] PAPÀ	IX-POSS	PASSATO	OSPEDALE	5	
Baseline-1	GIOVANNI	CUGINO	IX-POSS	PASSATO	OSPEDALE	5	
Baseline-2	GIOVANNI	ZIO	NONNO	IX-POSS	PASSATO	OSPEDALE	6
Translation	‘Giovanni’s {parents, cousins, uncle and grandfather} were hospitalized’						

Table 5.15: Sequential compound: ‘parents’, length: 5

Sequential compounds							
Type	Glosses					Length	
Target	IERI	MEMORIA [^] SASS-CL	NUOVO	SILVANA	VEDERE	5	
Baseline-1	IERI	FILM	NUOVO	SILVANA	VEDERE	5	
Baseline-2	IERI	NEGOZIO	APPLE	NUOVO	SILVANA	VEDERE	6
Translation	‘Yesterday, Silvana saw a new {hard disk, movie, Applestore}’						

Table 5.16: Sequential compound: ‘hard disk’, length: 5

A control question is associated to the item in **Baseline-1**.

The question asked in LIS is: *When did Silvana see the new movie?*

Sequential compounds								
Type	Glosses						Length	
Target	MONDO	C [^] POSS	DIVERSO	APPRENDERE	DARE	RICCO	6	
Baseline-1	MONDO	INFORMAZIONE	DIVERSO	APPRENDERE	DARE	RICCO	6	
Baseline-2	MONDO	VITA	STILE	DIVERSO	APPRENDERE	DARE	RICCO	7
Translation	‘Learning (a) different {culture, information, lifestyle} enriches you’							

Table 5.17: Sequential compound: ‘culture’, length: 6

Sequential compounds								
Type	Glosses						Length	
Target	PASSATO	COMUNITÀ	SORDA	DTS [^] SCRIVERE	ORA	PIÙ	6	
Baseline-1	PASSATO	COMUNITÀ	SORDA	MESSANGER	ORA	PIÙ	6	
Baseline-2	PASSATO	COMUNITÀ	SORDA	GIORNALE	LEGGERE	ORA	PIÙ	7
Translation	‘The Deaf community used to (use) {TTY, messenger, read newspapers} but not anymore’							

Table 5.18: Sequential compound: ‘DTS’, length: 6

A control question is associated to the item in **Target**.

The question asked in LIS is: *Who does not use TTY anymore?*

Sequential compounds								
Type	Glosses						Length	
Target	IERI	SERA	GIUSEPPE	POINTING [^] TRASPARENTE	ANDARE	TARDI	6	
Baseline-1	IERI	SERA	GIUSEPPE	CIRCOLO	ANDARE	TARDI	6	
Baseline-2	IERI	SERA	GIUSEPPE	ALLENAMENTO	PALLAVOLO	ANDARE	TARDI	7
Translation	‘Yesterday evening, Giuseppe went to (the) {psychologist, club, volleyball training} late’							

Table 5.19: Sequential compound: ‘psychology’, length: 6

A control question is associated to the item in **Baseline-2**.

The question asked in LIS is: *When did Giuseppe go late to volleyball training?*

List of paradigms with simultaneous compounds as targets:

Simultaneous compounds					
Type	Glosses			Length	
Target	VESTITO	SASS-CL [^] SASS-CL	METTERE	3	
Baseline-1	VESTITO	SPAZZATURA	METTERE	3	
Baseline-2	VESTITO	VERDE	BLU	METTERE	4
Translation	‘I throw my clothes in the {washing machine, garbage}’, ‘I throw out my green and blue clothes’				

Table 5.20: Simultaneous compound: ‘washing machine’, length: 3

A control question is associated to the item in **Baseline-1**.

The question asked in LIS is: *What was thrown in the garbage?*

Simultaneous compounds					
Type	Glosses			Length	
Target	UNIVERSITÀ	WE-CL [^] WE-CL	OBBLIGATORIO	3	
Baseline-1	UNIVERSITÀ	RIGA	OBBLIGATORIO	3	
Baseline-2	UNIVERSITÀ	QUADERNO	PENNA	OBBLIGATORIO	4
Translation	‘At university, a {compass, ruler, notebook and pen} is required’				

Table 5.21: Simultaneous compound: ‘compass’, length: 3

Simultaneous compounds					
Type	Glosses			Length	
Target	PAOLO	HLG-CL [^] SASS-CL	NERO	3	
Baseline-1	PAOLO	MAGLIA	NERO	3	
Baseline-2	PAOLO	CALZE	SCARPE	NERO	4
Translation	‘Paolo has (a) black {pencil case, shirt, socks and shoes}’				

Table 5.22: Simultaneous compound: ‘pencil case’, length: 3

A control question is associated to the item in **Target**.

The question asked in LIS is: *What color is the pencil case?*

Simultaneous compound						
Type	Glosses				Length	
Target	$WE-CL \hat{=} WE-CL$	VERDE	PAOLO	PERDERE	4	
Baseline-1	MOUSE	VERDE	PAOLO	PERDERE	4	
Baseline-2	LIBRO	DIZIONARIO	VERDE	PAOLO	PERDERE	5
Translation	'Paolo lost his green {electricity socket, mouse, book and dictionary}'					

Table 5.23: Simultaneous compound: 'electricity socket', length: 4

A control question is associated to the item in **Baseline-2**.

The question asked in LIS is: *What Paolo has lost?*

Simultaneous compound						
Type	Glosses				Length	
Target	$SASS-CL \hat{=} WE-CL$	NERO	IX-LOC	SCARSO	4	
Baseline-1	TELEVISIONE	NERO	IX-LOC	SCARSO	4	
Baseline-2	BORSA	CARTELLA	NERO	IX-LOC	SCARSO	5
Translation	'This black {copy machine, TV, bag and backpack} is/are poor quality'					

Table 5.24: Simultaneous compound: 'copy machine', length: 4

Simultaneous compound						
Type	Glosses				Length	
Target	$WE-CL \hat{=} WE-CL$	MANGIARE	TUTTI-I-GIORNI	INGRASSARE	4	
Baseline-1	PANCETTA	MANGIARE	TUTTI-I-GIORNI	INGRASSARE	4	
Baseline-2	TORTA	CIOCCOLATO	MANGIARE	TUTTI-I-GIORNI	INGRASSARE	5
Translation	'Eating {meat skewers, bacon, chocolate cake} every day makes you fat'					

Table 5.25: Simultaneous compound: 'meat skewer', length: 4

A control question is associated to the item in **Baseline-1**.

The question asked in LIS is: *What food makes you fat if you eat it every day?*

Simultaneous compounds							
Type	Glosses					Length	
Target	WE-CL [^] HDL-CL	IX-LOC	PLASTICA	COSTARE	POCO	5	
Baseline-1	SCOTCH	IX-LOC	PLASTICA	COSTARE	POCO	5	
Baseline-2	TAVOLO	SEDIA	IX-LOC	PLASTICA	COSTARE	POCO	6
Translation	‘This plastic {pencil sharpener, adhesive tape, table and chair} is/are cheap’						

Table 5.26: Simultaneous compound: ‘pencil sharpener’, length: 5

Simultaneous compounds							
Type	Glosses					Length	
Target	PERIODO	ORA	HDL-CL [^] WE-CL	COLORE	VARIO	5	
Baseline-1	PERIODO	ORA	TORTA	COLORE	VARIO	5	
Baseline-2	PERIODO	ORA	PIANTA	FIORE	COLORE	VARIO	6
Translation	‘At this time, {pens, cakes, plants and flowers} are of different colors’						

Table 5.27: Simultaneous compound: ‘pen’, length: 5

A control question is associated to the item in **Target**.

The question asked in LIS is: *What kind of object has different colors?*

Simultaneous compounds							
Type	Glosses					Length	
Target	SORDO	IX-1-PL	WE-CL [^] SASS-CL	USARE	FORTE	5	
Baseline-1	SORDO	IX-1-PL	MESSAGGIO	USARE	FORTE	5	
Baseline-2	SORDO	IX-1-PL	SKYPE	CAMFROG	USARE	FORTE	6
Translation	‘Deaf people use {faxes, text messages, Skype and Camfrog} a lot’						

Table 5.28: Simultaneous compound: ‘fax’, length: 5

A control question is associated to the item in **Baseline-2**.

The question asked in LIS is: *What device Deaf people use a lot?*

Simultaneous compounds								
Type	Glosses						Length	
Target	IERI	LOTTERIA	GIANNI	BP-CL [^] HDL-CL	BIANCO	VINCERE	6	
Baseline-1	IERI	LOTTERIA	GIANNI	PLAYSTATION	BIANCO	VINCERE	6	
Baseline-2	IERI	LOTTERIA	GIANNI	BOTTIGLIA	VINO	BIANCO	VINCERE	7
Translation	‘Yesterday, Gianni won a white {I-phone, Playstation, bottle of wine} at the raffle’							

Table 5.29: Simultaneous compound: ‘I-phone’, length: 6

Simultaneous compounds								
Type	Glosses						Length	
Target	GIOVANNI	FAMIGLIA	ZONA-CL	WE-CL [^] WE-CL	FARE-A-MANO	ANCORA	6	
Baseline-1	GIOVANNI	FAMIGLIA	ZONA-CL	PIZZA	FARE-A-MANO	ANCORA	6	
Baseline-2	GIOVANNI	FAMIGLIA	ZONA-CL	VINO	OLIO	FARE-A-MANO	ANCORA	7
Translation	‘Giovanni’s family still makes homemade {salami, pizzas, oil and wine}’							

Table 5.30: Simultaneous compound: ‘salami’, length: 6

A control question is associated to the item in **Baseline-1**.

The question asked in LIS is: *What kind of food, Giovanni’s family still make homemade?*

Simultaneous compounds								
Type	Glosses						Length	
Target	RISTORANTE	TAVOLO	WE-CL [^] WE-CL	APPOGGIARE-CL	CE-NEG	IMPOSSIBILE	6	
Baseline-1	RISTORANTE	TAVOLO	CUCCHIAIO	APPOGGIARE-CL	CE-NEG	IMPOSSIBILE	6	
Baseline-2	RISTORANTE	TAVOLO	CUCCHIAIO	PICCOLO	APPOGGIARE-CL	CE-NEG	IMPOSSIBILE	7
Translation	‘It is impossible to find a restaurant table without a {fork, spoon, tea spoon}’							

Table 5.31: Simultaneous compound: ‘fork’, length: 6

Chapter 6

An experimental approach to LSF compounds

6.1 Introduction

Chapter [chapter 5](#) presented an experiment on the perception of compounds in LIS; in this chapter, I replicate the same experiment for LSF. The main question I want to answer is the following: *Is phonological reduction a sufficient criteria to determine that a given linguistic element is a compound in LSF?*

6.2 Methodology

The methodology is virtually identical to that used for the LIS experiment in the previous chapter. The main difference is that I did not use social media to recruit participants. Instead, I asked Deaf informants working in our group to recruit 4-5 participant each, possibly with different backgrounds. The advantage of this different recruitment strategy is that all participants completed the test and all passed the control questions. Thus only one participant was excluded. The reason of exclusion was that s/he did not grow up in France.

The data in this study come from eighteen participants, ten (10) are men, eight (8) are women. Half of the participants have Deaf parents, four are early learners (4%), seven are late learners (36%). The age average of all participants is 35 years (range 26-69). Fourteen (73,7%) attended a Deaf school, the other had mainstream education. As for origin, seven grew up in the Île-de-France region, two are from Bordeaux, six are from Lyon and three are from Marseille.

As for the materials, all stimuli were created with the help of a native signer of LSF. I created 24 targets stimuli, twelve sequential and twelve simultaneous compounds. The list, divided by category is given in [Table 6.1](#).

Core^Core		Core^Cl		Cl^Cl	
Seq.	Sim.	Seq.	Sim.	Seq.	Sim.
‘never heard of’	‘Sl teach’	‘hard disk’	‘relay’	‘camping van’	‘to dance’
‘hypothesis’	‘cheap’	‘suicide’	‘to help’	‘progress’	‘marathon’
‘parents’		‘washing machine’	‘reach’		‘bottle’
‘digital’			‘goal’		‘to go inside’
‘in my opinion’			‘to film’		
‘disagree’					
‘evidence’					
‘never seen’					

Table 6.1: LSF target compounds

I constructed 24 target sentences each containing a compound. The sentences were of different length (from 3 to 6 signs). Each compound was used only once.

In addition to target sentences, I also created two sets of baselines/fillers where no compounds are used. The first set of baselines contained sentences that were 3 to 6 signs long. The second set of baselines contained sentences that were 4 to 7 items long. The first baseline sentences had same length as if the compound in target sentences were computed as a single sign. The second baseline sentences were one sign longer sentences, to match target sentences in case the compound were computed as made of two separate signs. In this particular baseline, the “additional” sign created a coordinated phrase. Thus for each target sentence I created two “fillers/baselines” which can be considered as minimal pairs. The list of stimuli and the control questions are provided in the [section 6.6](#).

6.3 Results

The results of descriptive and predictive statistics are given in this section.

6.3.1 Descriptive Statistics

The original dataset included 1296 tokens. Following the procedure used in [chapter 5](#), [Table 6.2](#) illustrates accuracy under the hypothesis that phonological reduction is enough to identify compounds.

	Match	Mismatch
Accuracy Seq.	64.8%	35.2%
Accuracy Sim.	84.7%	15.3%
Baseline-1	85.4%	14.6%
Baseline-2	69.4%	30.6%

Table 6.2: Accuracy of sequential and simultaneous compounds Hyp. 1

Similarly to LIS, simultaneous compounds have a very high accuracy in LSF (84.7%). The level of accuracy is virtually identical to that of its natural baseline (Baseline-1, 85.4%). Interestingly and differently from LIS where accuracy for sequential compounds was at chance, accuracy of sequential compounds is still quite high (64.8%) in LSF.

None *Type of school*, *Gender*, *Region of provenance* or *Age* seem to affect the distribution of accuracy. This is shown by the tables and plots below.

Accuracy/ School Type	Mainstream	Deaf School
match	79.4%	75.4%
mismatch	20.6%	24.6%

Table 6.3: Accuracy & School Type

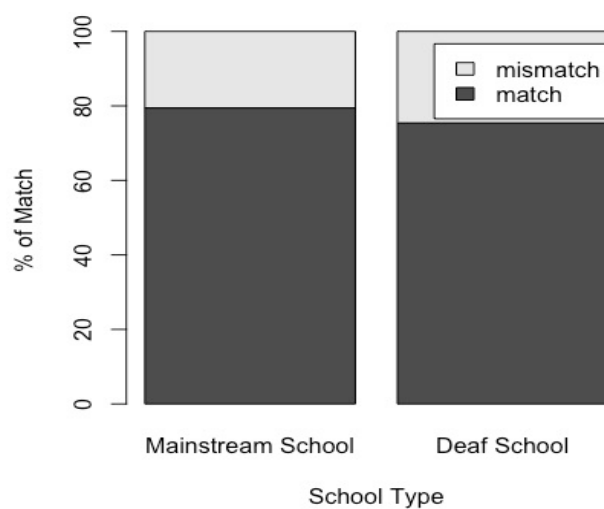


Figure 6.1: Accuracy & School Type

Accuracy/gender	F	M
match	79.4%	75.4%
mismatch	21.6%	24.6%

Table 6.4: Accuracy & Gender

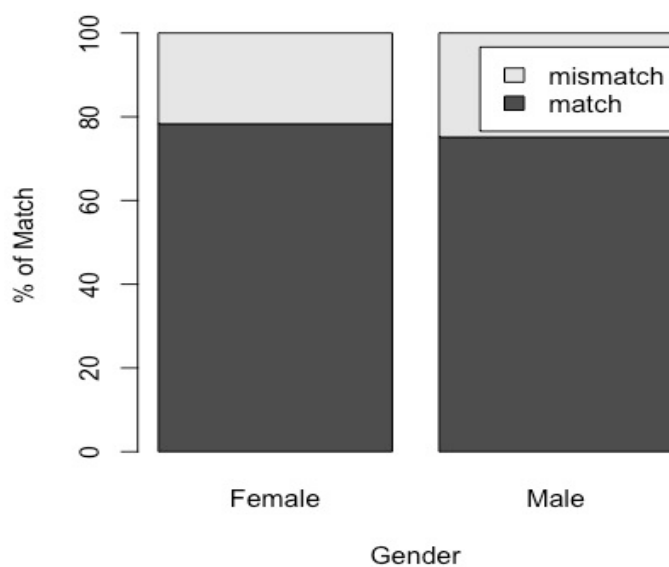


Figure 6.2: Accuracy & Gender

Accuracy/Region	Bordeaux	Lyon	Marseille	Paris
match	83.3%	77.3%	75.9%	74.2%
mismatch	16.7%	22.7%	24.1%	25.8%

Table 6.5: Accuracy & Region where participants grew up

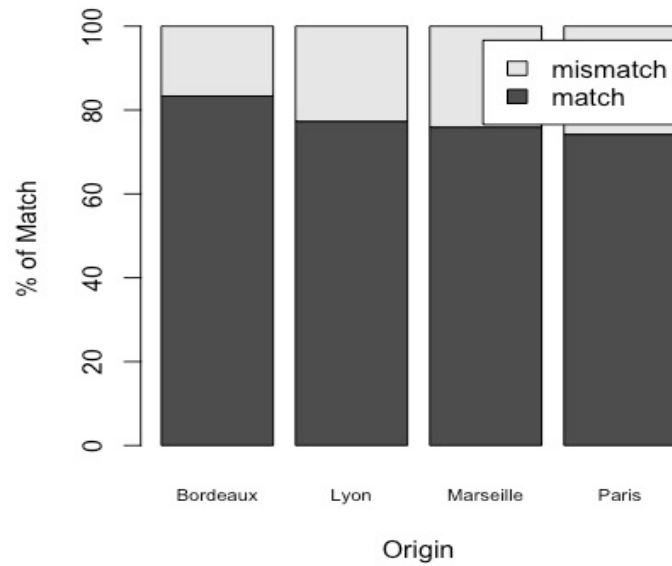


Figure 6.3: Accuracy & Region where participants grew up

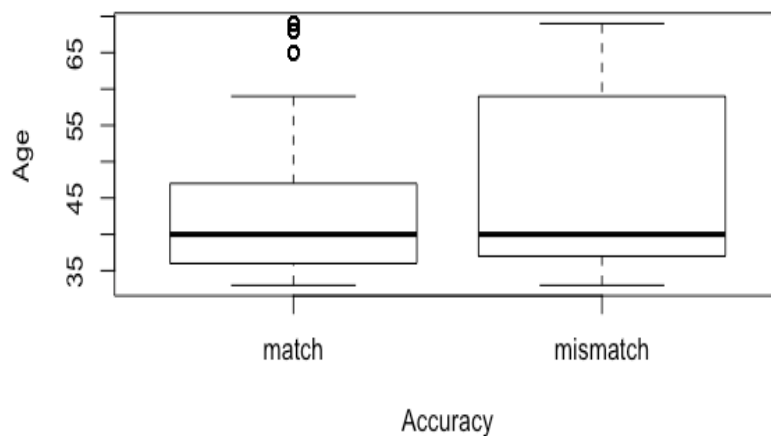


Figure 6.4: Accuracy & Age

Interestingly, there seems to be a consistent difference once we consider exposure to LSF between native and non-native signers, as shown in [Table 6.6](#).¹

Accuracy/ LSF Exp.	Native	Non-Native
match	83.2%	71.2%
mismatch	16.8%	28.8%

Table 6.6: Accuracy & LSF Exposure: Native = at least one Deaf parent

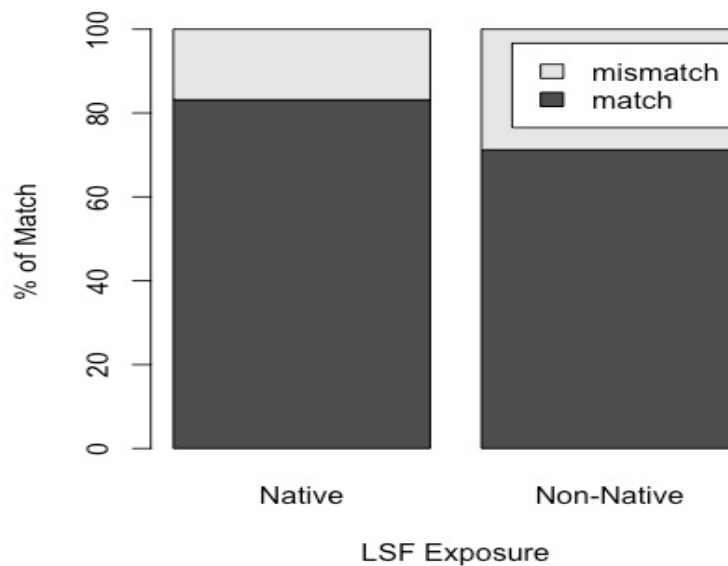


Figure 6.5: Accuracy & Exposure

6.3.2 Predictive Statistics

A generalized linear mixed model analysis with participant and item as random factors was conducted to investigate the data. With a step-up procedure I tested for main effect and interactions for the following dependent variables:

¹I treat both early and late signers as non-native because in the predictive statistics the two groups did not differ significantly.

- Stimulus Type (4 levels): Sequential, Simultaneous Baseline-1, Baseline-2
- Stimulus Length: from 3 to >6 signs per sentence²
- LSF Exposure: Native, Non-Native
- School Type: Mainstream, Deaf School
- Gender: Male, Female
- Region: Bordeaux, Lyon, Marseille, Paris
- Age

Of all these potential predictors, I found a main effect of *LSF Exposure*, *Stimulus Type*, *Length* and an interaction between *Stimulus Type* and *Length*. Outliers (<2 *Standard Deviation*) were removed (83 datapoints, 6.4% of the total). The graph of the main effect of LSF exposure is given in [Figure 6.6](#).

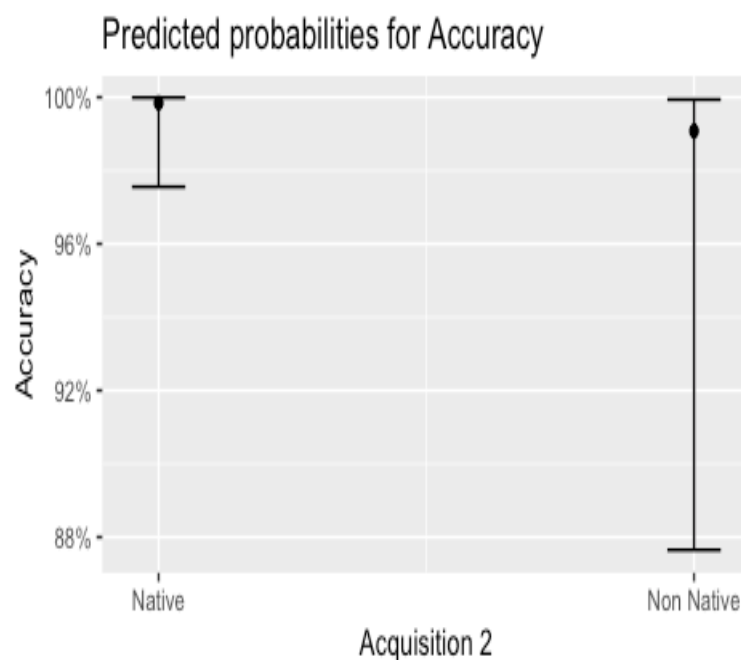


Figure 6.6: Mixed model: LSF Exposure

The graph of the interaction is given in [Figure 6.7](#), where it is shown that simultaneous compounds have a virtually identical behavior as the baselines, while sequential compounds

²Values of baseline sentences with 6 and 7 signs have been collapsed

behave in a different way. In particular, as the length of stimuli increases, accuracy decreases for baselines and simultaneous compounds while it increases with sequential compounds.

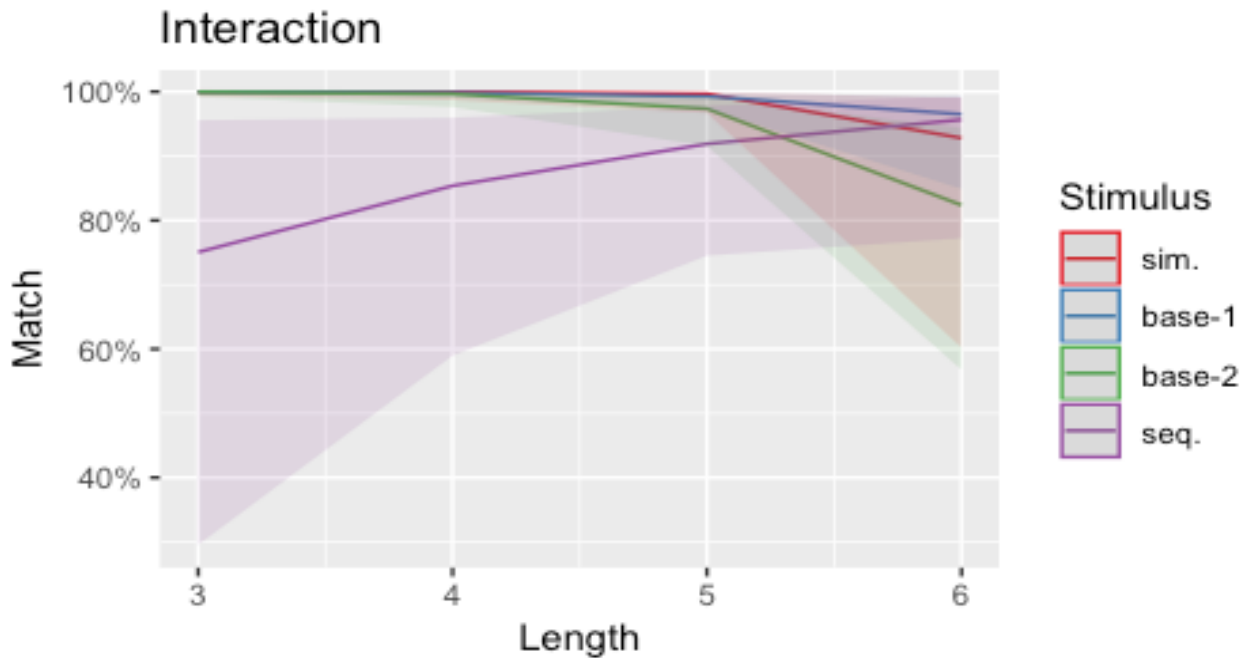


Figure 6.7: Mixed model: Interaction between length and accuracy

This difference is statistically significant, as shown in [Table 6.7](#)

Fixed Effects	Estimate	Std. Error	z value	P value
Length	-3.1434	1.3530	-2.323	0.020164 *
Baseline-1	-8.4483	7.9083	-1.068	0.285393
Baseline-2	-7.4844	8.0060	-0.935	0.349865
Stimulusseq.	-22.3056	7.8827	-2.830	0.004659 **
Non-Native	-1.7993	0.5301	-3.394	0.000689 ***
Length*baseline-1	1.5351	1.4339	1.071	0.284356
Length*baseline-2	1.0782	1.4417	0.748	0.454537
Length*sequential	3.8066	1.4352	2.652	0.007996 **

Table 6.7: Fixed effect values: Underlying level = Sequential compounds.

Model Info: AIC=760.7, BIC 816.8, Loglik = -369.3, Number of observations = 1213.

Very similarly to LIS, also in the case of LSF the interaction shows that sequential compounds do not follow the typical trend of decreasing accuracy while the length of the stimu-

lus increases. In order to further explore the possible sources of this fact I plotted the percentage of accuracy for items containing sequential compounds (see Figure 6.8). The graph shows that overall sequential compounds have a very high level of accuracy except for three items, TENT[^]SASS-CL ‘Camper van’, (16.7%), MACHINE[^]LAVER ‘Washing machine’, (27.8%) and SASS-CL[^]DUR ‘Hard-disk’ (22.3%).

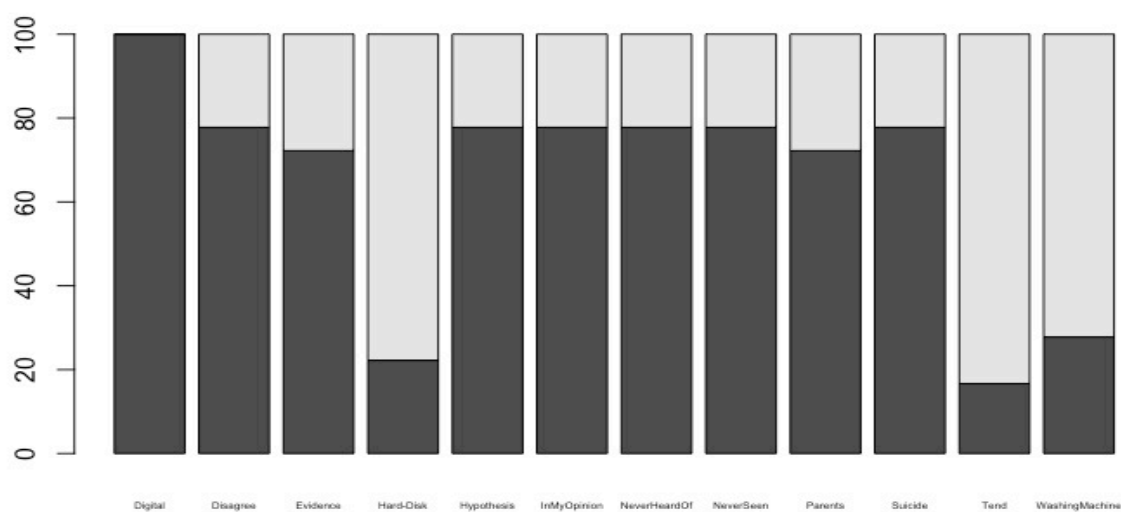


Figure 6.8: Accuracy by Item: Sequential compounds

The distribution of items containing simultaneous compounds is given in Figure 6.9 and shows that overall simultaneous compounds are perceived as one single sign.

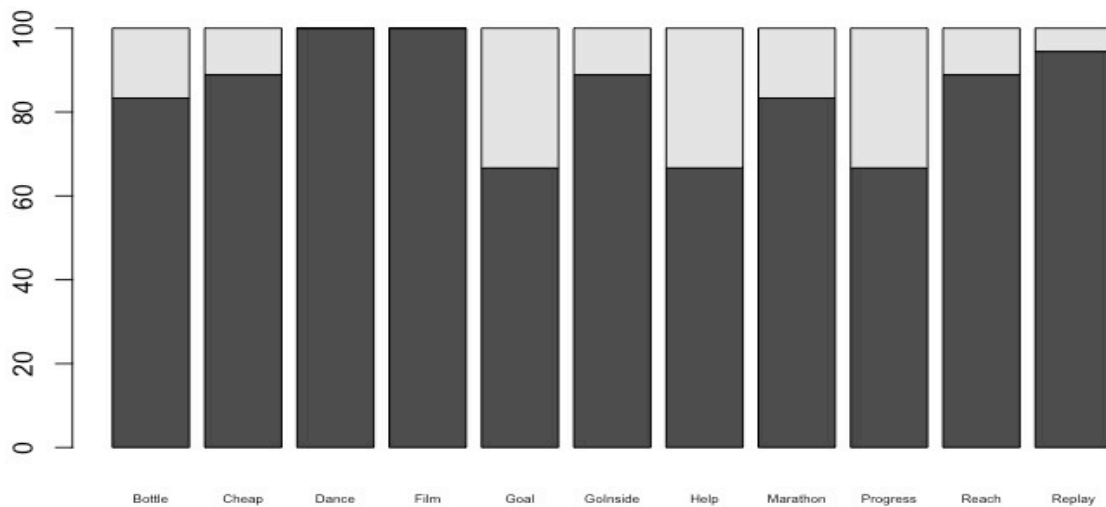


Figure 6.9: Accuracy by Item: Simultaneous compounds

6.4 Discussion

The study shows that there are three significant main factors: Stimulus type, Stimulus length and Exposure to LSF. There is also a significant interaction (Stimulus type * length).

The effect of Exposure to LSF indicates that native signers use phonological reduction as a criterion to identify compounds as lexical units more frequently than non-native signers.

In LSF, like in LIS, phonological reduction is a sufficient condition to identify simultaneous compounds as lexical units. This is also confirmed by the distribution of accuracy among simultaneous compounds.

The interaction between stimulus type and length is similar to the one already observed for LIS (see Chapter 5). For LSF as well, longer sequences induce lower accuracy for stimuli with simultaneous compounds and baselines but not for stimuli with sequential compounds. However, the overall accuracy for sequential compounds is higher in LSF than in LIS (64% vs. 50%), although the range is similar (from 16% to 100%), possibly indicating that LSF is somehow integrating phonological reduction as a stable criterion to identify compounds even for sequential compounds. This seems to be a possible explanation once we look at the distribution of accuracy among sequential compounds. It emerges that beside three items ('camper van',

‘washing machine’ and ‘hard-disk’), all the others have a very high level of match. This means that overall, even in the case of sequential compounds, phonological reduction could be a sufficient criterion, unlike in LIS.

6.5 Conclusion

In this chapter, I investigated whether phonological reduction is a sufficient condition to identify compounds in LSF. The criterion was first proposed for ASL in [Klima and Bellugi \(1979b\)](#). The logic of the criterion is the following: phonological reduction enhances the perception that a form is a single lexical unit, hence the compound is treated as a single sign. Experimental results have shown that phonological reduction is a valid criterion both for simultaneous and sequential compounds in LSF. In the case of sequential compounds, however, there could be some variation depending on specific compounds which are still perceived as composed of two separate signs.

6.6 Appendix 1

List of stimuli and glosses of the sentences used in the LSF experimental test.

List of paradigms with sequential compounds as targets

Sequential compounds					
Type	Glosses			Length	
Target	TENTE [^] SASS-CL	ROUGE	NOUVEAU	3	
Baseline-1	MANTEAU	ROUGE	NOUVEAU	3	
Baseline-2	VOITURE	PI	ROUGE	NOUVEAU	4
Translation	'{(The) camper van, (The) jacket, That car} is red'				

Table 6.8: Sequential compound: 'camper van', length: 3

A control question is associated to the item in **Target**.

The question asked in LSF is: *What color is the new camper van?*

Sequential compounds					
Type	Glosses			Length	
Target	ZÉRO [^] UN	PRIX	PAS-CHER	3	
Baseline-1	TRAIN	PRIX	PAS-CHER	3	
Baseline-2	LOUVRE	PI	PRIX	PAS-CHER	4
Translation	'{Digital, Train, The Louvre} products/tickets are cheap'				

Table 6.9: Sequential compound: 'digital', length: 3

A control question is associated to the item in **Baseline-2**.

The question asked in LSF is: *Which museum sells cheap tickets?*

Sequential compounds					
Type	Glosses			Length	
Target	SASS-CL [^] SASS-CL	BON	MARCHE	3	
Baseline-1	CONFUSION	BON	MARCHE	3	
Baseline-2	AVEUGLE	CONDUIRE	BON	MARCHE	4
Translation	‘The washing machine works well’, ‘It’s foggy, but you can walk’, ‘Blind people can still drive’				

Table 6.10: Sequential compound: ‘washing machine’, length: 3

Sequential compounds						
Type	Glosses				Length	
Target	JAPON	SITUATION	POINTING [^] POSS		PIRE	4
Baseline-1	JAPON	SITUATION	ÉCONOMIE		PIRE	4
Baseline-2	JAPON	SITUATION	PROBLÈME	SANTÈ	PIRE	5
Translation	‘The {general, economic, health problem} situation in Japan is getting worse’					

Table 6.11: Sequential compound: ‘suicide’, length: 4

A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *Which country has a worsening economic situation?*

Sequential compounds						
Type	Glosses				Length	
Target	POINTING [^] CŒUR	THOMAS	REFUSER	JOUER	4	
Baseline-1	IMPOSSIBLE	THOMAS	REFUSER	JOUER	4	
Baseline-2	ARRIVER	PAR	THOMAS	REFUSER	JOUER	5
Translation	‘It {is possible, is impossible, so happened} that Thomas refuses to play’					

Table 6.12: Sequential compound: ‘Hypothesis’, length: 4

Sequential compounds						
Type	Glosses				Length	
Target	VOIR [^] PO	GIOVANNI	CURARE	HOMO	4	
Baseline-1	BIEN-SUR	GIOVANNI	CURARE	HOMO	4	
Baseline-2	DECIDER	AVOUER	GIOVANNI	CURARE	HOMO	5
Translation	‘{It is obvious, Of course, It came out} (that) Giovanni is gay’					

Table 6.13: Sequential compound: ‘evident’, length: 4

A control question is associated to the item in **Target**.

The question asked in LSF is: *What is obvious about Giovanni?*

Sequential compounds							
Type	Glosses					Length	
Target	TRUMP	POINTING [^] DIFFERENT	NOUS	FAN	COMMUNISTE	5	
Baseline-1	TRUMP	DÉSIR	NOUS	FAN	COMMUNISTE	5	
Baseline-2	TRUMP	RUMEUR	FUTURE	NOUS	FAN	COMMUNISTE	5
Translation	‘Trump {opposes the fact, wishes, heard the rumor} that we are/will be fans of communists’						

Table 6.14: Sequential compound: ‘disagreement’, length: 5

A control question is associated to the item in **Baseline-2**.

The question asked in LSF is: *Who heard the rumor that we will be fans of communists?*

Sequential compounds							
Type	Glosses					Length	
Target	SASS-CL [^] DUR		VIEUX	MÉMOIRE	QUALITÉ	MOYEN	5
Baseline-1	PORTABLE		VIEUX	MÉMOIRE	QUALITÉ	MOYEN	5
Baseline-2	ÉLECTRONIQUE	RECTANGLE	VIEUX	MÉMOIRE	QUALITÉ	MOYEN	6
Translation	‘The storage capacity of old {hard disks, cellphones, electronic devices} is mediocre’						

Table 6.15: Sequential compound: ‘hard disk’, length: 5

Sequential compounds							
Type	Glosses					Length	
Target	POSSIBLE	IMPLANT	INTELLIGENT	SIGN-NOM	ENTENDRE [^] JAMAIS	5	
Baseline-1	POSSIBLE	IMPLANT	INTELLIGENT	SIGN-NOM	PROFITER	5	
Baseline-2	POSSIBLE	IMPLANT	INTELLIGENT	SIGN-NOM	PUBLIER	DIFFUSER	6
Translation	‘Luke {has never heard, takes advantage of the fact, publicizes and spreads} that, with CI, it is possible to become smart’						

Table 6.16: Sequential compound: ‘never hear’, length: 5

A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *What will Luke take advantage of, which makes it possible to become smart?*

Sequential compounds								
Type	Glosses						Length	
Target	MÈRE [^] PÈRE		DECIDER	ENFANT	PORTER	ÉCOLE	PRIVÉ	6
Baseline-1	DIRECTEUR		DECIDER	ENFANT	PORTER	ÉCOLE	PRIVÉ	6
Baseline-2	PROFESSEUR	FRANÇAIS	DECIDER	ENFANT	PORTER	ÉCOLE	PRIVÉ	7
Translation	‘The {parents, principal, French teacher} decided to move their child to a private school’							

Table 6.17: Sequential compound: ‘parents’, length: 6

Sequential compounds								
Type	Glosses						Length	
Target	VOIR [^] JAMAIS		DOCTEUR	TOUX	RHUME	CONFONDRE	GRAVE	6
Baseline-1	FO		DOCTEUR	TOUX	RHUME	CONFONDRE	GRAVE	6
Baseline-2	SHOCK	QUOI	DOCTEUR	TOUX	RHUME	CONFONDRE	GRAVE	7
Translation	‘It is {never seen, clear, shocking} that a doctor mixes/mixed up a cold and a cough’							

Table 6.18: Sequential compound: ‘never see’, length: 6

centering A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *What did the doctor mix up?*

Sequential compounds								
Type	Glosses						Length	
Target	SKI	OU	SURF	POINTING [^] POSS	MIEUX	QUOI	6	
Baseline-1	SKI	OU	SURF	ADAPTER	MIEUX	QUOI	6	
Baseline-2	SKI	OU	SURF	POUR	POSS	MIEUX	QUOI	7
Translation	‘What’s better {in your opinion, adapted for me, for you}, skiing or surfing?’							

Table 6.19: Sequential compound: ‘in your opinion’, length: 6

centering A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *The signer is asking which of two activities is better for him/her. Skiing is the first one. What’s the second one?*

List of paradigms with simultaneous compounds as targets:

Simultaneous compounds					
Type	Glosses			Length	
Target	FAN	WE-CL [^] SASS-CL	HIP-HOP	3	
Baseline-1	FAN	FÊTE	HIP-HOP	3	
Baseline-2	FAN	PERSONNE	GROUP	HIP-HOP	4
Translation	‘There are fans of hip-hop {dances, parties, groups}’				

Table 6.20: Simultaneous compound: ‘dance’, length: 3

A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *What kind of dance do they love?*

Simultaneous compounds					
Type	Glosses			Length	
Target	SIGN-NOM	CONTACTER	WE-CL [^] SASS-CL	3	
Baseline-1	SIGN-NOM	CONTACTER	BIENTÔT	3	
Baseline-2	SIGN-NOM	CONTACTER	CHARLOTTE	DEUX	4
Translation	‘Jan will contact you {(by) relay, soon, and Charlotte both}’				

Table 6.21: Simultaneous compound: ‘relay’, length: 3

Simultaneous compounds					
Type	Glosses			Length	
Target	CONFERENCE	LINGUISTIQUE	WE-CL [^] WE-CL	3	
Baseline-1	CONFERENCE	LINGUISTIQUE	ENNUYANT	3	
Baseline-2	CONFERENCE	LINGUISTIQUE	COMMENCER	DEMAIN	4
Translation	‘The linguistics conference will (be) {recorded, annoying, start tomorrow}’				

Table 6.22: Simultaneous compound: ‘to film’, length: 3

A control question is associated to the item in **Target**.

The question asked in LSF is: *What is the theme of the conference that will be recorded?*

Simultaneous compound						
Type	Glosses					Length
Target	APPORTER	CINQ	SASS-CL [^] SASS-CL		DIFFÉRENT	4
Baseline-1	APPORTER	CINQ	ADESIF		DIFFÉRENT	4
Baseline-2	APPORTER	CINQ	LIVRE	COULEUR	DIFFÉRENT	5
Translation	‘(You) bring 5 different {bottles, tapes}’ ‘You bring 5 books of various colors.’					

Table 6.23: Simultaneous compound: ‘bottle’, length: 4

A control question is associated to the item in **Baseline-2**.

The question asked in LSF is: *How many books of various colors need to be brought?*

Simultaneous compound						
Type	Glosses					Length
Target	BOURSE	CINÉMA	FAUT	WE-CL [^] ATTRAPER		4
Baseline-1	BOURSE	CINÉMA	FAUT	QUALITÉ		4
Baseline-2	BOURSE	CINÉMA	FAUT	ARGENT	DONNER	5
Translation	‘We need to {get, give money to} the cinema grant’ ‘The cinema grant needs to be good quality’					

Table 6.24: Simultaneous compound: ‘to attain’, length: 4

Simultaneous compound						
Type	Glosses					Length
Target	IX-1	AVOIR	DIPLÔME	ENSEIGNER [^] SIGN		4
Baseline-1	IX-1	AVOIR	DIPLÔME	PROFESSEUR		4
Baseline-2	IX-1	AVOIR	DIPLÔME	NON	FORMEL	5
Translation	‘I have (a) {SL teaching, professor, no official} certification’					

Table 6.25: Simultaneous compound: ‘to teach LSF’, length: 4

A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *What kind of certificate do I have?*

Simultaneous compounds							
Type	Glosses					Length	
Target	OBLIGATOIRE	WE-CL [^] SASS-CL	POLICE	OU	GENDARMERIE	5	
Baseline-1	OBLIGATOIRE	VOIR	POLICE	OU	GENDARMERIE	5	
Baseline-2	OBLIGATOIRE	APPELER	PERSONNE	POLICE	OU	GENDARMERIE	6
Translation	‘You have to {go to, see, call} the police or gendarmerie’						

Table 6.26: Simultaneous compound: ‘to go to’, length: 5

Simultaneous compounds							
Type	Glosses					Length	
Target	FILS	POSS	SIGNE-NOM	PI	BP-CL [^] WE-CL	5	
Baseline-1	FILS	POSS	SIGNE-NOM	PI	ÉTOURDIR	5	
Baseline-2	FILS	POSS	SIGNE-NOM	PI	TRAVAILLER	JAMAIS	6
Translation	‘My son John typically {helps people, has his head in the clouds, never works}’						

Table 6.27: Simultaneous compound: ‘to help’, length: 5

A control question is associated to the item in **Target**.

The question asked in LSF is: *What is typical of my son John?*

Simultaneous compounds							
Type	Glosses					Length	
Target	SIGNE-NOM	FABRIQUER	SAC	TOTAL	PAS [^] CHER	5	
Baseline-1	SIGNE-NOM	FABRIQUER	SAC	TOTAL	500	5	
Baseline-2	SIGNE-NOM	FABRIQUER	SAC	TOTAL	20	JOUR	6
Translation	‘In general/in total, Jean makes/made {cheap bags, 500 bags, bags in 20 days}’						

Table 6.28: Simultaneous compound: ‘cheap’, length: 5

A control question is associated to the item in **Baseline-2**.

The question asked in LSF is: *How many days does it take Jean to make bags?*

Simultaneous compounds								
Type	Glosses						Length	
Target	MAIRIE	ENCOURAGER	WE-CL [^] WE-CL		COURIR	SOLEIL	CHAUD	6
Baseline-1	MAIRIE	ENCOURAGER	PERSONNES		COURIR	SOLEIL	CHAUD	6
Baseline-2	MAIRIE	ENCOURAGER	DÉVELOPPER	ACTION	COURIR	SOLEIL	CHAUD	7
Translation	‘The mayor encourages {marathon, people, developing a program for} running in the hot sun’							

Table 6.29: Simultaneous compound: ‘marathon’, length: 6

Simultaneous compounds								
Type	Glosses						Length	
Target	INJS	FINI	NATIONAL	WE-CL [^] OBJECTIF		MINISTRE	CONQUÉRIR	6
Baseline-1	INJS	FINI	NATIONAL	PAR		MINISTRE	CONQUÉRIR	6
Baseline-2	INJS	FINI	NATIONAL	POURQUOI	LOGIQUE	MINISTRE	CONQUÉRIR	7
Translation	‘The INJS is no longer a national organization {which was the objective when, since, because of course} the ministry took charge’							

Table 6.30: Simultaneous compound: ‘aim’, length: 6

A control question is associated to the item in **Baseline-1**.

The question asked in LSF is: *What is the name of building that the ministry took charge of?*

Simultaneous compounds								
Type	Glosses						Length	
Target	SIGNE-NOM	CONNAÎTRE	LINQUISTIQUE	LSF	PI	WE-CL [^] WE-CL		6
Baseline-1	SIGNE-NOM	CONNAÎTRE	LINQUISTIQUE	LSF	PI	MENTIR		6
Baseline-2	SIGNE-NOM	CONNAÎTRE	LINQUISTIQUE	LSF	PI	CHANGER	FEMME	7
Translation	‘Do you know Johan, the LSF linguist, who always {tries to be best, lies, flirts with women}?’							

Table 6.31: Simultaneous compound: ‘to progress’, length: 6

Chapter 7

Conclusion

In this dissertation, I investigated the domain of compounds in sign languages. Compounding has been documented as a key strategy to enrich the lexicon of SL ([Quer et al. 2016](#) and [Sandler and Lillo-Martin 2006](#)) even in situations of emergent sign languages ([Meir et al. 2010](#)).

At the typological level, several classifications of compounds have been proposed in the literature of spoken languages. The most comprehensive one is summarized in [Bisetto and Scalise \(2005\)](#) and has been slightly adapted to sign language and applied to ASL by [Vercellotti and Mortensen \(2012\)](#). Compounds have been fairly well studied in ASL (a.o., ([Klima and Bellugi 1979b](#)), (?), ([Lepic 2015](#))). The diagnostics for ASL compounds emerging from this work have since been adopted for other sign languages, but this has often been done without performing the language-internal tests necessary to verify their status. In particular, phonological criteria (e.g., reduction, assimilation, etc.) have been used as easy targets to identify compounds in SL. Unfortunately, no study has systematically addressed compounds in SLs other than ASL.

At a formal level, SL compounds offer a varieties of challenges: the grammatical category is only rarely detectable in SL, complicating standard derivational approaches; the fact SLs have two relatively independent manual articulators allows the generative mechanism to create simultaneous compounds which are problematic under any theory of compounds.

This was the situation when I started my thesis. I decided to address the topic of compounding in SL from three main angles: typological/empirical, theoretical and experimental. In the empirical part, I offered a thorough description of compounds in two sign languages: LIS and LSF. In the theoretical part I provided a formal account of how to derive the whole typology of compounds found in these two languages. In the experimental part, I investigated

whether phonological reduction is a sufficient condition to identify compounds in SL.

I briefly summarize here the main results achieved in each of these domains.

At the typological level, the classification of compounds in SL can be addressed by looking at their syntactic relation (subordinate, attributive vs. coordinate), their semantic relation (endocentric vs. exocentric) as well as their prosodic nature (sequential vs. simultaneous). Furthermore, given the complexity of SL lexicon (core lexical items, classifiers, non-native forms), a variety of combinations is potentially available to generate compounds, including stacking of signs to create hypernyms. I adopted these typological approaches to describe compounds in LIS and LSF. I capitalized on the typology of ? and [Vercellotti and Mortensen \(2012\)](#) to investigate the possible combinations including simultaneous compounds and compounds with classifier signs. I applied several diagnostics to assess their status. My major contribution to the general debate on compounding is a more comprehensive typology of classifiers in which simultaneous forms are also taken into account. The question remains open whether simultaneous forms are only possible in sign language or whether spoken languages may have this option too (see below).

At the empirical level this translates into a thorough description of compounds in LIS and LSF. I presented an extensive overview of compounds in LIS and in LSF. I showed that the mechanism of compounding is fairly productive in both languages and that compounds can be found with basically all types of lexical material (core signs, classifiers, initializations, etc.). However, not all combinations are equally attested across the typology of compounds. In LIS, only classifiers are allowed to produce simultaneous compounds, while LSF simultaneous compounds seems to have less lexical restrictions in that they are attested also between core lexical items and seem to be productive. I also focused on the linguistic properties of compounds in LIS and LSF, describing phonological, prosodic, syntactic and semantic processes that may appear in compounds.

At the formal level, one of the challenges of SL compounds is that of identifying the correct grammatical category of signs. Rather than offering alternatives to the standard categorizations of signs/words in nouns, adjectives or verbs as proposed in [Vercellotti and Mortensen \(2012\)](#), I bypassed the problem by adopting a framework in which categorization and compounding are treated as two separate, independent but interacting phenomena. I capitalized on the interaction to offer distinct derivations for sequential and simultaneous compounds. In particular, I

used Distributed Morphology (Embick and Noyer 2007) as a reference framework and Harley (2009)'s proposal to derive sequential compounds. I adapted Snyder (2001)'s proposal to derive simultaneous compounds and Di Sciullo (2005)'s to account for hypernyms. My major contribution to the general debate is that of showing that compounds can be derived in multiple ways depending on their properties and that morphosyntactic derivation is not the only process that affects the combinatorial options of compounding. Postsyntactic processes, especially linearization, have to have access to at least partial representations in order to distinguish between forms that have to be spelled out sequentially or simultaneously.

At the experimental level, I investigated whether phonological reduction is a sufficient condition to identify compounds in LIS and in LSF. The criterion was first proposed for ASL in Klima and Bellugi (1979b). The logic of the criterion is the following: phonological reduction enhances the perception that a form is a single lexical unit, hence the compound is treated as a single sign. In LIS, experimental results showed that phonological reduction is a valid criterion for simultaneous compounds, but cannot be used for sequential compounds, where some reduced tend to be perceived as single signs, but many others do not. In contrast, in LSF, phonological reduction is a valid criterion both for simultaneous and sequential compounds in LSF. In the case of sequential compounds, however, there could be some variation depending on specific compounds which are still perceived as composed by two separate signs. My major contribution here was to show that importing criteria from one SL to another has to be done with extreme caution.

Despite the variety of approaches I followed to understand the behavior of compounds in SL, several questions remains to be addressed in future research. I list here three of them.

Although most of the lexical combinations generate compounds in LIS and LSF, several gaps have been found in the paradigm. Future research will determine whether these are accidental lexical gaps, or whether there are principled reasons behind them, like in the case of simultaneous compounds in LIS where core lexical items were disallowed entirely.

Another domain for future research is connected to the “flexibility” of SL in importing lexical items from foreign systems (e.g., via fingerspelling and initialization) and the productivity of the compounding process. The question to investigate is the extent to which **gestures** (i.e., articulatory material that is highly proximal to sign) can be integrated into the grammar of SL and productively generate compounds. One way to integrate gestures could be via complex

representations very similar to classifiers (see ?) for a similar idea of integrating gestures into the grammar of sign language).

Broadening the perspective, the study of compounds in SL offers unexpected avenues for future research in spoken languages too. The literature on the semantics of co-, pro- and post-speech gestures is growing rapidly (?). If gestures are indeed a real part of the grammar of spoken languages, it may be possible to find simultaneous forms at the lexical level in spoken languages, too.

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