Variation in mouthing occurrence in Greek Sign Language (GSL); the case of register and grammatical class

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Abstract

This thesis explores the mouthing occurrence rates across different registers (informative and narrative) and grammatical classes in Greek Sign Language (GSL). A general consensus has been reached dividing mouth activity into at least two subcategories of mouth actions: 'mouth gestures' and 'mouthings' (see edited volume by Boyes Braem & Sutton-Spence, 2001). Data consist of 45' of video recordings from six native and near-native[1] signers, transcribed using a software tool for annotating multimedia video recordings (ELAN). In an effort to gain some control over the influence of individual variation, all six signers have an example of SL production in both registers. A combination of semantic, syntactic and morphological criteria (Schwager & Zeshan, 2008) has been utilized in order to classify all manual signs for their grammatical class, in an effort to study the potential impact of grammatical class on mouthing occurrence. Statistical analysis using a multivariate logistic regression model (Rbrul) showed both factors of register and grammatical class to be significant predictors of mouthing occurrence (p<0.001), results that comply with similar findings from most SLs studied to date (e.g. Sutton- Spence & Day, 2001; Nadolske & Rosenstock, 2007; Johnston et al., 2015). During the course of this study, I succeeded in identifying specific patterns of mouthing occurrence, thus gaining a better understanding of the way mouthings behave during sign language production.

Keywords: [mouthings; variation; register; grammatical class; GSL].

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[1] Signers with deaf parents are classified as 'native', i.e. those who acquired GSL before the age of three, the pre-lingual learners (Bank et al., 2016), while the 'near-native' term is used to describe a signer born in a hearing family, raised from the age of three in a boarding-school for deaf and Hard-of-Hearing children (HoH).

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Sincere thanks to

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1. GREEK SIGN LANGUAGE (GSL)

Greek Sign Language (GSL) (also called ENG) is a natural visual-gestural language used by Greek deaf, hard-of-hearing (hereafter HoH) and hearing people in Greece (Papaspyrou 1994; Lampropoulou 1997; Hatzopoulou 2008). During the last three decades, the Hellenic Federation of the deaf (HFD) and individual researchers from different disciplines have attempted to estimate the number of deaf people in Greece. According to evidence provided by HFD, it is estimated that there are 8,500 to 10,000 (Lambropoulou 1994) or 12.000 deaf people in Greece (Mavreas 2001). In reference to the more generic term of 'users' of GSL in Greece, Sapountzaki (2015) estimates this number to be as high as 40,000 people, including many L2 users. A more recently published paper on fluency tasks seems to support Sapountzaki's estimations by presenting numbers of children (12,000) and adult (30,000) users of GSL (Vletsi et al. 2012). When examining these estimations, it is important to take into account that not all Greek deaf people use GSL (70% according to Mavreas, 2011) and that there is a large number of hearing people, who have expressed interest in learning the language (Hatzopoulou 2008). Substantial differences between official and unofficial estimations of the size of the signing population have been reported for a number of SLs, thus rendering their validity questionable (Johnston, 2004). The lack of official quantitative data and updated records can also explain the documented difficulty researchers face in order to make an accurate estimation (Vletsi et al. 2012).

GSL is an autonomous language and as such, it can be studied and analysed in all its aspects. It has its own lexicon, morphology, grammatical and syntactical structure (Papaspyrou, 1994). The language shares the same basic characteristics that have been documented for most SLs (Efthimiou & Fotinea,

2014): it is articulated by one or both hands in the space in front of the signer, while it also employs non-manual articulators such as eye gaze, eyebrows, facial expression, head and mouth movements (Hatzopoulou, 2008). The specific mouth movements termed as 'mouthings', constitute the focus of this study.

The first organization of the deaf was established in Greece in 1948, although it is estimated that the language was in use during the 1920s, when the first school and the first organization for the deaf were founded (Hatzopoulou, 2008). The landscape regarding deaf education started to change significantly during the 1980s. For the first time, GSL was used, alongside spoken Greek, as a means of communication in the classroom (Andrikopoulou, 2015).

Like most SLs, GSL is a minority language used within the broader Greek community and, as such, it is has been influenced by spoken Greek to a certain degree (Hantzopoulou, 2008). This influence can be attributed not only to the language contact between a majority and a minority language, but also to the lack of strict regulations regarding the level of GSL proficiency by professionals (e.g. teachers, teaching assistants and other staff members) in deaf education in early years (Sapountzaki, 2015). It was not until the introduction of the legislative act of 2000 (Fek. 78/14.03.2000) on Special Education, when GSL was recognised as the first language of deaf students in the Hellenic State. Following the issue of this legislative act, some knowledge of the language constituted a prerequisite for everyone working in the schools of the deaf and HoH throughout Greece. While some official recognition of the language was achieved, Hantzopoulou (2008) points out that this act focused only on education and not on other aspects of the life of deaf and HoH people in Greece. Therefore, at that stage, further recognition of GSL as an official language of the deaf and HoH remained the main goal of the Greek Deaf community

(Andrikopoulou, 2015). Another legislative act regarding special education was introduced in 2008 (Fek.199/02.10.2008). The act stated that "GSL is the first language (L1) of deaf and HoH students, while the Greek Language is their second language (L2). Students learn the Greek language through its written form while the acquisition of its oral form is a social choice made by each student individually. GSL and Greek are recognised as languages with equal status, therefore the ideal pedagogic approach is bilingual education. Apart from other qualifications, the certified knowledge of GSL is a necessary prerequisite for the employment of teachers and supporting staff at the special education units" (Fek.199/02.10.2008, translation mine).

The most significant change made as a result of this act was the establishment of strict criteria regarding teachers' qualifications. Following these legislations, as well as substantial research on sign bilingualism worldwide (e.g. Cummins, 1984) new educational and pedagogic methods have since been aiming at the establishment of a truly bilingual educational environment for Deaf and HoH students in Greece (Lampropoulou, 2004). However, the 'total communication policy (Sapountzaki 2015:318) used in the schools of the National Protection Institution for the Deaf during the 1980s (Andrikopoulou 2015) did not change dramatically the decades to follow (Hantzopoulou, 2008). This educational policy is described as a combination of some fingerspelled items, spoken Greek and some signed words for semantic clarification (Kourbetis, 1999; Sapountzaki, 2015).

Nowadays the number of students attending the schools for the deaf and HoH children is reducing rapidly (Sapountzaki, 2015; Efthimiou, Fotinea & Sapountzaki, 2018), a phenomenon that has been observed for a number of Deaf

communities, such as the British deaf community (Sutton- Spence and Day, 2001). The Ministry of Education is moving towards the integration of students to special education units in mainstream schools (Efthimiou, Fotinea & Sapountzaki, 2018). At the same time, as the number of cochlear implantation procedures increases substantially the landscape in deaf education is changing. Young members of the deaf community prefer to socialize through social media instead of gathering in the various deaf clubs, whose number is gradually decreasing (Sapountzaki, 2015).

Irrespective of any changes that the community is currently going through, GSL is a vibrant, dynamic language, while the number of hearing professionals who take an interest in learning the language (mostly people involved or aspiring to get involved with deaf education) is constantly increasing (Sapountzaki, 2015). During the course of preparing this thesis, and more specifically on the 7th of September 2017, GSL was recognised as an official state language with equal status to spoken Greek. The State is taking measures "to promote it and to meet all the communication needs of the Deaf and HoH citizens" (Fek. 65/07.09.2017, translation mine).

1.1. Sign Language Research in Greece

Research on GSL started in the 1980s. Initially, the point of focus for most researchers was to identify and transcribe the basic elements of the language (Antzakas, 2008). The first official lexicographical projects include those presented by Logiadis and Logiadis (1985) and by Triantaphilidis (1990). More recent lexicographical attempts by Efthimiou et al. (2001) include the 'dictionary of computing signs' called PROKLISI, a 'multimedia dictionary of GSL Basic Vocabulary (comprising of 300 signs)' and A Children's Dictionary of GSL called

'NOEMA' (1999-2001) (Efthimiou, Fotinea & Sapountzaki, 2018).

Lampropoulou (1997) conducted substantial research on language development, while her focus initially revolved around some basic characteristics of GSL signs, such as location, handshape, etc. Papaspyrou (1998) applied the theory of generative-transformational grammar to the linguistic analysis of SLs; he attempted to form a detailed comparison of signed and spoken language using Chomsky's theory and to create a systematic form of written representation of a SL. The system could be used to describe different aspects of these visual-gestural languages. Early in his research, Kourbetis (1987) conducted a comparative study regarding the academic achievement of two separate groups of children born in deaf and hearing families respectively.

In the 21st century, more linguistic research on GSL has been undertaken. Kourbetis and Hoffmeister (2002) described the basic characteristics of name signs in GSL and the name-giving process within the Greek community in general and the Greek Deaf community in particular. Hatzopoulou (2008) investigated the acquisition of pronominal signs in GSL, and Sapountzaki (2005) analysed the free functional elements of tense, aspect, modality and agreement as possible auxiliaries in GSL. Antzakas' doctoral dissertation (2008) constitutes the first systematic research focusing on the different mechanisms employed by GSL for marking negation (also see Antzakas & Woll, 2001). In his sociolinguistic research, Mavreas (2011) focused on the language planning of GSL, while working within the field of morphology, Andrikopoulou (2015) analysed compounding and compounds in GSL. Other studies on GSL revolve around the creation of assessment tasks of verbal fluency (Vletsi et al., 2012), as well as the assessment of deaf children's writing skills in comparison to their GSL language

proficiency skills (Koutsoubou 2004).

In recent years, there is a shift of interest towards the creation of electronic educational material, easily accessible to deaf students and their family (Andrikopoulou, 2015). The Institute for Language and Speech Processing (ILSP) works towards utilising 3D technology to create educational material accessible to deaf and HoH students (Efthimiou & Fotinea 2014).

In summary, while there has been some research on fundamental characteristics of the language, most researchers point out that linguistic research of GSL is still in its early days (Antzakas, 2008) and that the need for more empirical data and linguistic research on the language remains substantial (Hatzopoulou 2008).

2. THEORETICAL BACKGROUND

It is the goal of this chapter to present a brief review of the ways in which mouth actions are used in sign language production by deaf signers and the factors that have been observed to have an effect on how mouth actions are articulated. Section 2.1 of this chapter will present a brief introduction of mouth gestures and mouthings and their categorization. Section 2.2 will focus exclusively on mouthings, emphasizing on the frequency of their occurrence, their functionality and their linguistic status, whereas the chapter concludes with section 2.3 which includes the questions that have motivated this project.

2.1. Mouth actions in SLs

Since the late 1970s, when the first sign linguists focused their research on non-manual elements, it has been acknowledged that SLs use multiple non-manual articulators, such as the upper part of the body, the head, and parts of the face, in order to disambiguate between homonymous manual signs, to modify and/or complement the meaning of the co-occurring manual sign by adding, for instance, adverbial or adjectival information, to mark different sentential types, such as questions (e.g. raised eyebrows have been considered an indication of questions for some SLs), to structure the discourse, to express emotions etc. (Pfau & Quer, 2010). For GSL, non-manual elements seem to function as has been described for other SLs (Papaspyrou 1994, 1997, 1998) with the exception of "the backwards tilt of the head, which is distinct for marking negation in GSL" (Antzakas & Woll, 2001:604) (see also Section 4.5.2.5). Amongst non-manuals in general, the importance of the mouth as a conveyor of meaning stands out.

"The mouth is a prominent site of non-manual activity and movements of the mouth are an obvious accompaniment to manual signing" (Johnston et al., 2015:5).

It is well established in literature that these mouth movements or mouth actions are usually divided by researchers in two distinct categories: 'mouth gestures and mouthings' (Boyes Braem & Sutton Spence, 2001). The first category includes the mouth movements seen as inherent elements of SLs, while the latter category of mouth movements is thought to originate from the SpL(s) of the surrounding community. The focus of this study pertains exclusively to mouthings but I will first include a brief presentation of mouth gestures.

2.1.1 Defining mouth gestures

In more detail, the term 'mouth gestures' is used to describe all communicative mouth movements used in sign language production, which are not mouthings, i.e. they do not resemble words from the dominant SpL (Bank et al., 2016). They are non-manual mouth actions which can add adjectival or adverbial meaning to the manual sign they accompany (Crasborn et al., 2008). They are thought to function as an intrinsic part of the morphology of SLs (Vogt-Svendsen, 2001; Sutton-Spence, 2007), while they may occur in sign language production "lexically bound to a manual sign" or not (Crasborn et al. 2008: 50). They co-occur mainly with verbs and morphologically more complex signs (Keller 2001), or "productive lexical items" (Sutton-Spence, 2007:148). A frequently cited example of a mouth gesture for BSL (and other SLs) is, for instance, the protrusion of the tongue adding the adverbial meaning of, for example,', 'without control', or 'boring' etc. (Lewin & Schembri, 2011). Unlike the case of the protruded tongue, which adds

meaning to the manual sign, Bergman and Wallin (2001) also describe cases of lexical mouth gestures which do not have a particular meaning when analysed separately from the manual sign they co-occur with. Those mouth gestures can, in many cases, have a disambiguating role like in the case of the two manual signs BE-CRAZY-ABOUT and COMMIT-SUICIDE described by Hatzopoulou (2008). The researcher notes that a mouth gesture distinguishes between the two signs as it accompanies the first sign but not the second. Mouthings are also frequently analysed for their disambiguating role (see Section 2.2.2).As far as the terminology used to describe these mouth patterns is concerned, some of the terms that have been used are 'mouth arrangements'(Sutton-Spence & Day, 2001), 'oral components' (Woll, 2001) but 'mouth gestures' has come to be the most widely used (Boyes Braem & Sutton-Spence, 2001).

2.1.2 Defining Mouthings

Despite the documented significance of non-manuals in general, and mouth actions in particular, in early years, research on mouth actions focused primarily on mouth gestures since they were viewed as central to sign language production (Boyes Braem, 2001), contrastingly to mouthings. If one examines this "trend" within the context of the established eagerness of sign linguists to present evidence proving the independence of SLs and their true status as fully-fledged languages (Schermer, 2001), it seems logical that scholars would initially focus on mouth gestures as they were considered not to have stemmed from SpLs, unlike mouthings. Nonetheless, the linguistic status of mouthings remains a matter of lively debate amongst researchers. A considerable amount of recent research has focused on mouthings, especially following the Leiden Workshop in 1998 and

extensive work in 2001 on mouth actions as important articulators (Boyes Braem & Sutton Spence, 2001).

Nowadays, research on mouthings (and mouth gestures) is focusing on introducing new approaches regarding their study, based on larger corpora and the design of machine-readable material. The main goal for many researchers is to produce new, easily accessible data, which can contribute to a cross-linguistic comparison of SLs (e.g. see Crasborn et al., 2008 for their cross-linguistic analysis of the frequency distribution and spreading behaviour of mouth actions in three European SLs). This becomes possible with the introduction of corpora for SLs (such as the BSL, the Auslan, and the NGT corpus), the use of ID-glosses, which are widely used in the new corpora for SLs (Johnston, 2008b) and the design of detailed corpus annotation guidelines, such as those introduced for the Auslan corpus (Johnston, 2016). Through these processes, a phenomenon such as mouthings could be observed and studied cross-linguistically.

As for the various definitions proposed for mouthings and their relation to SpLs, Sande and Crasborn (2009:79) define mouthings as "movements of the lips or mouth, derived from lexical items of the surrounding spoken language" Ebbinghaus and Hessman (2001:133), identify them "as a particular realisation of spoken language words", while Johnston et al. (2015:58) point out that mouthings are "complete or partial silent articulations of the spoken words of the ambient spoken language". Mouthings are also described as visual representations of the spoken words, "articulated without vocalisation and the prosodic features of spoken words" (Vogt-Svendsen, 2001:31) and "semantic gestures" adapted to the visual-gestural modality and structure of the manual sign (Ajello et al., 2001:235). For instance, a manual sign

in GSL glossed as HOUSE[2] may be accompanied by the mouthing "σπίτι" ´('house'), which is articulated simultaneously with the manual sign (usually) without vocalization (P4: Narrative[3]).

For most researchers, the definition of mouthings springs from the inevitable comparison of the two established categories of mouth actions with one another, regarding their origins. For the mouth movements that stem from SpLs, the terms that have been used by researchers include those referring to them as 'spoken components' (Schermer, 1990), 'word pictures'(Vogt- Svendsen, 1981; Schroeder, 1985) and of course, 'mouthings' (Boyes Braem & Sutton-Spence, 2001), a term which started being more widely used after the Leiden workshop on mouth actions in 1998 (see the various contribution in Boyes Braem & Sutton-Spence, 2001).

During the Leiden workshop, the contributors attempted to reach consensus regarding the terminology used for the two distinct categories of mouth movements. Some of the terms were avoided since their translation did not work in other SLs or because they were considered misleading regarding the real nature of the linguistic phenomenon described by the proposed term (Boyes Braem, 2001). Ultimately, the contributors never reached full consensus, but the terms 'mouthings' and 'mouth gestures' prevailed. Although sign linguists present different theories regarding mouth movements, most of them have adopted those two terms. During the course of this study, I also use these terms.

2.1.3   Categorising mouth activity

Recently, presenting a comparative study of mouth actions cross-linguistically, Crasborn et al. (2008) proposed a detailed categorization scheme for mouth actions. In

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[2] Capital letter are used here for manual gloss and lowercase letters for mouthings.
[3] The parenthesis provides information about the participant (1-6) and the register where the specific example is found.

their typology, they accept the dual distinction between mouthings (M-types) and mouth gestures, but further divide the latter into four categories, namely A-type, E-type, 4-type and W- type mouth gestures.

The A-type category refers to mouth gestures with adverbial or adjectival function. These types of mouth gestures have been observed in most SLs studied to date (e.g., Bergman, 1983 for SSL; Liddell, 1980 for ASL; Sutton-Spence & Woll, 1999 for BSL etc.) and are thought to combine with the manual sign, in a productive manner, in order to modify or complement the meaning of the manual sign. Sandler (2009) notes that although mouth gestures in general depend on their context for meaning, thus exhibiting frequent variation, those which add adverbial or adjectival information to the manual sign [like the example of puffed cheeks used to depict the large size of an entity, as described by Bank, Crasborn & van Hout, 2016)] are highly conventionalised and therefore they should be treated as linguistic elements.

The E-type category includes mouth gestures that do not carry additional meaning like the A-type category. They parallel the movement of the hands and are considered obligatory in sign language production. Therefore, they are included in the lexical description of the sign (Crasborn et al. 2008). The category of semantically empty mouth gestures is close to what Woll (2001) termed 'echo phonology'. Since movements of the hands and the body influence the use of the mouth (Bergman & Wallin, 2001), instances of mouth gestures in this category include cases of mouth movement mirroring the movement pattern of the manual sign, like in the case of the GSL sign 'DISAPPEAR', whose starting point is accompanied by the opening of the mouth, which then closes abruptly to echo the closing of the hands (also described for other SLs, such as LIS - see Fontana, 2008).

The 4-type category presents mouth gestures characterized by their "enacting"

nature. In this category Crasborn et al. (2008) include those mouth gestures that enact movements of an actual mouth (biting, chewing, kissing etc.) This type of mouth gestures are also described in detail by Woll (2001) and Sutton-Spence and Day (2001).

The W-type category includes mouth gestures which should be examined as part of a whole-face expression. In this category, the mouth is not independent and usually used to express emotions. This type of mouth gestures are not considered conventionalised as they exhibit significant variability amongst signers. Therefore, they are excluded from the linguistic analysis in most research projects as they are perceived gestural in nature (Crasborn et al. 2008; Johnston et al., 2015). Instances of W-type mouth gestures may be used to express surprise/shock, fear, etc.

The M-type category refers to mouthings and is described as being associated lexically to the accompanying manual signs. Other categorizations schemes focusing specifically on mouthings have been proposed to describe their form, their frequency of occurrence and their interaction to the accompanying manual sign, as described in the next Section.

2.1.3.1 Types of Mouthings

Banks et al. (2011) proposed for NGT a threefold classification of mouthings into:

1. 'standard mouthings': mouthings semantically relevant to the manual sign they accompany, occurring in high frequency with certain manual signs, e.g. the mouthing "have" co-occurring in high frequency with the manual sign HAVE for Auslan (Johnston et al., 2015) (see also Section 7.5).

2. 'mouthing variants': mouthings that differ from the standard mouthing which would be anticipated to co-occur with a certain manual sign, e.g. the mouthing

"talk" co-occurring with the manual sign SIGN to construct the meaning "sign language interpreter" (example taken from Banks et al., 2011.for NGT)

3. 'overlaps': mouthings which do not relate to the manual sign in any way.

The most recent attempt of classification is made for ISL by Mohr (2014), who proposes six types of mouthings, including multiple subcategories. On his critical evaluation of Mohr's work, Banks (2015) characterises her classification of mouthings as the most detailed one provided so far, without failing to express his scepticism on certain points, mainly with regards to mouthings which could simultaneously belong to more than one of the proposed categories. In this project, I do not use any sub-categorisation of different types of mouthings.

2.1.4. Mouth actions and further considerations

Nowadays, a number of researchers argue that a clear-cut, static, dual distinction between mouth gestures and mouthings might be an oversimplification of the nature of mouth actions (e.g. Johnston et al., 2015). In previous years, researchers such as Vogt-Svendsen (2001) have even pointed out that the two categories of mouth gestures and mouthings have many linguistic similarities (especially in terms of functionality), so much so that any observed differences may not be sufficient for researchers to propose and sustain a clear distinction between the two (Vogt- Svendsen, 2001). Keller (2001: 205) also argues that their distinction has been over- emphasised in literature. The researcher notes that deaf signers identify mouth actions visually through their "motor articulation patterns" and therefore mouth gestures and mouthings are relatively similar to one another. Although the two are articulated in the mouth similarly, Keller (2001) clarifies that the level of lexicalisation and the functions the two categories of mouth actions serve are not

the same. Contrastingly, in their work on DGS, Ebbinghaus and Hessmann (2001) argue extensively in favour of the two separate categories.

In reference to the relationship between the two categories and their use in sign language production, mouthings and mouth gestures are not usually considered interchangeable with one another (Keller, 2001). At the same time, Fontana (2008) describes a few cases of manual signs being paired either with a mouth gesture or a mouthing depending on a variety of factors, such as the overall nature of the communicative event, the identity of the addressee or the function of the sign on the sentential level. She presents cases of signs being paired with a mouth gesture when the manual sign was used as a verb and with a mouthing when it was used as a noun. In the current dataset, the sign glossed as MOTORCYCLE/ DSM: MOTORCYCLE-MOVING3 was paired with the mouthing "μηχανή" ("motorcycle") when the signer's intention was to refer to the entity, and with a mouth gesture, denoting the noise of a vehicle driving off, when the sign was classified as a verb (P2: Narrative). Although mouthings were not used as an indication of grammatical class for reasons pertaining to circularity (see Section 4.1.1), mouth gestures were perceived as an additional indication of the manual sign's grammatical class during grammatical class assignment (see also Section 4.4.4).

Overall, scholars adopt different approaches regarding the analysis of the nature of the various actions and their transcription. Some of the most widely used transcription methods are presented here.

2.1.4.1 Transcription

Mouthings are usually transcribed with the use of SpL orthography, as full (or

partial) words of the surrounding SpL. Researchers have raised serious concern regarding the use of the alphabetical system for the transcription of mouthings (Keller, 2001; Vogt-Svendsen, 2001 etc.), as it could be misinterpreted to imply that mouthings are articulated identically to spoken words. Closer examination reveals that, in many cases, the differences in the articulation of mouthings and spoken words are substantial, so much so that researchers underline the fact that identifying what is actually mouthed could be challenging for researchers during the transcription process (Johnston et al., 2015). Keller argues that the standard spelling rules of a SpL lead the annotator to comply with these rules regardless of what is actually mouthed. Therefore, subtle differences are lost or additional information is added and the -already quite technical- transcription includes information which does not always portray what the signer is actually mouthing. This led the researcher to present a kinematic model for the transcription of mouth movements, which focuses on the representation of the way the mouth moves during signing. Vogt- Svendsen (2001) also proposes a system of graphic symbols, which she argues that should be used to describe all mouth actions. Sutton-Spence and Day (2001) adopt the orthographic system for the transcription of mouthings but they introduce a different system for mouth gestures. Their system uses numbering codes to describe the movement of the mouth, the jaw, the cheeks, etc. To this day an orthographical system is still the transcription scheme used more widely, especially for mouthings. In lack of a more methodologically sound transcription scheme, I also adopt the orthographical approach for the present dataset (see also Section 5.3).

2.2 Mouthings

2.2.1 Occurrence of mouthings

The occurrence of mouthings during sign language production has been reported to be influenced by a variety of linguistic, social, cultural and individual factors (Boyes Braem, 2001). Overall, a number of scholars report that mouthings co-occur with over 50% of their transcribed data (e.g. Schermer, 2001; Sutton-Spence & Day, 2001; Ebbinghaus & Hessman, 2001; Boyes Braem, 2001; Bank et al., 2015, etc.).

In studies of mouthings, the nature of manual signs co-occurring with mouthings has been of particular interest for sign linguists. A number of studies have focused on how mouthings are related to sign type (e.g. Johnston et al., 2015) and sign grammatical class (e.g. Sutton- Spence & Day, 2001; Nadolske & Rosenstock, 2007; Johnston, et al, 2015).

With regard to sign type, fingerspelled items seem to favor mouthing co-occurrence quite strongly for a number of SLs (Nadolske & Rosenstock, 2007; Johnston et al., 2015). Brentari (2001) suggests that fingerspelling and mouthings are interrelated since they both could be viewed as borrowing mechanisms used to introduce lexical concepts from the surrounding SpL into the structure of the SL. In that sense, if fingerspelling in not commonly used in a SL (e.g. in LIS or, GSL[4]) then the percentage of mouthings would be higher in that particular SL (Boyes Braem, 2001; Ajello et al., 2001).

As for the grammatical class of the manual sign, nouns seem to also favour mouthing occurrence (Johnston et al., 2015). Generally, most scholars agree that

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[4] As noted by Ajello (2001) and Hantzopoulou (2008) respectively.

the items that convey semantic information in an utterance, i.e. the lexical categories, not the items exhibiting a more grammatical function (such as the various functional categories) are more likely to be accompanied by mouthings (Hohenberger & Happ, 2001). It has also been claimed that signs with a more complex morphology, which "have aspects of their handshape, movement and/or location modified meaningfully" (Johnston et al., 2015:58) seem to disfavour the occurrence of mouthings. While mouthings are reported to accompany mostly nominal signs, some categories of verbs, adverbials and other function words are usually paired with mouth gestures.(Johnston et al., 2015). Plain (or 'non-modified' as Vogt- Svendsen, 2001 terms them) verbs, such as KNOW, THINK, EAT, TRY, WORK, etc. are morphologically simpler than other verbal categories and have been reported to co- occur more frequently with mouthings than other lexical categories for a number of SLs (e.g. Sutton- Spence & Day, 2001 for BSL). Inflected verbs, i.e. verbs articulated with varying beginning and/or end points to encode information about their arguments or locations, such as GIVE, PAY, PUT, LOOK etc., are usually reported to exhibit stronger resistance towards mouthings than plain verbs (Hohenberger & Happ 2001; Zeshan 2001; Crasborn et al., 2008), with the exception of a recent project on Auslan (Johnston et al., 2015), which reports on slightly higher percentages of mouthings co-occurring with indicating than plain verbs (see Section 4.6.1.1.1).

The strongest resistance towards mouthings has been documented for the signs Liddell (2003) terms as 'depicting verbs', i.e. signs articulated with a classifier[5] handshape. They are used to describe actions or states, but what distinguishes this category from other verbal categories is that aspects of their

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[5] Alternatively, Cormier et al. (2012) used the terms 'depicting handshape units' and 'depicting handshapes' instead of the term 'classifier'.

meaning are depicted with the incorporation of the classifier handshape (Liddell, 2003) For instance, in the present dataset a signer uses the manual sign glossed as DSM: PERSON-GETS-OFF-VEHICLE (P2: Narrative) which is articulated using a 2-DOWN handshape to identify the referent, i.e. a man getting off his bike. These verbs have been analysed as having both linguistic and gestural elements (Cormier et al., 2012), which has caused substantial controversy in the literature (e.g., Liddell, 2003). They are considered morphologically complex and they have been frequently observed to resist mouthings (Nadolske & Rosenstock, 2007; Johnston et al., 2015, etc.). Reflecting on this observation, Mohr (2014) argues that although a rare phenomenon, depicting verbs, and inflected verbs in general, have been observed to be accompanied by lexical mouthings, under certain circumstances, for ISL. Such instances led the researcher to introduce sub-categories for these mouthings in her detailed classification of several types of mouthings (see Section 2.1.3.1). In such cases, in which a depicting verb may be accompanied by a mouthing, the mouthing could be used as a discourse marker (see Section 2.2.2 for the discourse and other functions of mouthings).

For Indo-Pakistani Sign Language (IPSL), Zeshan (2001) includes in her analysis a set of characteristics that all words, which serve as sources of mouthings from the surrounding SpL, share. She argues that the words used in mouthings rarely consist of more than two syllables, they usually belong to the everyday vocabulary, they are phonetically and phonologically simple and they are not (usually) articulated in their inflected form. Nevertheless, mouthings of inflected verbs in their imperative form have also been observed for IPSL. For DGS, Hohenberger and Happ (2001) argue that mainly the stems of the words are mouthed and they support their argument with the example of an adult signer who communicates using Signed German. The woman participant in their study uses mouthings nearly with every manual sign, but in the case of inflected verbs she only mouths the citation form of the verb.

Other factors reported to influence the frequency of mouthings include the effect of register, as a number of scholars has found a substantial effect of this factor in the percentage of mouthing use, with informative signed texts reported to favour mouthings more than narratives (e.g., Sutton- Spence & Day, 2001 for BSL, Nadolske & Rosenstock, 2007 for ASL; see Section 3.1.1).

Educational policies and cultural factors of different countries, such as the social status of the surrounding SpL have also been observed to influence the occurrence of mouthings. In Germany, the oral educational policies of deaf education in the country are thought to play an important role in the frequent use of mouthings, according to Keller (2001) (see also Section 2.7). In Switzerland, the propensity of signers to mouth extensively during sign language production could be perceived as the signers' intention to culturally identify with one of the surrounding SpLs, (Boyes Braem, 2001).

As for the individual factors, i.e. those relating to the linguistic background of the signer, including their age, linguistic background and age of language acquisition have been observed to influence the percentage of mouthings used by individual signers in various SLs (Sutton Spence and Day, 2001; Raino, 2001, etc.) (see also Section 7.4). The sample of participants included in the current study (4 males and 2 females) is not large enough to test for the potential influence of factors relating to linguistic background.

Regarding the issue of the consistency of mouthing occurrence, different linguists investigated how often certain mouthings co-occur with a particular manual sign (e.g. Banks et al., 2011). Mouthings co-occurring with certain manual signs at high rates of frequency have been described as 'standard mouthings' (Banks et al., 2011, see also Section 2.1.3.1). Banks et al. (2011) found for the

NGT signs which were paired with more than one type of mouthing that, in most cases, there was at least a single mouthing related to the core meaning of the manual sign, which was observed to appear more frequently. Nevertheless, even a standard mouthing is not always used throughout the same dataset in an obligatory manner. There are documented instances in which the standard mouthing was either replaced by a mouth gesture or did not occur at all in Auslan (Johnston et al., 2015). I would need to draw from a larger database in order to trace potential cases of standard mouthings for the current project.

2.2.1.1 Mouthing and manual sign co-occurrence

The mouth and the hands are simultaneously used during signing, but the manual sign and the mouthing are rarely completely synchronised (Hohenberger & Happ, 2001). The researchers also argue that the manual sign is the one that provides the time slots and mouth movements must comply with these slots.

There are techniques employed by signers to achieve this synchronisation. Mouthings, being subordinate to the manual sign and the time slots it offers, may be articulated in full, they may be reduced, some syllables may be lengthened and some may be excluded from articulation, in order to synchronise with the co-occurring manual sign (Ajello et al., 2001). Zeshan (2001) adds that it is also a semantic type of subordination, since the mouthing is not only synchronised with the manual sign, but it also becomes semantically significant through its co-articulation with the manual sign (Hohenberger & Happ, 2001). In reference to this synchronisation, Pfau and Quer (2010) pay special attention to reduced or partial mouthings and the linguistic device of 'reduplication', which is applied in order for the manual sign to coincide with the accompanying mouthing. Mouthings reduplicate so they can align

themselves with a sign that is also reduplicated. If the manual sign is reduplicated so that the signer can add, for example, the information of plurality and is therefore articulated multiple times, the mouthing could either be articulated the same amount of times or it could stretch over all the reduplicated signs in order to match the start and end point of the repeated manual sign (Vogt-Svendsen, 2001). In the present dataset, I encounter various instances of the manual sign reduplicated for plurality, with the accompanying mouthing being equally reduplicated, e.g. the manual sign SHOP occurs reduplicated three times in the GSL data (P1: Narrative) to describe the existence of a lot of shops on a street, each time accompanied by the mouthing 'μαγαζί' ('shop').

SL researchers frequently point out that mouthings can stretch and spread to the following (progressive spreading) or the previous sign (regressive spreading), with the first type of spreading being significantly more frequent according to empirical data (88%-12% respectively[6])(Sandler, 1999; Boyes Braem 2001; Crasborn et al., 2008; Pfau & Quer, 2010; Bank et al., 2015, etc.). Cases of spreading include only those instances where the mouthing spreads over 50% of the adjacent sign (Bank et al., 2015). The frequent occurrences of mouthings starting before or spreading over their target sign led to a number of studies on spreading behaviour and the functions it serves (e.g., Bank et al., 2015). For DGS, Hohenberger and Happ (2001) distinguish between stretched mouthings that carry independent information (as in their example of the mouthing 'breakfast' occurring stretched across multiple manual signs such as EAT DRINK/COFFEE EAT, thus providing vital semantic information and a more specific reading of the co-occurring manual signs) and redundant mouthings, i.e. mouthings whose meaning is a translation of the manual sign and do not serve a

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[6] Data taken from Johnston et al. (2005)

specific purpose. In both cases the mouthings stretch over multiple signs in order to synchronise temporarily with the co-occurring manual signs.

Stretched mouthings are viewed by many as 'conjunction mechanisms' used by a signer aiming at the establishment of prosodic constituents (Nespor & Sandler, 1999; Boyes Braem, 2001). Statistically, it is more likely that the source of the spreading is a lexical sign and the target a function sign, e.g. a pointing sign or a classifier, as it has been documented for most SLs studied to date (Sutton-Spence, 2007; Crasborn & van Hout 2008; Mohr 2014 etc.). Indexical signs like the sign PT: LOC: THERE (P3:Narrative), used in example 1, depend on the context for their meaning and they are rarely produced with their own mouth pattern (Sutton-Spence, 2007).See the example:

(1)

| Mouth: | 'Κίνα' ('China')_____ (cont.) a |
| Manual: | CHINA   PT:LOC:THERE |

Meaning: 'China is there' (P3: Narrative)

In this particular example, the mouthing stretches over both signs. The signer is assigning a specific location in the signing space for China. Later in the discourse he does the same for Germany. Then, after both countries are assigned a specific location, he maps the trajectory of an aircraft flying from point A (China) to point B (Germany) (P3: Narrative). The mouthing "Κίνα" ("China") is stretched over the pointing sign to combine these two signs into a single constituent; thus assigning a location in space to the country of China is accomplished.

While examining cases of stretched mouthings in ISL, Mohr (2014) argues that grammatical class should also be regarded as a defining factor with respect to the spreading behaviour that mouthings exhibit. The researcher also claims that instances

in which grammatical class influenced the spreading behaviour of mouthings make up for one-third of the overall spreading cases identified in her dataset. Oh the other hand, researchers such as Pfau (2009) claim that this kind of spreading is not common. During the course of this study all manual signs and mouthings are going to be identified for their grammatical class (see Chapter 4), but cases of stretched mouthings are not going to be studied separately.

2.2.2 Functions of mouthings

There is indeed no consensus amongst researchers regarding the level of integration of mouthings in the structure of SLs. Nevertheless, most researchers agree that they serve a range of lexical, grammatical, stylistic and prosodic purposes (Boyes Braem, 2001).

For a large number of European SLs it has been observed that mouthings are used by signers in order for them to disambiguate between two homonymous signs (i.e. performed with the same manual sign), whether they are semantically related or not (Ebbinghaus & Hessmann, 1996; Schermer 1990; Pimia, 1990, Raino, 2001 etc.). For instance, for GSL the same manual sign glossed as MASCULINE is used for the signs MAN and BOY and therefore a co-occurring mouthing could provide the extra semantic information to disambiguate between these two, semantically related manual signs. Especially for cases of semantically unrelated signs, the element used to distinguish between the two meanings, except for the overall context, is the mouthing. Ajello et al. (2001) call these cases of manual signs 'homophones', which are further disambiguated through the use of mouthings.

Except for their disambiguating role, mouthings can also offer a closer description of a manual sign's meaning. The meaning usually corresponds to a number of different (but semantically related) word-meanings (Rainò, 2001). In the current

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dataset, the sign glossed as GROUP is almost in every instance paired with a mouthing that further explains its intended meaning in a specific context. In different instances, the signers pair the manual sign with different mouthings such as: "ομάδα" ("group"), "επιτροπή" ("committee") or "κόσμος" ("people").

Within this context of semantic clarification, Ajello et al. (2001) provide examples of hypernyms being further specified through the use of the appropriate mouthing (e.g. FISH/tuna, example taken from Ajello et al., 2001). Mouthings, therefore, could also be viewed as a linguistic device utilised for the production of new, more specialised lexical items (Boyes Braem, 2001).

On the lexical level, instances of mouthings identified as code-switches usually include those articulated with "proper names or nominal concepts not commonly used in deaf culture" (Boyes Braem, 2001:110). These mouthings are considered to be used in order to provide the information for which there is not a conventionalised manual sign (yet) (Boyes Braem, 2001). These proper names and nominal concepts could also be further specified by the use of fingerspelling or the combination of fingerspelling with mouthings, depending on the SL in question. Nevertheless, lexical gaps filled only with the use of mouthings are not very common since the introduction of new signs occurs naturally for SLs, as for all languages (Hohenberger & Happ, 2001). Therefore, it is important to point out that the choice of a certain mouthing to provide clarification of the intended meaning is not to be perceived as the only mechanism these visual-gestural languages have at their disposal (Hohenberger & Happ, 2001). It should rather be interpreted as the signer using elements originating from a more standardised language, i.e. the surrounding SpL (Fontana, 2008). For LIS mouthings are used to fill lexical gaps only in the case of proper names, neologisms and toponyms (Ajello et al., 2001). For late learners,

cases of mouthings used to fill lexical gaps are reportedly more common than early learners, even if there is a conventionalised sign used frequently within the deaf community (Boyes Braem, 2001). According to Boyes Braem (2001), this might be due to a more limited vocabulary late learners may have at their disposal (in comparison to early learners) or due to the signer's intention to emphasise being fluent in a spoken and signed language (Raino, 2001).

On a grammatical level, Rainò (2001) argues that signers often manipulate elements of the dominant SpL to establish certain functions within a SL. For the case of mouthings in particular, she argues that they are exploited in order for the signer to highlight those cases in which the sign is used as a noun and not as a verb. According to this argument, signs which are semantically and formationally related (e.g. FOOD/EAT) seem to be articulated almost identically in FinSL. For FinSL, Rainò (2001) points out that, in those instances, when the sign is used as a noun it is accompanied by a mouthing (e.g. when the intended meaning is FOOD the mouthing "food" would probably occur), but when it is used as a verb (e.g. EAT) it would be expected to be paired with a mouth gesture. She argues that in those instances these mouthings could be viewed as 'noun markers', used to mark the grammatical class of the manual sign they accompany during signing (Rainò, 2001:44).This claim is not absolute and it can be rather misleading in cases of grammatical class identification (see Section 4.1.1).

Mouthings can also have a morphemic function (Pfau & Quer, 2010). Depending on their interaction with the manual sign, mouthings can be distinguished in free or bound morphemes. Vogt-Svendsen (2001) identifies for NSL cases of mouthings functioning as bound morphemes, used to add semantic information, while being simultaneously articulated with a nominal manual sign, e.g. the manual sign

PULLOVER being paired with the mouthing of the colour adjective "red" to express the meaning "red pullover"). Ebbinghaus and Hessman (2001) also report combinations of manual signs and mouthed words in DGS, with the latter adding semantic information to the manual sign, e.g. manually signing HAIR while mouthing "blonde".

Cases of mouthings functioning as free morphemes, i.e. not being accompanied by a manual sign and therefore being the sole carriers of the intended meaning, are discussed by several researchers for a number of SLs (e.g. Vogt Svensden, 2001; Boyes Braem, 2001) (see Section 7.3.1). These cases are treated as code-switching to the matrix SpL in Boyes Braem's research (2001).

Mouthings can also be used to express negation. Several ways of expressing negation have been documented: conventionalised manual signs, non-manual facial signals (head tilt/ head shake, raised eyebrows etc.) and mouth actions, which express negation. On his extensive work on negation in GSL, Antzakas (2008) states that in GSL mouthings play an important role in expressing negation in those cases in which negative head markers are not present. Instances of negation being expressed through the mouthing alone have also been reported for other SLs (e.g. for DSGS by Boyes Braem, 2001).

Mouthings have also been reported to function as a means of showing emphasis (Boyes Braem, 2001). In cases in which mouthings may seem redundant- since their use does not add semantic information to the manual sign- Boyes Braem (2001) suggested mouthings can generally help the signer highlight specific aspects of the discourse, which require more attention. For example, in my GSL dataset one of the signers uses the manual sign IN-SECRET (P6:Narrative), which he pairs with the mouthing "κρυφά" ("secretly"), accompanied by raised eyebrows, or the same signer

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using the manual sign IMPORTANT, while mouthing "σημαντικό" ("important"), again with raised eyebrows in the same story.

Mouthings can be used to introduce or refer back to previously mentioned referents throughout the discourse, thus contributing to the establishment of cohesion (Fontana, 2008). Take for example the infrequent co- occurrence of mouthings with depicting verbs; while this particular category of verbs is known to disfavour the occurrence of mouthings, they have been documented to co- occur with mouthings that specify certain elements of these sign (Boyes Braem, 2001). For instance, signers have been documented to offer the semantic information of an agent, the subject or other nominal elements of the depicting verb they use, through the use of a mouthing, e.g. the signer signing the meaning "human is approaching slowly" while mouthing "άνδρας" ("man"), thus adding the information that the man of the story she was narrating was approaching the signer (P2: Narrative). Those mouthings might be considered essential as they add information which is not transmitted through a manual sign (Boyes Braem, 2001). In this particular example the added information refers to the identity of the human approaching.

The prosodic functions of mouthings have to be approached through the examination of 'stretched mouthings' (Boyes Braem, 2001; Hohenberger and Happ, 2001). For a detailed discussion of the spreading behaviour of mouthings see Section 2.2.1.1).

2.2.3 The linguistic status of mouthings

SLs are minority languages that develop inside larger communities and in sustained contact with a dominant SpL (Woodward, 1973). Consequently, most signers are usually bilinguals who communicate in the SpL of the surrounding

community and the SL of the deaf community, on a regular basis (Johnston & Schembri, 2007; Grosjean, 2010). This often means that while the hands have the leading role during language production, the mouth is still free to assist at the transmission of the intended message, by offering additional information. In other words, both languages can – theoretically – be produced at the same time (Emmorey & Pyers, 2008), although in practice, using a SpL while signing is considered extremely difficult given the substantial differences in the syntactic structure and other aspects of spoken and signed languages (Brentari, 1990).Therefore, it is logical to view mouthings as instances of what Emmorey et al. (2008) term as instances of 'code-blending', thus originating from the signer's other language (i.e. the SpL).

The linguistic status of mouthings is a matter of heated debate (Hohenberger & Happ 2001; Keller 2001; Bank et al. 2011). Researchers' approaches vary considerably thus forming a hypothetical continuum regarding their linguistic status (Davis, 1989). On one end, researchers such as Boyes Braem (and Ajello et al 2001; Woll, 2001; Bergman & Wallin, 2001; Rainò, 2001; Sutton-Spence & Day, 2001; Vogt-Svendsen, 2001) suggest that mouthings can be viewed as part of the sign language lexicon, since they can complement the meaning of the manual sign by adding semantic content. They can disambiguate between identical manual signs (see Section 2.2.2), they are present irrespective of the hearing status of the interlocutors, etc. In that context, mouthings should be treated as elements originating from the dominant SpL, which have been integrated in the structure of SLs. At the other end of the continuum there is the argumentation according to which mouthings are merely coincidental to sign language production (Ebbinghaus & Hessman, 2001; Hohenberger & Happ, 2001).

For Ebbinghaus and Hessman (2001), all mouth actions should be examined for their semantic contribution, but not treated as integral parts of SLs. Hohenberger and Happ (2001:185) characterise mouthings as merely a "peripheral performance phenomenon" and they point out that there is a variety of sociolinguistic factors known to affect their behaviour (e.g. age of language acquisition, the family's linguistic background, education, etc.). According to the researchers there are instances in which they can be dropped altogether (such as instances of communication between signers of different SLs).

Cases of 'mismatches' of the mouthing with the manual sign it accompanies, have been reported by a number of scholars (Boyes Braem, 2001 for DSGS; Hohenberger & Happ, 2001 for GSL; Vinson et al., 2010 for BSL, etc.) (see Section 7.5) and they seem to support the argument that mouthings and the manual signs are accessed separately by the signer, instead of them forming an undivided unit (Vinson et al., 2010). Examples of mismatches have also been reported for DGS (Ebbinghaus & Hessman, 2001), BSL (Sutton- Spence, 2007) etc. and they have also been found in the present dataset for semantically related signs (see also Section 7.5), e.g. manually signing SKI while mouthing "χιόνι" ("snow") (P2: Narrative), or manually signing DAY++ while mouthing "αύριο" ("tomorrow") (P3: Narrative). In these instances, the meaning of the manual sign does not comply with the spoken word from which the chosen mouthing stems, leading researchers to argue that the signer accesses the mental lexicon of the spoken and the signed language independently (Vinson et al. 2010). On the other hand, Emmorey et al.'s (2010) findings suggest that native ASL signers, who also use spoken English, did not retrieve lexical signs, during a picture-naming task in code-blended English and ASL, slower than they did during a picture-naming task,

in which they used only ASL. Therefore, those findings could be interpreted as an indication that the bimodal language user is not charged with an extra cognitive load, although differences in the speed of articulation between these two cases were observed.

For Boyes Braem (2001) instances of mouthings occurring as code-switches from the surrounding SpL should be distinguished from instances of mouthings which serve specific lexical, grammatical and other functions in discourse. According to the researcher, in the latter case, mouthings still originate from the surrounding SpL but they are used as loans, without interrupting the structure of the SL. For Boyes Braem, in order to distinguish between code-switches and loans, one should focus on the various functions mouthings may serve during sign language production (see Section 2.2.2).

Other researchers also made distinctions between the different kinds of mouthings. For instance, Schermer (1990) used the term 'spoken components' for mouthings, while highlighting the differences between spoken words articulated in instances such as Signed Dutch, and spoken components used as integrated borrowed elements and not instances of code-switching.

Vogt-Svendsen (2001) characterizes mouthings as loans from spoken Norwegian, altered in order to fit the structure of the manual signs in NSL. Many researchers share the same opinion, pointing out that, although mouthings fulfil criteria employed in SpLs for distinguishing loan elements, they still should be viewed as elements that have adapted to the structural and visual characteristics of SLs (Ajello et al., 2001). Therefore, according to that argumentation, they should be considered a loan element from the surrounding SpL, which has been reworked in accordance to the specific characteristic of these visual-gestural languages.

Those that highlight their ephemeral nature also address the issue of the frequently observed individual variation in the frequency of mouthings between different signers (see Section 7.4). As previously noted, mouthings seem to be frequently influenced by a variety of factors, both linguistic and sociolinguistic. The phenomenon of individual variation in their use is a fact that Zeshan (2001) finds consistent with the variable sociolinguistic background of different signers. One of the sociolinguistic factors thought to influence mouthings the most is the amount of oral education the signer has been exposed to throughout his/her life (Sande & Crasborn, 2009). Therefore, the question regarding their linguistic status arises often in literature within the context of the wider impact the environment of oral education has had on the communication of deaf people (Hohenberger & Happ, 2001). Nevertheless, viewing mouthings mainly as a "remnant of oral education" does not offer a satisfactory explanation of their frequent occurrence in sign language production or their acceptance by deaf native signers as part of the language (Fontana, 2008:107). In terms of their acceptance by deaf signers, Schroeder (1985) reports cases of NSL signers having trouble believing that signers of other languages use less or no mouthings. Also relevant here are studies which report cases of signers who have not received any kind of formal education but are still observed to mouth words from the matrix SpL (Fontana, 2008), as in the case of signers of Adamarobe Sign Language (Nyst, 2007).

The hearing status of the interlocutors in any communication event may be related to this variation, since it constitutes a factor specific to the visual-gestural modality (Baker et al. 2016). Nevertheless, Schermer (2001) argues that, contrary to popular belief, the presence of mouthings is not strictly analogous to the presence or absence of hearing participants. Mouthings are not dropped when the

conversation takes place between deaf interlocutors (Crasborn, 2006).

Although, as previously mentioned, Vinson et al.'s (2010) analysis indicates that manual signs and mouthings are processed separately in the mental lexicon of the signer, Bank et al. (2016) argue that their findings indicate a strong link between the frequencies in the frequency of the two. They note that it is highly unlikely that signers process what is transmitted via SL completely independently from spoken language elements. According to the researchers, this view could stimulate significant research in the field of bilingualism.

Early reports regarding the use of mouthings, mainly on European SLs, suggested that the phenomenon of mouthings occurs in every SL in varying degrees. Mouthings are present in most western SLs studied to date, although differences in the extent of their use cross-linguistically are reported (see Section 4.7) (Banks et al., 2015). Recent work on less established or newly emerging SLs, such as Nicaraguan Sign Language (Kegl et al., 1999) and Kata Kolok (de Vos & Zeshan, 2012) challenge the notion that mouthings occur in all SLs since signers of those SLs reportedly do not use mouthings at all. The frequent occurrence of mouthings in communication indicates that their relation to SLs may be more complex than what was initially suggested, thus making their study very important.

2.2.3.1 Mouthings:redundant or obligatory?

Many arguments regarding the linguistic status of mouthings and the notion that they are not an inherent part of SLs focus on the issue of the established redundancy in their use, for a number of cases. In other words, mouthings carrying the same meaning as the manual sign they accompany can, in some instances, be characterised as redundant (Boyes Braem, 2001). Furthermore, some of the signs

that have been observed to co-occur with mouthings may also be articulated without the corresponding mouthing, especially if the same sign has re-appeared repeatedly elsewhere in the discourse (Vogt-Svendsen 2001). Most researchers attest to the fact that mouthings may not be obligatory (Sande, 2009), except for specific instances, e.g. when they serve a phonemic purpose (such as disambiguating between homonyms) (Rainò, 2001). On that note, Mohr (2014) argues that semantic redundancy is usually present in cases of what Banks et al. (2011) define as 'standard mouthings' (see Section 2.1.3.1), e.g. manually signing HAVE while mouthing "έχω" ("have"). Such cases could be viewed as semantically redundant.They usually include the stems of verbs or the singular form of nouns and are thought to be used by the signer in order to maintain reference throughout communication (Boyes Braem, 2001; Fontana, 2008). Although a number of scholars have observed something similar cross-linguistically, exceptions to this rule are not uncommon. For instance, cases of verbs being mouthed on their inflected past form have also been noted for other SLs (Schermer, 1990; Fontana 2008) and for the present dataset , e.g. manually signing HAVE with mouthing "έχει" ("has") (P1: Narrative and P6: Informative).

As previously mentioned, when discussing the linguistic status of mouthings, some scholars focus on the fact that signers may drop mouthings (Hohenberger & Happ, 2001; Rainò, 2001) or substitute them with words in English in instances of communication between signers who use different SLs (Vogt-Svendsen, 2001; Fontana 2008). Therefore, since they could be dropped or substituted they could not be considered obligatory. In these instances, mutual understanding is the ultimate goal and therefore all mouth movements are dropped to avoid confusion. On the other hand, in cases of signers using different sign

dialects, mouthings can be used to facilitate communication between those signers. Since different dialects present differences mainly in the lexicon, mouthings of the surrounding SpL could provide semantic clarification (Boyes Braem, 2001)

Observing cases of immigrants who start learning the SL of the country they immigrate to before having learned the surrounding SpL, Vogt-Svendsen (2001) points out that these people still articulate the manual signs and the mouthings simultaneously, although they do not know the spoken word these mouthings stem from. Therefore, the researcher concludes that these people learn the manual sign and the mouthing simultaneously, thus acknowledging the fact that both elements are important for mutual understanding and therefore their interaction is significant (Vogt-Svendsen 2001; Rainò 2001). Something similar has been claimed with regards to young children who have not yet acquired a large number of words from the surrounding SpL; they have still been observed to pair their manual signs with mouthings (Rainò, 2001). At the same time care-givers have also been observed to use an increased number of mouthings when they sign towards young children (Sutton-Spence & Day, 2001). Such variability in the use of mouthings could be viewed as an indication that they should rarely be considered obligatory. Nevertheless, their high occurrence rates signify that they serve multiple functions in sign language production (see Section 2.2.2).Although in many cases mouthings are viewed as redundant, at the same time, redundancy is a phenomenon which characterises every linguistic system, including SLs (Hohenberger & Happ, 2001). Ong (1977) suggested that this observed redundancy could be explained in terms of the not-standardised nature of SLs, which, like oral languages, do not have a written form. In the researcher's view, the fluid structure of a language with no written form is somehow "strengthened" semantically through the repetition and redundancy of

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mouthings. As far as obligatoriness is concerned, it has been proposed that mouth gestures are more obligatory than mouthings but less obligatory than manual signs (Vogt-Svendsen, 2001).

2.2.3.2 The nature of mouth actions: gestural or linguistic?

In recent years, a number of researchers have put forward a hypothesis according to which mouth actions can be analysed as gestural elements. Fontana (2008) attempted to analyse the various mouth actions occurring in SLs through the application of the basic principles of gesticulation, as discussed by Kendon (2004) and McNeil (2000) for SpLs. According to her argument, since SLs are visual-gestural languages and therefore the hands carry the basic information through the manual signs, mouth actions can be analysed as gestures intended to accompany the manual signs (Pizzuto, 2003a). Fontana (2008) went as far as to characterise all mouth actions that accompany manual signs gestural. On the same page, but less radically, Dachkovsky and Sandler (2009) and Sandler (2009) identify a separate category of mouth actions with a gestural nature (gestural iconic mouth actions), which is distinguishable from the "lexical" (E-type) and adverbial/adjectival mouth actions described by Crasborn et al. (2008) and other researchers. During language production, both spoken and signed languages make use of oral and manual elements (Sandler, 2009). Gesture studies for SpLs have demonstrated the important role of gestures in speech, which are thought to provide semantic clarification and to structure the discourse (Kendon, 1980).Putting the focus of research regarding mouth movements on their (potential) gestural nature may prove to be rather crucial in terms of understanding the use of the mouth in these

visual-gestural languages, but further research on that area is necessary in order to test this hypothesis.

2.2.4 Practical implications

The question regarding the status of mouthings is not merely a theoretical one as the practical implications are rather broad. Schermer (1990) and Boyes Braem (2001) postulate that further research on this issue is quite significant for lexicographers and it could potentially "evoke high emotional and political interest in wider circles" (Boyes Braem, 2001:119), since mouthings originate from the ambient SpL and therefore their inclusion in the lexicographical description of a sign might be seen as controversial. As described by Schermer (2001), during lexicographical projects for SLN, researchers often encountered instances in which the informant, who was recorder to produce the citation form of a sign, expressed the feeling that the articulation of the mouthing was necessary. The researcher also observed that the occurrence of mouthings varied significantly amongst the various signers and with regard to the situation surrounding the articulation of a mouthing, e.g. cases of signs encountered in isolation usually occurred with mouthings more often than cases of the same signs being observed in context. Therefore the researcher anticipates that, if mouthings are included in the lemmas of manual signs, this could lead to differences in the rates of mouthing occurrence during natural signing over time, i.e. a more "resilient" presence of mouthings (Schermer, 2001:280).

Ebbinghaus and Hessmann (2001) note that the description of a sign in a lexicon should include those non-manual elements co-occurring frequently with certain manual signs. Nevertheless, the researchers also clarify that these frequently co-occurring pairs of manual and non-manual signs "should not be

reduced to the status of single signs" (Ebbinghaus & Hessman, 2001:134), thus implying that the way manual and non-manual units interact in general has to be thoroughly and carefully described. Non-manuals in general and mouthings in particular have not been studied extensively for GSL. Considering that fact, as well as the variety of new research projects and e-learning platforms, designed for GSL (Efthimiou et al., 2004), I argue that the current research is going to illuminate some of the possible ways mouthings correlate with manual signs, thus providing valuable information for such projects.

To summarise, empirical data from a number of SLs demonstrate that the different functions mouthings serve in SL production highlight that mouthings need to be researched further. Therefore, of great significance for each analysis regarding the linguistic status of mouthings, is also the study of the functions that mouthings serve during communication.

2.3 Research Questions

The general focus of the present study refers to the use of mouthings in GSL and how it is influenced by the two linguistic factors of register and grammatical class. I seek to answer this question by studying the behaviour of mouthings co- occurring with manual signs of various grammatical classes, across different registers. Taking into consideration the theoretical background of previous studies focusing both on the factor of register and grammatical class for other SLs (mainly the three studies of Sutton-Spence & Day, 2001 for BSL; Nadolske & Rosenstock, 2007 for ASL, Johnston et al., 2015 for Auslan, etc.), my specific research questions are the following:

1)   How frequent are mouthings in GSL? Can specific distributional patterns of mouthing occurrence across the current dataset be detected?

2)   Does the factor of register constitute a significant predictor of mouthing occurrence for GSL, as claimed for other SLs? And if it does, is the informative register associated with higher rates of mouthing occurrence than the narrative register?

3)   Does mouthing occurrence vary in relation to the grammatical class of the manual signs mouthings co-occur with? Do mouthings occur more frequently with nouns, and nominal constructions in general, and less frequently with morphologically more complex signs, such as depicting verbs?

The present thesis attempts to focus on these research questions in the chapters to follow.

3 VARIATION IN MOUTHING OCCURRENCE

While general observations about mouthings can be discussed, e.g. their function in SL production, their linguistic status, their interaction with the manual sign, etc., it has become clear that there is substantial variation in their use by different signers and in their behaviour in different social contexts (Sutton-Spence & Day, 2001; Keller 2001; Zeshan, 2001, etc.). Overall, both linguistic and sociolinguistic factors have been observed to affect the percentages of mouthings in SLs studied to date (for projects focusing on both linguistic and sociolinguistic factors see Sutton- Spence and Day, 2001 and Rentelis, 2011 for BSL, Nadolske and Rosenstock 2007 for ASL, Mohr 2014 for ISL, Johnston et al., 2015 for Auslan, etc.).

Due to the variety of factors which could potentially influence the frequency of mouthings, projects like this inevitably face substantial difficulty in focusing on specific factors and trying to control, as much as possible, the influence of others. More specifically, to focus on the factor of register and control as much as possible the influence of individual variation, the dataset was constructed using examples of language production from both the informative and narrative register for each signer, (see Section 5.1). As highlighted for SpLs (Biber & Conrad, 2019) and SLs (Nadolske & Rosenstock, 2007), one of the most important principles adopted for register analysis is for the samples selected to include productions of the same participants for comparison.

In this chapter, I will explore some of the linguistic factors which have been considered to be significant predictors of mouthing occurrence in

literature, followed by an overview of similar projects for other SLs. The main objective of the current study is to investigate in what degree and manner two of these factors, i.e. register and grammatical class, affect mouthing rates for the GSL data. Considering the small number of signers from whom data were gathered (four men and two women), the current analysis does not focus on any social factors. Therefore, they are not discussed further at this point.

3.1 Factors affecting mouthing occurrence rates
3.1.1 Register

Throughout the literature it is generally observed, both for SpLs (e.g. Halliday, 1968, Joos, 1967, Gregory & Carroll, 1978, Biber & Conrad, 2019.) and SLs (e.g. Zimmer, 1989; Sutton-Spence & Day, 2001; Nadolske & Rosenstock, 2007; etc.) that speakers/writers/signers tend to use language differently in different situations and contexts. The phenomenon is usually referred to as 'register variation' and it is considered a linguistic universal (Biber & Conrad, 2019; Ferguson, 1981). This section will provide an overview of the register approach in the analysis of different text varieties for SpLs and the application of the analytical steps described in the current project. Moreover, results of previous research on the interaction of register and mouthing occurrence in various SLs will be presented. Lastly, issues regarding representativeness and other considerations will also be discussed here (see also Section 7.6.1).

According to Zimmer (1989:253), "register variation…involves differential language use that is sensitive to situational factors". Similarly, for Schermer (2016:288), what constitutes a register is "the appropriate language use for a specific situation directed to a specific group of speakers". Quinto- Pontos and Mehta (2010:558) characterise differences in the use of language across

different registers as "patterned", thus implying that certain distributional patterns across different situations can be detected systematically and cross-linguistically; in the current case, the differences in question refer to the distributional patterns of mouthings. In the course of this project the term 'register' is adopted, instead of the relative terms 'text type' and 'situation' used by other scholars (Johnston et al., 2015 and Nadolske & Rosenstock, 2007 respectively). While describing previous research on this subject, I adopt each researcher's preferred term, to present their findings and observations regarding the influence of register on mouthing production.

Several models have been proposed by scholars to describe the observed differences in the use of language (spoken or signed) across different registers. Joos (1967) presented five discrete 'styles' of communicative situations for spoken English, including the categories of 'intimate, casual, consultative, formal and frozen style'. Although similar attempts to identify different registers have been made throughout the literature, researchers such as Gregory and Carroll (1978) argue that an analysis based on a discrete characterisation of different registers is almost impossible since features associated with a particular register can be found in other registers as well. Corroborating this observation, Shaw (1987) argues that although some properties of distinct registers may be traced (without them comprising a definitive list), specific boundaries among registers cannot be traced. For instance, information-giving registers may also include utterances of a more descriptive nature (such as in cases of constructed-dialogues), depending on the overall context of the situation (Sutton-Spence & Day, 2001). In the current dataset, one of the participants provides detailed information regarding the school where she

works in a formal manner, but she also includes in her signing a short example of an informal dialogue between two signers, and more specifically between a mother discussing with her child about school (a case of constructed dialogue).

In terms of identifying specific registers, Biber and Conrad (2019:10) argue that the description of various registers is based on different "levels of specificity", i.e. academic prose could constitute a register, while the methodology sections of academic papers could also be described and analysed as a distinct, more specified register, depending on the researcher's goals. For example, Sutton-Spence and Day (2001) describe for BSL the seven different data sources they termed 'registers' (including 'news interpreting', 'lectures', 'teaching stories', etc.), which comprised the three more generic registers described as the 'informative', the narrative' and the 'descriptive' registers.

3.1.1.1 Register analysis

Registers present observable differences in the distribution of specific linguistic characteristics which could be found in different register, but in variable degrees (Halliday, 1968; Biber & Conrad, 2019). For instance, the rates of occurrence of a linguistic phenomenon, such as the use of nouns across text varieties (e.g. academic texts and fairytales), is expected to vary. Nevertheless, nouns are expected to be found in both registers. Any distinctive characteristics regarding linguistic phenomena and their frequency will arise through the comparative study of at least two registers (Joos, 1967; Gregory & Carroll, 1978; Biber & Conrad, 2019).

The register approach is based on the analysis of these linguistic characteristics and the situational context of the communication and the interaction

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of the two (Biber & Conrad, 2019). This interaction will reveal the functions associated with the higher frequency of specific linguistic varieties on certain registers. The researchers postulate that the analysis of the situational characteristics has to precede that of the linguistic ones. Any patterns emerging with regards to language use derive from the differences in the circumstances of the communication, the various communicative purposes and contexts. Through these analytical steps, the study of register variation becomes circular since any observations regarding the linguistic phenomena may require for a re-assessment of the interaction of linguistic and situational characteristics in different stages of the analysis (Biber & Conrad, 2019)

In the present study, the frequency of mouthings across different registers is analysed in association with the variable situational contexts and communicative purposes across the different registers (see Table 1 below). As is highlighted by Biber and Conrad (2019), an analysis of register variation is closely related to grammatical class assignment since sentential constituents have to be firstly identified for their grammatical class before their occurrence across different registers can be statistically analysed. Therefore, in this project, besides the factor of register and its (potential) influence on mouthing occurrence rates, the study of grammatical class was also considered of vital importance (see Chapter 4). Therefore, the analysis of the various grammatical classes through a register perspective could provide a better understanding of any distributional patterns of mouthing use for the current dataset (see Section 6.1.3).

3.1.1.2 Linguistic indicators and parameters of their analysis

Biber and Conrad (2019) discuss a set of parameters to be taken into consideration

during the analysis of linguistic indicators across specific registers pertaining mainly to: the circumstances of production, the overall structure, and context of the communication situation, the communicative purpose of the speaker/ writer (or signer), and also the topic, a parameter which influences the word choices of speakers/signers (see Section 7.2).

As for the production circumstances and mouthing occurrence, Vogt-Svendsen (2001) argues for NSL that mouthings are likely to occur more frequently with dialogues and at the beginning of signed stories, thus highlighting that the context and the structure of the communicative event could also influence mouthing rates. As for the latter, Shaw (1987) notes that the topic of a communication situation could be considered indicative of its formality (see Section 3.1.1.5). For instance, in the current project, the use of technical vocabulary and specific terminology in the translations of UN articles is expected to have an impact on mouthing occurrence rates for this sub-register (see Section 7.2). When Johnston et al. (2015) compared their findings on mouth actions to those reported for European SLs, they observed a high number of 4-type mouth movements (see Section 2.1.3) and consequently a low percentage of mouthings for the narrative tasks. They note that the topic of the story, i.e. the overall context of the story involves a wolf, a dog, etc. "present multiple opportunities for this kind[7] of representation" (Johnston et al., 2015:14) and therefore lower mouthing rates, since all mouth actions are related; if the appearance of a certain type of mouth action is prominent it can influence the percentages of another type of mouth action, considering that only one mouth action can appear in the mouth at a time (Sande & Crasborn, 2009).

The following table (Table 1) summarises the situational characteristics of the

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[7] They refer to the type of mouth gesture termed '4-types' (Johnston et al., 2015)

video recordings composing the current dataset. Following the statistical analysis of mouthing occurrence rates, the results will be discussed in Section 7.2 in relevance to the situational characteristics as described in the following table (see also Section 5.1).

Table 1: Situational characteristics of the GSL data sources.

Parameters	Informative Register		Narrative Register	
	UN articles	Curriculum presentations	Personal vignettes	Children's fairy tales
Participants	4 deaf signers	2 deaf signers	3 deaf signers	3 deaf signers
Channel	GSL	GSL	GSL	GSL
Production Circumstances	To be featured on official website (formal) Carefully prepared	To be featured on the website of two language schools and on youtube (less formal- the signer addresses the audience directly) More spontaneous signing	Recorded for educational purposes- casual dressing- casual circumstances	To be featured on official website (formal) Carefully planned
Setting	Professional	Professional	Professional	Professional
Communicative purposes	Translating written text Conveying information	Conveying information about the schools Explaining the enrolment process	Narrating stories to be used for educational purposes	Narrating stories to entertain children who visit the website

3.1.1.3 Choosing the data for analysis

Before the analysis of the situational and the linguistic characteristics, the researcher faces the important task of selecting the appropriate material for his/her dataset. Biber and Conrad (2019) highlight the importance of both large- and small-scale projects on register analysis, providing that, in the latter case, at least two types of texts would be chosen to represent a larger register and that the chosen texts would be as representative as possible of the generic register. Issues of representativeness have to be addressed for this project as well (see also Section 7.6).

The decision regarding the chosen texts' representativeness should be based on previous research. Comparison to previous findings will highlight whether any findings could be generalized and considered typical of a register (Biber & Conrad, 2019). For SLs, the study of register variation is not as extensive as for SpLs. Specifically for GSL, this is the first project studying the influence of register on specific linguistic phenomena. Therefore the choice of texts to comprise the more generic 'informative' and 'narrative' registers is based mainly on Sutton-Spence and Day's (2001) description of sub-registers composing the more generic registers (see also Section 3.1.1.4). Moreover, since focusing on a single type of texts as representative of an entire register is methodically flawed (Biber & Conrad, 2019), in this project it was deemed essential to include at least two types of texts varieties for each register (see Table 1). Any results yielded should ideally be compared to those of a larger-scale research project on register, specifically for GSL. In Section 7.2, the results of the present analysis will be discussed in correlation to past research

projects on the behaviour of mouthings across various registers cross-linguistically.

3.1.1.4 Previous research on mouthing behaviour across different registers

For BSL, Sutton-Spence and Day (2001) examine seven registers, which they group into the larger categories of informative, descriptive and narrative registers. They too describe differences in the nature of the video-recordings included in each register. For instance, their narrative register includes video recordings of both factual and descriptive narrations. The differences in the nature of the analysed data may account for some of the differences in the number of mouthings used across the different registers. According to the researchers, the percentage of mouthings found in the informative register is high (77%), whereas at the narrative register the same percentage is lower (50%). Like Sutton-Spence and Day's study, the present project focuses on the distributional patterns of mouthings throughout two distinct registers; informative and narrative. Analogically to Sutton-Spence and Day's register termed 'news translations', the informative data in the current project consist of a selection of United Nations (UN) articles, translated into GSL, and two video recordings featuring the presentation of the new curriculum of two sign language schools. For the narrative register I used a selection of personal vignettes produced by four native Deaf signers (recorded for teaching purposes), analogous to Sutton-Spence and Day's 'teaching stories' register and two retellings of children's stories similar to the researchers' register termed 'fantasy stories' (see also Section 5.1).

For Auslan, Johnston et al. (2015) analysed tokens from the Auslan corpus, focusing mainly on three text types; monologues (narratives, story retellings), dialogues (conversations, interviews) and elicited data (sentence elicitation, picture stimulus). They report on a significantly lower percentage of mouthings for the story retellings (20.3%) compared to their dialogical data (68.6%). Their participants exhibited significant individual variation in the production of mouthings, ranging from signers who mouthed a lot, to signers who hardly ever mouthed at all. Nevertheless, the influence of the text type was substantiated by the examination of 11 individuals who provided examples of both dialogues and narrative monologues, with one of them providing examples for all three text types. Following the close examination of the mouthing occurrence rates for each of them individually, a specific pattern emerged; higher percentages of mouthings were observed with dialogues in comparison to narrative monologues (for a similar analysis on the participants of this study see Section 7.2).

For ASL, Nadolske and Rosenstock (2007) focused on mouthing occurrence across three different settings, i.e. conversations, storytellings, and a lecture. Similarly to the BSL data, they report on lower rates of mouthings for the narrative tasks (42%) and higher percentages of mouthing occurrence for their conversational data and the lecture (60%). Examining data from the NGT corpus, Sande and Crasborn (2009) also focused on mouth activity across conversational and narrative data. They noted that for the conversational data the percentage of mouthings was as high as 78% of the documented mouth activity, whereas for the narrative tasks the same percentage was significantly lower, at 47%. Again for NGT, Schermer (2001) examined mouthing

occurrence in the retellings of two written stories, a retelling of a picture story and a discussion between deaf interlocutors. Contrastingly to the previously mentioned projects, Schermer did not report on the same substantial differences in mouthing occurrence rates across the three settings, with percentages of mouthing occurrence between 50% and 60% approximately for all of them. Based on these data, Schermer questions previously accepted arguments regarding the influence of register in general, as well as the influence of written text on the frequency of mouthings; the written words (in Schermer's project found in the task of story retellings) are usually thought to stimulate higher mouthing rates (e.g. see Rainò, 2001 for FinSL). According to the researcher, a strong influence of register is not supported by these small differences in her NGT data. The potential influence of the written sources is of some relevance to the current study as well, since the informative video recordings for four of the six signers (the UN articles on Human Rights) are assumed to be associated with written sources. Since I used already available data, the exact circumstances of their elicitation are not known and therefore the potential influence of written sources is not studied further at this point (see also Section 7.2.2).

3.1.1.5 Further considerations

Apart from the influence of the written source, the varying language that is being employed in different registers is usually sensitive to other factors, such as the formality of the situation (see Section 7.2.2). About the factor of formality, Sutton-Spence and Day (2001), while citing previous research on BSL (e.g. Sutton-Spence, 1994), claim that when BSL is used in formal settings

the influence of spoken English is more prevalent. Zimmer (1989) also describes cases of formal settings (e.g. a lecture) in which ASL was replaced by Signed English, which were viewed as a "higher" linguistic variety than ASL, and therefore more appropriate for a formal setting. Nevertheless, as research on SLs progresses and their status increases, earlier hypotheses regarding the influence of formality in general and in the percentages of mouthings, in particular, have to be tested further.

For ASL, Nadolske and Rosenstock (2007) hypothesised that the percentage of mouthings would increase in formal settings. Their data partially challenged this hypothesis since the percentage of mouthings used in the analysed lecture and the conversations between participants revealed the same percentage of mouthing occurrence (60%), although one of the two settings, i.e. the lecture, was considered more formal than the others. Stone (2011) also stresses that the even the process of videotaping participants may be analysed as a factor raising the formality of a specific situation, although some signers are experienced and quite used to being filmed so the influence of this factor may not be so prevalent.

Moreover, Joos (1967) argues towards the existence of an observable link between the level of familiarity amongst conversational partners and the rate of mouthings found in conversational data; the more familiar with each other, the higher the possibility of them using 'private' language, according to the researcher. In reference to the uses of mouthings, as the level of familiarity increases the use of mouthings seems to decrease substantially. Although a conversational task was not included in this dataset, thus making this particular factor irrelevant to this specific project, its influence is discussed here briefly in

order to highlight the plethora of factors operating simultaneously in a communicative event.

As for the (potential) influence of the audience, Quinto-Pozos and Mehta (2010) incorporate in their project on register variation in the use of constructed action (CA), Bell's (1984) sociolinguistic framework of 'audience design'. According to this theory, variation in the use of language occurs when the speaker (or in this case the signer) alters his/her language use in response to his/her audience (Bell, 1984). Bell's analysis of the effect of the audience also included cases in which the audience was not present, but merely perceived, i.e. the speaker assumed the sociolinguistic characteristics of his/her audience and altered his/her signing accordingly. Although Quinto-Pozos and Mehta's (2010) design did not include cases of non-present audience in their study of the influence of the audience in cases of constructed action occurring during sign language production, it would be logical to assume that there would be differences between e.g. child-directed or adult-directed narratives. Sutton-Spence and Day (2001) include in their analysis a child-directed register (with present audience), for which they report higher rates of mouthings. The influence of the factor of the audience could potentially be significant for this dataset as well, with regard to the children's fairy tales and adult-directed stories, all of which are included in the narrative register. Nevertheless, further research is needed to investigate the application of the effect of perceived audience to sign language production in general (see Section 7.2.2).

Quinto-Pozos and Mehta (2009) underline the importance of research on register variation, not only in terms of capturing quantitatively any differences in signing that would potentially emerge, but also in terms of trying

to recognise qualitatively the ways language changes across different registers. To stress the importance of these research projects, Zimmer (1984) also notes that through these projects, a great deal of knowledge regarding the linguistic competence of the signer could also be acquired.

As previously mentioned, the study of linguistic features associated with specific registers is tightly related to the grammatical of grammatical features (Biber & Conrad, 2019), which makes the need for a concise grammatical class assignment an issue of vital importance. This factor will be discussed in detail in the following chapter.

4 GRAMMATICAL CLASS

4.1 Grammatical class in the spoken and signed modality

In this chapter, I will discuss the subject of PoS classification in spoken (briefly) and signed language research. I will also describe the criteria taken into consideration during grammatical class assignment and finally the various grammatical classes identified in an effort to examine the factor of grammatical class and its (potential) effect on mouthing occurrence rates (for similar projects see Sutton-Spence & Day, 2001, Nadolske & Rosenstock, 2007; Johnston et al. 2015).

The establishment of a functional word class system that could be applied cross-linguistically attracted the interest of scholars from various disciplines from antiquity (Robins, 1966), but it still remains one of the most controversial and regularly recurring topics in the field of linguistics (Haspelmath, 2012). Except for the term 'word class', the terms 'Parts of Speech (PoS)' and lexical categories are also frequently used (Haspelmath, 2012).

The PoS system put forward from the second century BC for Ancient Greek (mere tou logou) by Greek scholars (Aristarchus and his student Dionysius Thrax, Apollonius Dyscolus, Plato and Aristotle) consists of eight classes[8] and remains –in its core- the most widely used PoS system today (Robins, 1966; Erlenkamp, 2000). For Modern Greek the PoS system is thoroughly described in Triantaphilidi's (1941) grammar and consists of:

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[8] This PoS system consists of the rhema (predicate), the onoma (noun), the metoche (participle), the arthron (article), the antonymia (pronoun), the prothesis (preposition), the epirrhema (adverb) and the syndesmos (conjunction) (Robins, 1966)

rhemata (predicates), ousiastika (nouns), epitheta (adjectives), epirrhemata (adverbs), arthra (articles), antonymies (pronouns), metoches (participles), syndesmoi (conjunctions) and epifonimata (interjections). The grammatical class of mouthings included in the 'mouthing grammatical class (MOUTHINGGRAMCL) tier is based on these classes (see Section 5.3.1). Hapelmath (2012) questions the application of these long established categories for the description of the structure of all languages effectively, thus highlighting the scepticism expressed by a number of scholars regarding the universality of a word class system developed to describe a specific language, i.e. Ancient Greek.

For SLs, the topic is viewed as significantly under-represented in the literature (Schwager & Zeshan, 2008; Mohr, 2014, etc.). In recent years, a combination of semantic, syntactic and morphological criteria have been proposed as the most accurate approach for the identification of grammatical classes in sign linguistics (Schwager & Zeshan, 2008; Mohr, 2014), while the occurrence of non-manual elements is also taken into account as a modality-specific element employed for grammatical class identification (see Section 4.4.4) (for similar projects see also Crasborn et al. 2008; Schwager & Zeshan 2008; Meir 2012; Mohr, 2014). Morphological complexity, the semantic content, the sign's formational characteristics and/or the syntactical slot it fills play an important role in PoS classification (Mohr, 2014). For researchers such as Zeshan (2000/2003), Schwager and Zeshan (2008) and Mohr (2014) the goal is to devise and systematically test a set of criteria that could be applied cross-linguistically but still produce valid results for each SL separately; a challenging task if one considers how different SLs are to one another and to

SpLs on a lexical, typological and grammatical level (Meir, 2012).

Few attempts have been made to date to identify different grammatical classes in individual SLs since the number of theoretical problems that arise along the way is significant. Linguists such as Erlenkamp (2000), Mohr (2014), Zeshan (2000/2003) and Slobin (2008) argue that a PoS classification system inspired by equivalent schemes for SpLs should not be applied to all SLs without first taking into consideration modality-specific elements of SLs' structure, such as the grammatical use of space (Perniss and Özyürek 2015), the use of classifier constructions, simultaneously occurring phenomena (e.g. non-manual elements), the use of iconicity etc. (Perniss et al., 2010; Meir et al., 2013). Padden's (1988) early classification of content words, Zeshan's (2000) classification based on spatial characteristics of the signs, Schwager and Zeshan's (2008) latest work on a combination of semantic and morphosyntactic criteria and Mohr's (2014) proposed syntactic categories and lexical classes, as well as the way the two categories map onto one another for ISL, are some of the attempts made for the provision of PoS classification criteria specific to the nature of SLs. Nevertheless, while it has been advocated that a traditional PoS classification system, inspired by SpLs, should be adjusted to the structure of SLs and not applied in an ad hoc basis, at the same time a set of strongly justified and methodologically adequate criteria for grammatical class assignment has not been established yet (Schwager & Zeshan, 2008; Meir, 2012). Therefore, I have employed a variety of guidelines to present a provisional classification of the full set of signs that constitute this dataset (2704 tokens in total). Overall, the starting point of the current analysis was always the signed utterance, never the translated sentence in Greek. The goal of

this project is neither to attempt a thorough syntactical analysis of the signed texts nor to propose a PoS classification scheme that could possibly be applied cross-linguistically. The purpose of this provisional classification is to map mouthing rates in accordance with the grammatical class of the accompanying manual signs.

4.1.1 Mouthings and grammatical class

Baker and Pfau (2016) note that for those SLs (e.g. NGT) in which a noun-verb distinction cannot be based on a systematic difference of movement patterns the syntactical slot of the sign and the use of mouthings could help in grammatical class assignment. It is crucial to keep in mind though that, although there is consensus with regards to the factors of morphological complexity and grammatical class and their correlation to mouth actions in general (and mouthings in particular), in this project I am attempting to map any mouthing patterns that would potentially emerge with regard to their correlation to different grammatical classes. In that sense, accepting that they can be used as a criterion for grammatical class identification would practically mean that I have pre-supposed the way mouthings behave when- at the same time- mapping mouthing occurrence patterns is the ultimate focus of this project. It is important to avoid this circularity for a number of reasons.

Firstly, researchers such as Mohr (2014) argue that, for ISL mouth actions can hint towards the manual sign's morphological complexity but they are not useful for a more detailed classification of the signs in the various grammatical classes. Also, for IPSL, Zeshan (2001) notes that mouth patterns usually appear irrespective of the syntactic position of the manual sign they

accompany, in contrast to what has been observed for other, mostly European, SLs. Therefore, for some SLs at least, it seems that mouthings would not constitute a helpful criterion for grammatical class identification (for further discussion on mouth actions used as cues for grammatical class identification see Section 4.4.4). In the course of this study, I was aware of the importance of this issue, which is why during the transcription and the glossing process as a separate MOUTHINGGRAMCL tier was added for future purposes (see Section 5.3).

4.2 Clausal Boundaries

For this project the order of constituents was based on the documented SOV structure for GSL (Hantzopoulou, 2008) and the grammatical relations identified for the clausal constituents. Guidelines described for other SLs in relation to basic and complex structures and the occurrence of embedded clauses (e.g. temporal, relative, causal, etc.) were also taken into consideration (Pfau & Bos, 2016; Pfau, 2016). Due to lack of time and resources the boundaries of clauses were not annotated in detail on a separate tier. Parentheses are used in the following examples to mark clausal boundaries.

The clause identification guidelines described by Van Valin & LaPolla (1997) and Van Valin (2005) are based on the analysis of the basic constituents of a clause, i.e. the predicate and its arguments. The predicate's arguments are dictated by its valency (Pfau & Bos, 2016) and the nature of the participants, i.e. whether they are animate or inanimate, therefore being able to assume the semantic roles of agent, patient, etc. The researchers describe the clause as consisting of a "nucleus", i.e. a predicate, which -combined with its arguments-

forms the "core" of the clause. Any other constituents are found in the "periphery" of the clause (Van Vali, 2005).

In that sense, the semantics of a ditransitive verb like GIVE dictate for an argument with the syntactic role of an actor and two arguments identified as objects (direct and indirect). In cases of indicating/ agreement verbs, such as GIVE or TAKE, the arguments may not be overtly stated in the clause since this category of verbs is morphologically modified to include information about their arguments (Schembri et al. 2018).

(2)

Mouthing					"αναπηρ(ία)" "disabili(ty)"	"ελευθερία" "freedom"		"παράνομα "illegally"	
Manual	[FS:B	PERSON	SELF		DISABLED	FREEDOM	BE-TAKEN	ILLEGALLY	NOT]

Meaning: '(A disabled person) should not be illegally deprived of his/her freedom' (P1: Informative)

The signer has assumed the role of a disabled person from the previous utterance, so the argument is not overtly mentioned again in this clause. The verb BE-TAKEN is modified in order for the orientation of the palm to indicate the person deprived of his/her freedom.

In clauses with no copula (see Section 4.6.1.2), attributive adjectives or nouns could function as predicates and therefore a clause consisting of an entity and an attributive sign will still be treated as a clause, even with the absence of a verb (Pfau & Bos, 2016) (see examples 11 and 15 included in the list of examples at the end of the chapter).

Focusing on more complex structures, which include subordinate clauses, some of these clauses describe the verb, whereas others are used to describe the noun (e.g. relative clauses) (Pfau, 2016). Pfau also argues that in many SLs

(including ASL) the subordinate clauses are not introduced by a specific conjunction, as is accustomed for SpLs, and that the constituent order of these clauses is similar to that of a main clause. The lack of conjunctions introducing subordinate clauses could make it difficult to distinguish between coordination (parataxis) and subordination (hypotaxis). For clause coordination the use of explicit markers, such as AND, OR or BUT, is not considered common for all SLs (Pfau, 2016). For example, for Hong Kong Sign Language the "adversative conjunction" BUT (Pfau, 2016:164) is only marked non-manually. In the GSL data AND occurs only twice, both times in the narrative register (see example 19 at the end of the chapter) and OR occurs only once as a mouthing, "ή" ("or"), unaccompanied by a sign.

The case of causal/purpose clauses have been frequently described as an exception, since a "dedicated causal conjunction" glossed as REASON has been described to introduce these clauses. In this project this sign occurs 12 times and it is consistently identified as a conjunction (see Section 4.6.2.1).

Looking at conditional clauses, they are described as being introduced by a sign glossed as IF (for ASL, LIS, DGS, NGT) which is usually accompanied by non-manual markers, such as raised eyebrows (Pfau, 2016; Pfau & Quer, 2010). In this project a sign glossed as IF occurs 9 times, always introducing a conditional clause and in all 9 cases accompanied by raised eyebrows. The sign is articulated with a palm-up form and is in all 9 instances accompanied by a mouthing "αν" ("if").

(3)

Mouthing	"αν" "if"		"λέω" "say"			"σίγουρα" "certainly"	"'όχι" "no"
Manual	[IF	PT:PRO 1SG	SAY	GIVE]	[PT:PRO3 SG	CERTAINLY	REFUS E]

Meaning: 'If I tell him to give (it) he will certainly refuse' (P6: Narrative)

Lastly, for cases of constructed actions, Ferrara & Johnston (2014) note that the constructed action could be the argument in a construction. In the following example the constructed action has preceded and it is not overtly stated. The sentence that follows does not repeat the argument and it is easily understood that the constructed action plays the role of the subject.

(4)

Mouthing			"μέσα"	"έκφραση"	"έχει"	"διάλογο"	"έχει"
Manual	(CA)	PT:DE T	[INSIDE	EXPRESSION	HAVE]	[DIALOGUE	HAVE]

Meaning: 'This (constructed action) has expression and dialogue (P2:Informative)

4.3 Criteria for grammatical class classification

4.3.1 Semantic criteria

A grammatical class classification based solely on semantic criteria is considered by many almost impossible (Schachter 1985; Sasse, 1993). Researchers such as Sasse (1993) state that a purely semantic approach is not enough for grammatical class classification neither on the level of a single language nor for a cross-linguistic classification. Under the influence of PoS distinction in SpLs, it is usually assumed that words/signs expressing the universally recognised notions of person or thing are classified as nouns. According to this 'notational approach" (Croft, 2000) words/signs referring to

actions should be classified as verbs, while those that denote properties should be categorised as adjectives, if they refer to a noun, or adverbs if they modify a verb (Dixon, 1985). In recent years and in reference to the application of semantic criteria to the structure of SLs, Schwager and Zeshan (2008) state that, since all lexical units share some characteristics that can be used to group them together in the same class, those individual features have to be studied closely in order to determine the various word classes in SLs. Following influential approaches of Sasse (1993), Anward (2000) and Löbner (2002), Schwager and Zeshan (2008) present several 'concept classes', such as: concrete and abstract entities, properties, states, actions, etc. The researchers propose a binary approach towards the examination of specific individual features of each manual sign in order for it to be classified in one of the proposed concept classes, e.g. the feature [±dynamic] could be applied to signs classified as verbs. At the same time, Anward (2000), expanding on Stassen's (1997) earlier work, identifies eight basic semantic classes including person/thing, event, property, place, time, relation, quantity, and situation.

However, upon close examination of individual semantic features of the various classes, it has become apparent that not all of the units that constitute a semantic class are representative examples of the features they are supposed to share with other units in the same class; in other words, while some are prototypical examples of the semantic class they belong to, others are rather marginal. For ISL, Mohr (2014:697a) identifies a number of "universal semantic exemplars" for nouns, verbs, adjectives, and adverbs. To further explain her argument, she uses the example of the sign CHANGE in ISL, which is also found in the present dataset on eight separate occasions. She argues that,

although the sign constitutes an abstract entity and therefore is categorised as nominal "it lacks the characteristic of stativity" and therefore it is not treated as a prototypical member of the class (2014: 697b). In that sense, cases of signs identified as abstract entities may be used to describe events or conditions (Baker & Pfau, 2016). For this particular example, the same approach was followed when it was encountered in the present dataset; the sign was considered nominal in two out of a total of the eight times it occurred in the present dataset. In those instances it was identified semantically as an abstract entity functioning as the argument of the signed sentence.

Sasse (1993) highlights the importance of the semantic criterion especially since various semantic groups such as entities, materials etc. constitute universal concepts which could be applied for a rough classification. On the same note, for Meir (2012:87) semantic criteria constitute the starting point of a PoS classification scheme as they are "cognitively-based" criteria and as such could be applied cross- linguistically[9].

Semantic criteria are the starting point of the present classification, although I did not proceed to a full description of semantically different concept classes, as proposed in Schwager and Zeshan's (2008) classification project. Such an analysis could possibly be applied cross-linguistically, but the dataset to which it was applied was quite limited, consisting only of 250 signs. In the current project, an overview of mouthing occurrence in reference to the factor of grammatical class was possible only through the classification of all the manual signs included in the analysis. Therefore, such a detailed examination of individual characteristics of separate concept classes for a total of 2704signs

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[9] Semantically similar concepts may not belong in the same concept class when studied comparatively in unrelated SLs, such as DGS and Kata Kolok (for more information see Schwager & Zeshan, 2008).

far exceeded the purposes of the present study. Nevertheless, the basic classes of concrete and abstract entities, properties and actions were taken into consideration and applied to the current provisional classification.

4.3.2 Syntactic criteria

The syntactic level occupies a central space in PoS classification for all natural languages (Croft, 2001). Hengeveld (2004) states that the syntactic function of different lexical classes can be used to differentiate between those classes. For instance, a word/sign recognised semantically as an entity can fill either the syntactic slot of the subject or the object of a signed utterance (Schwager & Zeshan, 2008). Therefore a sign should not be considered in isolation but through the "lens" of its syntactical function.

The various concepts (e.g. entities, actions, etc.) described in the previous chapter "are presupposed to be lexicalised in specific syntactic functions" (Schwager & Zeshan, 2008:20). Four basic syntactical roles are identified for Schwager and Zeshan's concept classes including the argument, the predicate, the argument modifier and the predicate modifier. Similarly, Evans (2000) states that a verb functions as the head of a clause, nouns function as arguments, adjectives either modify the meaning of nouns or function as predicates, while adverbs modify the meaning of the verb they accompany[10]. Manual signs were classified on the basis of their semantic identity as well as their syntactic function on the sentential level, as in the following example:

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[10] Mohr terms that notion as "predisposition of syntactic constituents" (2014:697c).

(5)

Mouthing	"άνθρωποι" "people"	"αναπηρία" "disability"				"'άνθρωποι" "people"
Manual	[PEOPLE	DISABLED	GROUP	PT:DET	ALL	PEOPLE

Mouthing					
Manual	REDUCED-INTELLIGENCE	HEART-PROBLEM	WHEELCHAIR	BLIND	DEAF

Mouthing	"κοινωνία" "society"			
Manual	SOCIETY	CREATE-]OBSTACLES	[TRY	REDUCE-INEQUALITY]

Meaning: 'This group of people (meaning people with disabilities), all of them, people with reduced intelligence, heart problems, (people using) wheelchairs, blind or deaf people, people with various disabilities, (for them) the society creates obstacles and (they) try to reduce inequality" (P3: Narrative).

In this example the signs CREATE-OBSTACLES and TRY are identified as verbs, and therefore two clauses are marked. The sign PEOPLE is not repeated but it is easily assumed as the subject of the verb TRY. The manual sign SOCIETY is identified as the subject of the verb CREATE-OBSTACLES and therefore a noun.

However, when it comes to SLs, several issues arise during the syntactical analysis of a signed sentence. For instance, let us turn now to a frequently cited example of signs which can be challenging to identify based on their syntactical function; the case of the so-called 'multifunctional signs' (Meir, 2012; Mohr, 2014; Schwager & Zeshan, 2008). A number of researchers have frequently cited the example of the signs DEAF and HEARING occupying various syntactical slots and thus functioning as arguments, predicates or modifiers[11] (Nadolske & Rosenstock, 2007). It has also been observed that they

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[11] Cross-linguistic research has shown that this is not the case for all SLs alike. Taking for instance the sign DEAF which can occur in different syntactical slots in DGS, but only as an argument in Kata Kolok (Schwager & Zeshan, 2008).

can occur bearing different lexical meanings depending on the context, which practically means that their categorisation in concept classes (see Section 4.3.1) can be rather difficult (Mohr, 2014). See the following examples of the sign DEAF from this dataset:

(6)

Mouthing				"αυτό-αυτό" "this-that"	
Manual	[PT:PRO1SG	DEAF]	[DOCTOR	THIS-AND-THAT]	[UNDERSTAND-NOT]

Meaning: 'I am Deaf. The doctor was talking (saying this-and-that), (I) do not understand' (P2: Narrative)'.

(7)

Mouthing			"κινητό" "mobile"		
Manual	[ONE	DEAF	MOBILE	DSM:MOBILE-SCREEN-OPEN]	[SIGNING]

Meaning: 'One Deaf (person) opens his/her mobile phone and starts signing' (P1: Narrative).

In these two examples the sign DEAF occurs in two different syntactic slots. In the first example the sign is identified as a predicate adjective (in lack of copula, see Section 4.6.1.2), while in the second example the sign is the subject of the sentential predicate and therefore is identified as a noun.

Closely related to the syntactic criterion is the pragmatic or discourse criterion. Every signed sentence constitutes a part of a wider discourse that has to be taken into consideration. Based on that notion, Hopper and Thomson (1985) argue that the discourse categories of topic and comment are highly relevant to the basic distinction between verbal and nominal constituents, which has been the subject of interest for a number of researchers, such as Supalla and Newport (1978). The topic of a sentence is presupposed to coincide with the

noun of a sentence, and in many cases to occupy sentence-initial position, while the comment is usually expressed by the verb, which in GSL usually occupies the sentence-final position (Hantzopoulou, 2008). The syntactical structure of GSL follows a **"topic-first order"**, i.e. the topic of the signed utterance is located in the sentence-initial position and is realised by the use of a noun or a place specifier (Sapountzaki, 2015:328). Consider the following example:

(8)

	topic	*comment*
Mouthing	"σπίτι"	
	"house"	
Manual	[HOUSE	DESCRIBE…

Meaning: 'The description of the house is…' (P4: Informative).

In this example the general discourse topic is the house. The signer announces that she is going to describe the house where the basic incident of the story took place. The topic occupies the sentence initial position, it is classified as a noun, it is accompanied by the mouthing "σπίτι" ("house") and it is followed by a comment expressed by the verb DESCRIBE.

Sutton-Spence (2007) notes that since mouthings can contribute at the clarification of the manual sign's meaning they are frequently associated with the sentential or the wider discourse topic. The discourse-related criterion was also taken into consideration during the process of sign grammatical class classification.

4.3.3 Morphological criteria

Can the form of the sign hint at its grammatical class? The most researched SLs have been found to share various morphological processes, such as verbal

agreement (Aronoff et al., 2005). In this chapter I am not going to engage in a detailed discussion of morphological processes in SLs; I will rather discuss changes in the morphology of the manual sign which could be considered indications of the manual sign's grammatical class, and as such were taken into consideration here.

For GSL, as is the case for other SLs as well, morphological modifications of verbs include "alterations in the type and the size of the movement pattern, reduplication, direction and use of space for agreement" (Sapountzaki, 2015:325). These morphological processes may also include the use of non-manuals (body movements, mouth actions, etc.) which could also hint at the manual sign's grammatical class (see Section 4.4.4).

In terms of the modification of the movement pattern in predicates, in literature, such changes have been described to depict aspectual marking from the late 1970s (Klima & Bellugi, 1979). In some detail, the movement of the sign can become longer or shorter to depict a durative or diminutive aspect respectively. It can also be reduplicated to mark the repetitive nature of the action described by the verb or it can be intensified to mark the forceful nature of the action (Sapountzaki, 2015). Since aspectual markers are assumed to be combined mainly with predicates they are considered here as significant indicators of verbal signs. On that note, Efthimiou et al. (2004) include in their analysis the field they term as 'GSL_ASPECT', which describes the adverbial values of continuation, duration, degrading, intensity or repetition of the movement pattern of the predicate, as shown their example (5):

(9)

Mouthing

Manual   [RAIN+GSL_ASPECT=int]

Meaning: 'It rains heavily' (P3: Narrative)

Accompanied by the appropriate non-manuals, these values are incorporated in the predicate's morphology making the addition of a separate sign that would translate, for instance, as "heavily, continuously, little, much etc." not obligatory, depending on the context. The following example from this dataset was identified as the verbal sign AIR-BLOWING, and not the nominal sign AIR, due to the alteration of the movement pattern, aiming at the provision of the information regarding the intensity of the action described by the predicate.

(10)

Mouthing

Manual   [AIR-BLOWING+GSL_ASPECT=int]

Meaning: 'The air was blowing strongly' (/with intensity)' (P3: Narrative).

As for the completive/ perfective aspect, in many SLs it is usually expressed through the use of the free morpheme usually glossed as FINISH (Fisher & Cough, 1972/99; Rathmann, 2005 for ASL), 'DONE' ('ΠΡΑΓΜΑΣΟΠΟΙΗΘΗΚΕ') (Vletsi, 2008 for GSL), FATTO (Zucchi, 2003 for LSI), etc. For GSL, it usually follows the sentential verb (Sapoutzaki, 2005), but it can also appear pre-verbally in rare instances (Vletsi & Stavrakaki: 2007). Therefore its occurrence could be considered another indicator of verbal signs. Instances of this sign observed in the current dataset occur mainly on a post-

verbal position, thus functioning as grammatical markers that place the whole meaning of the sentence in the past.

(11)

Mouthing
Manual   [PT:PRO1SG   PAY   FINISH]
Meaning: 'I paid' (P1: Narrative)

The majority of morphological processes refer to events, expressed by the verbal constituent of a sentence (Schwager & Zeshan, 2008). The verbal morphology can be more complex than the morphology of nouns, which exhibit limited or no inflection at all (Pizzzuto & Corazza, 1996), especially for gender and case (Meir, 2012). One particular example on how morphological processes can reflect the grammatical class of a sign is the category of indicating/ agreement verbs, which are modified to include information about their subject (Schembri et al. 2018) (see also Section 4.6.1.1.1). They are morphologically interesting and have thus been the subject of extensive research in the field of sign linguistics (e.g. Padden 1988; Meier 1998 etc.). Scholars' interest pertains to all the possible ways these verbs are observed to be modified for subject and object in a signed sentence. Schwager and Zeshan (2008) note that this inflection is realised either through the addition of suffixes (for subject(s) and object(s)) at the beginning and end point of movement respectively (e.g. GIVE) or through the change of the orientation of the fingertips or the hand that produces the verbal sign (e.g. TEASE[12]). In examples like the verb GIVE semantic classes and morphological processes are linked since the verb is also

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[12] In GSL, the sign is performed with an extended INDEX finger directed at the person who is being teased. If the signer is the one that is being teased the fingertip will be aiming at him/her.

semantically transitive (Schwager & Zeshan, 2008). Changes in the direction and/or orientation can indicate the Source and the Goal of the verb (Perniss et al., 2007), thus facilitating the whole process of grammatical class assignment. If the morphology of the sign does not allow for the alteration of its features or spatial agreement with either of its arguments (as in the cases of verbs articulated in specific parts of the body), such as the verbs THINK, TAKE-ON-RESPONSIBILITY or REFUSE, then in those cases the agreement could, in some SLs, be achieved through the addition of a person agreement marker (PAM) (Baker & Pfau, 2016).

Classifications of a smaller set of nouns and verbs have also been made with regard to the movement pattern of the manual sign (Supalla and Newport, 1978; Nadolske & Rosenstock, 2007, etc.). According to that notion, for some SLs[13], when one compares the movement pattern of semantically and formationally related noun- verb pairs, the sign identified as noun is usually articulated through a sharp movement pattern (e.g. SCISSORS), while the equivalent verb is articulated through a longer movement pattern (e.g. CUT-WITH-SCISSORS) (Meir, 2012). In that respect, two seemingly identical manual signs dictate two different sentential constituents. While this observation has been made by several researchers, Schwager and Zeshan (2008) and Baker and Pfau (2016) clarify that these differences in the movement patterns can mostly be observed in cases in which the semantic content of the manual signs refers to an instrument and the action performed using that particular instrument (as in the previous example, i.e. SCISSORS/CUT-WITH-SCISSORS). In the present dataset,

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[13] The differences in the movement pattern between nouns and verbs are observed for a number of SLs, but not all of them. Baker and Pfau (2016) argue that this cannot be established for NGT signs.

the example of AIRPLANE and FLYING-AIRPLANE (P3: Narrative), signed using the same handshape, appears extensively in one of the personal vignettes. Upon close examination I find that the movement pattern of the noun is indeed performed in a shorter, sharper manner and was-in some cases- paired with the mouthing "αεροπλάνο" ("airplane"). At the same time, the movement of the hand for the verbal sign FLYING-AIRPLANE was longer (so as to demonstrate the trajectory of the airplane), more relaxed and, in some instances, paired with a mouth gesture bearing the adverbial meaning of a relaxed, uneventful flight.

While examining the morphological criterion, there are a few concerns that arise. A large proportion of lexemes in SLs are not morphologically modified, which basically means that with the frequent absence of such processes, it would not be wise to rely solely on morphological criteria to classify the various signs (Erlenkamp, 2000). Even though early research on the subject argued towards the identification of clear, distinct grammatical classes based mainly on the formational characteristics of a sign (Supalla & Newport, 1978; Klima and Bellugi, 1979), morphological criteria do not constitute the only reliable criteria for grammatical class assignment (Schwager & Zeshan, 2008). Nevertheless, differences in the movement pattern proved particularly useful during grammatical class assignment in the course of this project. For instance, the intended meaning of an airplane flying in the sky not in full speed is encoded in the movement pattern of the manual sign, which slows down significantly (AIRPLANE- FLYINGslowly), thus indicating that the manual sign, which is marked for aspect, is verbal.

4.4 Other cues for grammatical class identification

Meir (2012:89) discusses a variety of "distributional evidence", which can be used as cues to facilitate grammatical class distinction. This evidence has to do with the co-occurrence of signs with specific function words (which Meir describes as quite selective regarding the signs they pair with) and the co-occurrence of specific content signs with other categories of content signs (e.g. adjectives with nouns).

4.4.1 Co-occurrence with function words

For Meir (2012), the study of function signs is of great significance due to the fact that their occurrence close or adjacent to content signs can hint towards the grammatical class of those signs. Following that principle, if a possessive sign (e.g. YOURS) occurs with a content sign, the latter would probably be a noun (Padden, 1988; Meir, 2012). Also, pointing signs functioning as demonstratives are more likely to occur in close proximity to the nouns they refer to (Meir, 2012).

(12)

Mouthing	"'ένα" "one"	"βράδυ" "night"	"δύο" "two"	"αδέρφια" "brother"				"αδερφός" "brother"
Manual	[ONE	NIGHT	TWO	SIBLINGS	DSM:STORE- THINGS++]	[THINK]	[PT:PRO3S G	SIBLING

Mouthing		"δύο" "two"	"παιδιά" "children"			"άγχος" "anxiety"	"έξοδα" "expenses"
Manual	POSS:PRO1S G]	[TWO	CHILDREN]	[MARRIED]	[PT:PRO3S G	BE- ANXIOUS	[HAVE- EXPENSES]]

Meaning: 'One night, two siblings were storing (their crops). One of them was thinking: "He is my brother, he (has) two children and he is married, he is anxious, (he has) a lot of expenses" (P6: Narrative).

Both PT: PRO3SG signs are identified as the pronoun 'he', since the signer is pointing towards the location, which was earlier assigned to his brother. The sign POSS: PRO1SG ('my') is classified as a possessive determiner, it is found in close proximity to the noun SIBLING, and therefore the phrase translates as 'my brother'.

4.4.2 Negative particles

A side-to-side headshake can spread over a predicate to negate the meaning of the predicate, thus being viewed as an intonational feature, which marks the verbal nature of the sign (see example 12) (Pfau, 2002). For ISL, Meir (2012:94) notes that negative existential signs (NEG-EXIST) could not occur with the semantic value of property, as in the case of adjectives and adverbs. Taking into consideration such examples of negative particles and the various ways in which they have been observed to interact with some grammatical classes, negative particles were also used as cues during grammatical class assignment. For a detailed discussion see Section 4.6.2.4.

4.4.3 Co-occurrence with other content signs

The overall context of a signed utterance can also indicate the grammatical class of the signs from which the utterance is composed. For instance, the occurrence of a sign, which could be characterised semantically as an entity, is likely to be accompanied by a modifier like NEW, which would normally be classified as an adjective. Both adjectives and Shape and Size (SASS[14])

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[14] Size and shape specifiers (SASS) are adjectival signs. They are considered quite common in SLs, they are used to describe the size and shape of an object and they are usually combined with an

modifiers have been frequently observed to occur more often with nouns for a number of SLs, such as ISL (Meir, 2012). Whether this is a general rule for GSL remains to be examined, nevertheless there have been some examples of adjectives, see example 13). On the other hand, modal verbs and auxiliaries occur more frequently with verbs as has been claimed for a number of SLs, such as ÖGS) (see example 18) (Hunger, 2006).

4.4.4 Co-occurrence with non-manual features

Non-manual features are often used in a grammatically significant way, like function words (Sandler, 1999). In that sense they can also be considered selective of the signs they accompany. Therefore grammatical class is considered significant when it comes to the distribution patterns of mouth gestures, mouthings, head nods etc.

With regard to mouth gestures, the adverbial and adjectival functions they serve have been studied extensively (e.g. Sutton-Spence & Woll 1999, etc.).Mouth gestures, and facial expressions in general, which serve adverbial functions can show the way an action is performed, namely whether it is performed e.g. 'effortlessly' (11), by adding an adverbial meaning to the verbal sign. Thus, they can be used to indicate that a sign is verbal (Meir, 2012). In that sense, mouth gestures can either be combined with a nominal or a verbal sign, i.e. describing a small-sized movement or a small- sized entity (Baker & Pfau, 2016). They are usually combined with the appropriate facial expression and they can be incorporated on the morphology of the sign (Efthimiou et al., 2004). In the current dataset I encountered a large number of mouth gestures

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appropriate mouth gesture (Baker & Pfau, 2016).

carrying adjectival and/or adverbial information (e.g. the pout lips for the addition of the adjectival information 'small' co-articulated with the noun HOSPITAL to create the meaning of a very small-sized hospital in an island (P2: Narrative)).

4.4.5 Prosody

The rhythm of signing (including pauses) can also help in marking which signs are paired together, thus belonging to the same nominal or verbal sentential constituent (Baker & Pfau, 2016). Specifically for clause construction and clausal boundaries (see Section 4.2) Pfau and Bos (2016) highlight the importance of pauses in marking constituents in simple and complex structures. For instance, in the former case the researchers argue that pauses do not occur in between parts of verbal or nominal phrases, thus marking the constituents as parts of a larger group (i.e. verbal or nominal phrases). As for complex structures, the researchers argue that a pause may occur before the introduction of subordinate clauses for a number of SLs (e.g. NGT, DGS, etc.). Instances of pauses have been included in the comment tier to assist in identifying clausal constituents and grammatical class assignment. Therefore pauses have proven particularly useful for identifying clauses and assigning grammatical classes.

In summary and upon close examination of the present dataset and the abovementioned criteria, it seems only natural that a grammatical class assignment process would take into consideration all three of these levels (i.e. semantic, syntactic and morphological) and the abovementioned cues for a systematic grammatical class assignment. Overall, the starting point of the current analysis was always the signed utterance, never the translated sentence

in Greek.

4.5 Issues that arise during the assignment of grammatical classes

Firstly, SLs are younger than most SpLs, thus exhibiting different linguistic traits than the latter (Meir, 2012). A number of scholars describe certain signs which have different functions depending on the place/slot they occupy, as their lexicalisation and/or grammaticalization process has not been completed [consider the case of 'multifunctional signs' described by Meir (2012), Mohr (2014) and Schwager & Zeshan, (2008)]. Secondly, the identification of sign boundaries is not always straightforward, making it difficult, on occasion, to distinguish between individual signs and their grammatical class (see Section 5.3), especially in the case of narrations, as in the airplane crash narration. The latter included a number of depicting verbs in the description of the trajectory of the aircraft, during which the succession of the signs was rapid, thus making it challenging to identify the boundaries of different signs. During the course of this study the beginning and the ending point of each sign was marked in reference to the raising and lowering of the hands or the change of the handshape.

Moreover, for a large number of SLs studied to date it has been noted that their syntax can be fairly flexible (Johnston et al. 2015). For instance, a nominal constituent comprising of a noun and its modifier, can be moved as a whole entity in different places within a signed sentence, without the result leading to an ungrammatical sentence. Taking for instance the phenomenon of 'topicalization', i.e. the placement of the topic of the utterance at the beginning of the signed sentence, a common technique used by the signer (or the speaker

for SpLs) in order to emphasise a specific constituent, one can see that the movement of constituents is a frequent phenomenon (Baker & Pfau, 2016). For GSL, a clause-initial position is identified as the place that hosts emphasised constituents (Efthimiou et al., 2006), a fact which was also taken into consideration here in correlation with the discourse criterion (see Section 4.3.2).

4.6 Grammatical classes- Lexical and Function signs

Signs belonging to one of the aforementioned groups (nouns, verbs, adjectives and adverbs) are lexical and therefore they are distinguished from functional signs such as pointing signs, conjunctions, interjections etc. The proposed classification is mainly based on Nadolske and Rosenstock's (2007) grammatical class classifications for ASL and includes the following classes.

Table 2: Grammatical classes included in this project

Entities	Predicates/Verb Categories	Modifying elements	High Greek Contact	Other
Nouns	Verbs	Adjectives	Conjunctions	Interjections
Pronouns	Depicting verbs	Adverbs	Prepositions	Mouthing with no signing
Question Signs	Predicate Adjectives	Negators		NorV
		Determiners		

Amongst others, Nadolske and Rosenstock (2007) included also the category of 'lexicalised fingerspelling', which is accepted as an integral part of ASL. Since fingerspelling exhibits high levels of lexicalisation in ASL (Ajello et al., 2001), their choice to include the aforementioned category is understandable but for GSL the use of fingerspelling, in general, is not as common amongst native signers (Hatzopoulou, 2008), thus leading me to exclude this class from the current analysis. A description of each class individually is included bellow.

4.6.1 Lexical Signs

4.6.1.1 Nouns and Verbs

Referred entities (concrete or abstract) are identified as nouns and signs that describe events, processes, actions etc. constitute the class of verbs. One of the most researched issues regarding grammatical class assignment in sign linguistics is the identification of nominal and verbal signs (Supalla & Newport, 1978; Johnston, 2001; Hunger, 2006; Kimmelman, 2009), especially when it comes to pairs of semantically related signs such as CHAIR/SIT, ASK/QUESTION, AIRPLANE/FLYING-AIRPLANE, etc. (see below Section 4.6.1.1.1 on noun-verb distinction).

4.6.1.1.1 Determining what is a verb

Verb categorization is heavily based on the morphological information they include. I will now present briefly several verb categories although, as previously mentioned, for the course of this project only two basic verbal categories were identified: the category of 'verbs' and the category of

'depicting verbs'. In the current classification the first category includes verbs of varying morphological complexity, which have not been distinguished any further. For the second category there is consensus in literature regarding the fact that it exhibits very low percentages of mouthings (Nadolske & Rosenstock, 2007; Johnston et al., 2015, etc.) and therefore the statistical results would be skewed if they were not separated from the rest of the verbs.

For most SLs a tripartite classification of verbs is adopted:

Plain verbs are identified by fixed beginning and end points and they do not encode in their morphology information about their arguments[15], contrary to the other categories of verbs (Perniss et al., 2007). Plain verbs such as LOVE, KNOW, THINK etc. are easily identified and characterised as verbs, which exhibit a lower degree of morphological complexity, a characteristic that has been observed to influence mouthing occurrence rates for a number of SLs [e.g. for BSL (Sutton-Spence & Day, 2001), for ASL (Nadolske & Rosenstock, 2007) and Auslan (Johnston et al., 2015)].In this project the (potential influence of morphological complexity is not studied).

Indicating or Agreement verbs are identified by the varying beginning and/or end points determined by the location, which is associated with and refers to their arguments, encoding information regarding the syntactic role (i.e. whether it is a subject or an object), the person and the number of the argument(s) (Meier 2002; Sandler & Lillo-Martin 2006; Fenlon et al., 2018, etc.) (see also Section 4.3.3) The beginning and end location of the movement pattern of an indicating verb are semantically significant, but there have been

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[15] Some information regarding the direct object may be included in the plain verbs through the handshape or the movement according to Sutton- Spence & Woll for BSL (1999).

researchers, such as Liddell (2003), who argue that this modification in the movement patterns can be viewed more like a referencing device rather than verb agreement. Therefore, the most discussed debate regarding indicating verbs concerns their directionality (Meier, 2002) and whether it can be considered a form of grammatical agreement or a gestural element (Liddell, 2003). Fenlon et al.'s (2018) latest findings seem to support a more gestural analysis of directionality of indicating verbs, which they describe as constructions that combine both lexical items and deictic gestures. Generally, indicating verbs are considered morphologically more complex than plain verbs; therefore it is usually assumed that the percentage of mouthing co-occurrence would be lower than the equivalent percentage for plain verbs.

Depicting verbs are a phenomenon observed in most SLs studied to date. What differentiates this category of verbs from the rest is the fact that they "depict aspects of their meanings" (Liddell, 2003:261) through their basic element, the handshape. The handshape depicts the size, shape and generally the semantic class of an object and also whether it moves or stays stationary in the signing space (Cormier et al., 2013). The most highly debated issue for researchers concerns their linguistic and gestural nature. This documented dual nature (Liddell, 2003) causes problems regarding their systematic classification. They are annotated using a number of words to explain the action that is being depicted, e.g. DSM: AIRPLANE-FLYING-EXPERIENCE- TURBULENCE, DSM: HUMAN-PLACED-ON-FLAT-SURFACE, DSM: MAN-HANGING-FROM-HELICOPTER (P3: Narrative) and in most cases they are not accompanied by one specific mouthing. As it is to be expected, there are exceptions to this "rule"; instances of depicting verbs being accompanied by the mouthed noun of the entity

depicted [for the first example the mouthing "αεροπλάνο" ("airplane") accompanied the depicting verb], or even the verb that describes the action, have been documented (Liddell, 2003). In a classifier handshape, the shape assumed by the hand is the appropriate one for the depiction of characteristics of the object/entity and also the "handling" of the object/entity depicted by the handshape, with the addition of movement to express the way it moves in space (Zeshan, 2003). For instance, Baker and Pfau (2016) present two examples from the Flemish Sign Language, which were both glossed as "LIE-ON" a flat surface. One of them referred to a book, so the B-Handshape was used, while the other one referred to an apple, so the signer selected the C-Handshape (placed on a flat surface), as more appropriate for the type of the entity depicted in the handshape, i.e. the apple. Throughout the glossing process I also included information in reference to the handshape that was being employed in each instance for future research (e.g. B-FLAT handshape used for referring to the UN contracts).Upon close examination of the dataset, I argue that the majority of these signs had a verbal function and therefore I decided to adopt Liddell's (2003) preferred term of 'depicting verbs'[16]

Here I am not exclusively concerned with the lexical class of verbs. Therefore, a detailed classification of all verb categories and their subcategories was not included in the project. Nonetheless, I systematically identified and glossed the category of depicting verbs separately, as it is observed to strongly disfavour mouthing co- occurrence (by Nadolske & Rosenstock, 2007; Johnston et al., 2007, etc.).

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[16] Other terminology includes the terms 'polycomponential verbs/ (Schembri, 2003), 'depicting signs' (Johnston et al., 2015) 'depicting constructions' (Cormier et al., 2013) etc.

4.6.1.1.1 Distinguishing between nouns and verbs

"No language wholly fails to distinguish noun and verb, though in particular cases the nature of the distinction may be an elusive one" (Sapir, 1921:126)

The full set of semantic, syntactic and morphological criteria is employed in the process of noun and verb distinction. To summarise, cues which could hint towards one or the other category include negation, the use of pointing signs on specific contexts, the co-occurrence of non-manual elements and the location of the sign in the sentence. The latter is indicative of the sign's grammatical class, especially if examined in association with the sentential constituents that precede or follow the term in question. For instance, Fisher and Gough (1999) explain that, if the sign appears in between two nouns it is probably a verb. Furthermore, if it follows a sign that could be identified as an auxiliary, statistically it is more likely to be identified as a verb. Of course, Fisher and Cough also point out that in many cases the auxiliary can function as the main verb. As mentioned in Section 4.3.3, for semantically and formationally related signs formational differences in the movement pattern of the performed sign can indicate the sign's grammatical class[17] (Supalla & Newport, 1978). Those formational differences are attested for a number of SLs (such as RSL, Kimmelman, 2009) and are thought to be "rooted in iconicity" (Meir, 2012:90).

The 'NorV' class includes signs which could be classified either as nominal or verbal for which I was not confident to make a decision regarding

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[17] Examples of noun-verb pairs include: BOAT/ SAIL, KEY/UNLOCK, QUESTION/ASK etc. (Meir & Sandler, 2008).

their grammatical class. In most cases the structure of the signed sentence was quite loose or there were not any indicating cues that would decisively hint towards one of the classes. It was also deemed important for these signs to be included in a separate class and not to be excluded altogether since the class contains 132 signs in total.

4.6.1.2 Adjectives and Adverbs

For ISL, Meir (2012) argues that adjectives and adverbs can in many cases be performed using an identical sign, as in the case of the sign NICE, which can either modify the meaning of a noun or a verb (Meir, 2012). Therefore the sign could either have adjectival or adverbial function. In those instances the location of the signs and the signs which precede or follow a particular term can help distinguish between the two classes. In the present dataset the sign NICE is mainly used as an adverb [e.g. FEEL NICE (P5: Informative)]. Baker and Pfau (2016) offer examples of adjectival identification; adjectives located between a noun and an INDEX pointing sign referring to that particular noun. They argue that in those instances the adjective can be recognised as a constituent of the noun phrase, where the noun is the head to which the adjective attributes certain characteristics. Such an example from the current dataset:

(13)

Mouthing

| Manual | [WOMAN | TALL | PT:DET | DSM: CLIMB-MOTORCYCLE] |

Meaning: 'A tall woman climbs on a motorcycle' (P2: Narrative)

 In this case TALL was identified as part of the noun phrase and an adjective that

describes a physical characteristic of the woman.

The class of adjectives [the signs that would fall into the concept class of 'property', as described by Schwager and Zeshan's (2008) argumentation] is not as straightforward to identify in SLs. In sign linguistics, adjectives are sometimes divided in two separate categories based on their syntactical function in a sentence. These categories are usually termed as 'predicate adjectives' and 'attributive adjective' (see also Padden, 1988; Pizzuto & Corazza, 1996). This classification of adjectives was later adopted also by Nadolske and Rosenstock (2007) whose proposed grammatical classes constitute the basis of the grammatical classes included in the current project as well. Two adjectival classes were included in the present classification; one was termed 'predicate adjectives' and the other was simply called 'adjectives' (see Section 4.6, table 2). The first category includes elements which carry the semantic value of property and function as predicates in the signed utterance, while the second category includes elements which attribute the semantic value of property to the nominal sign they refer to. For the category of predicate adjectives in particular, Padden (1988) notes that, like other predicates they too inflect for aspect. Therefore, the movement pattern of a predicate adjective could be altered to include aspectual information, as was described for verbs in Section 4.3.3.

In the current dataset, amongst the easiest to be identified as adjectives were those referring to the colour (i.e. GREEN), the size of an object or entity (i.e. SMALL), those referring to the shape of the object (i.e. SQUARE), those found next to or in close proximity to the noun they refer to (see also Section 4.4.3) (Baker & Pfau, 2016). Nevertheless, even in the case of colour adjectives, some

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instances could be classified as verbal and were translated, for instance, as "the car is blue". The copula "be", as a separate sign, is thought to be rare in natural signing (Baker & Pfau, 2016), and would therefore be glossed as "BE-GREEN" and classified as predicate adjectives.

The fourth major class identified for spoken and signed languages is the class of adverbs. Adverbs are characterised by their modifying function towards the verb of the sentence. The adverbials I was able to identify with a high level of certainty were, in many cases, temporal (e.g. AGAIN, P3: Narrative), or spatial, (e.g. PT: LOC: HERE, P6: Narrative) and so on. As previously mentioned, adjectival and adverbial meanings can also be incorporated in the noun or the verb itself through the modification of the movement pattern of the manual sign or the simultaneous occurrence of non-manuals (Crasborn et al., 2008).

4.6.1.2.1 Time adverbials

In SLs, the desired time frame can be inferred from the overall context of the utterance or through the use of time adverbials [which set the 'timelines' as described by Schermer & Koolhof (1990)], such as YESTERDAY, LAST WEEK etc. or semantically broader ones such as FUTURE, PAST to set the time line of the action described by the verb. Sapountzaki (2005) and Efthimiou et al. (2004) note that for GSL these adverbials are located in a sentence-initial position.

(14)

Mouthing	"χώρα" "country"				"πληροφορίες" "information"		"μία φορά" "once"
Manual	[COUNTRY	OFFICIAL- MEMBER	WRITE	TEXT	INFORMATION]	[DSS:(B-FLAT):GIVE- DOCUMENT	ONCE]

Mouthing		again	infor(mation)		
Manual	[FUTURE	AGAIN]	[INFORMATION	UNALTERED	STABLE]

Meaning: 'A country which is an official member (of the UN) drafts a document and submits it once. In the future (the country does the same) again while the information (on the document) is not changed' (P5: Informative).

The signs ONCE, FUTURE and AGAIN are treated here as adverbs. The sign ONCE is modifying the depicting verb, the sign AGAIN is modifying the same depicting verb, which is not repeated, but easily assumed here. The time adverbial FUTURE is used to set the time frame of the signed utterance.

Examples for adjectives and adverbs:

(15)

Mouthing		"δικαιώ(ματά" "ri(ghts)"		"πολιτικό" "civil"	"οικονομικό" "financial"	"πολιτιστικό" "cultural"	(negative side-to-side headshake)	
Manual	[HUMAN	RIGHTS	MANY-DIFFERENT]	[CIVIL	FINANCIAL	CULTURAL	BE-EQUA]L	[BE-UNEQUAL]

Meaning: 'There are many different personal rights: civil, financial, cultural rights (these are) not equal; they are unequal" (P1: Informative).

CIVIL, FINANCIAL, CULTURAL: The signs have been identified as adjectives, whilst signs such as MANY-DIFFERENT, BE-EQUAL AND BE-UNEQUAL function as predicates due to the lack of copula. More specifically they have been classified as predicative adjectives since semantically they all attribute properties to the noun RIGHTS, they are found in sentence final position (as previously mentioned, verbs are usually found in sentence- final position for GSL), there is no other verb in the utterance while the sign BE-EQUAL is accompanied by a side-to-side headshake negating the meaning of the accompanying manual sign (see Section 4.3.3 and 4.4.2 for negative particles used as cues for predicates). Taking all these into consideration the sign BE-UNEQUAL is treated as a clause on its own.

(16)

Mouthing				"ψηφι(ακό)" "di(gital)"	
Manual	[RECENTLY	NEW	TV	DIGITAL	BE-GREAT]

Meaning: 'Recently, a new digital TV was great' (P3: Narrative).

The manual sign NEW is classified as an adjective, since it precedes the noun it modifies (TV) and it does not occupy a predicate slot. The sign RECENTLY is a time adverbial used here to set the time frame of the utterance.

(17)

Mouthing	"αποκλείεται"	"μοιάζει"			"διπλά"
	"no-way"	"feels-like"			"double"
Manual	[NO-WAY	FEELS-LIKE	PERSON	KILL	DOUBLE++]

Meaning: "No-way! It feels like killing the person twice" (P3: Narrative).

A characteristic example of a manual sign classified as an adverb occurs in this example. The manual sign DOUBLE++ is mirrored in the non-dominant hand repeated and accompanied by the mouthing "διπλά" ("double"). The sign has been classified as an adverb modifying the use of the verb KILL.

Examples for all content signs:

(18)

Mouthing	"αν"	"άνθρωποι"				"πρέπει"			
	"if"	"people"				"must"			
Manual									[BE-OBLIGATORY]
	[IF	PEOPLE	DEAD]	[FOOD	WHERE]	[MUST	EAT]	[pause]	

Meaning: 'If people are dead and there is no food, it is obligatory (for people) to eat' (P3: Narrative).

The sign DEAD is classified as a predicative adjective (in lack of copula), MUST is identified as a modal verb and is thus included in the variable category of 'verbs'. EAT is also classified as a verb, since the modal verb preceding this sign is treated as a cue marking EAT as a predicate.

(19)

Mouthing							"παππούς"	
							"grandpa"	
Manual								
	[PEOPLE	SIGNING	[pause]	[SOME	BE-CLEVER]	[ONE	ELDER	BE-GENIUS]

Meaning: 'People are signing. Some are clever, one (of them), an elder, is genius' (P1: Narrative).

The manual sign PEOPLE is classified as a noun, since it is semantically identified as an entity and syntactically it is recognised as the subject of the following verb SIGNING The signs CLEVER and GENIUS are classified as predicate adjectives since semantically they correlate with the semantic class of property and they occupy the predicate slot in the absence of the copula. It is noteworthy that the manual sign ELDER is further specified semantically through the accompanying mouthing grandpa.

(20)

Mouthing	"συμβό(λαιο)"	"χώρα"	"πόσο"	"είκοσι"				
	"con(tract)"	"country"+++	"how-many"	"twenty"				
Manual	[CONTRACT PT:DET	COUNTRY+++	NUMBER	TWENTY	SIGN++]	(pause)	[PT:DET	FINISH]

Meaning: 'This contract is signed by twenty countries. Then it is complete' (P1: Narrative).

The manual sign CONTRACT is classified as a noun. Semantically the sign is perceived as an entity. It is accompanied by the PT: DET sign, which is considered a cue for nominal signs (translating to "this contract"). In reference to the overall discourse (previous and following sentences) the sign is identified as the topic of the utterance (discourse criterion). The manual sign SIGN is identified as the predicate of the utterance. It is articulated with a repetitive movement pattern to demonstrate the continuous process of twenty countries signing the document.

4.6.2 Function Signs

Besides content words, some function signs make their way into SL production, although their use is not as extensive as in SpLs. The most frequently attested will be discussed in this chapter. For these signs, Baker and Pfau (2016) point out that the number of function signs in SLs with a purely grammatical function is very limited, as is the case for some SpLs[18]. Nonetheless, examples of conjunctions and particles can appear in natural or elicited data. With regard to the relationship between mouthings and functional elements in general, Keller (2001) notes that those elements that serve only morphological functions in the matrix SpL and are not replicated (grammatically or manually) in the SL, are not usually mouthed. I include here only those function signs occurring with some degree of frequency. Prepositions occurred with very low frequency and therefore were excluded from the final statistical analysis.

4.6.2.1 Conjunctions

SLs generally make little use of conjunctions. There have been some interesting cases of conjunctions "introducing subordinate clauses" in SLs, such as BECAUSE and WHEN in BSL or IF and BECAUSE in NGT (Baker & Pfau, 2016:109). Sapountzaki (2005) in her analysis of tense markers focuses on the grammaticalization path of RELATION, which is analysed as a marker that introduces causal clauses. Several instances of this conjunction being used in the present dataset have been observed. It is glossed as RELATION, in most cases paired with the mouthing "λόγω" ("because"). Conjunctions such as OR, BUT, and AND are used to link main clauses and they are usually accompanied

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[18] Such as Chinese or Malay (Baker & Pfau, 2016)

by the equivalent mouthing, as observed in the present dataset. The manual sign AND appears only a few times in the data, which is not surprising considering that most scholars analyse its use as a language contact phenomenon (e.g. Baker & Pfau, 2016).

(21)

Mouthing				"παππούς" "grandpa"		"γιαγιά" "grandma"		"καπί" "kapi "(seniors centre)
Manual	ALL	DSM:EYES-TURNING	ELDERS	AND	ELDERS	REGARDING	FS:K-A-P-I

Meaning: 'Everybody turned and looked at me, grandpas and grandmas from the senior centre' (P1: Narrative).

The sign AND is identified here as a conjunction located between the two manually identical signs, which are semantically specified further by the co-occurring mouthings "παππούς" ('grandpa') and "γιαγιά" ('grandma'). The sign AND occurs only twice in the dataset (see Section 4.2), so in this specific example it could be hypothesized that it occurs in order to separate the two manually identical signs ELDERS, semantically specified further by the co-occurring mouthings.

4.6.2.2 Pointing: pronouns and determiners

Classifying pointing signs as pronouns, determiners or locatives was another significant challenge for this study. If a given token's function was ambiguous between different possibilities (e.g. a point to a person standing in a particular location could either be a pronominal or locative point), both possible functions were included in the gloss. Other scholars have faced similar difficulties while attempting to classify pointing signs. For instance, a recent study on lexical frequency for BSL found that a pointing sign that could not be classified as a

pronoun, a determiner or a locative was in the top ten most frequent items in the BSL Corpus (Fenlon et al. 2013).

Pointing with an extended INDEX finger can encode the difference between a definite and an indefinite noun, while it can also have a pronominal function (Cormier, Schembri & Woll, 2013). Zeshan (2003:11) notes characteristically that its use is "equivalent to pronouns", as they are used in SpLs. It occurs immediately before or after the sign it localises in space (Baker & Pfau, 2016). Referents (and objects) are localised in the signing space, with the use of the INDEX pointing, irrespective of whether they are actually present or they are (arbitrarily) assigned a place in the signing space of the signer. In the latter case pointing is located at a shoulder level, utilising the upper signing space (Sapountzaki, 2015). In both cases the signer can point to that particular location to refer back to each referent. In the case of a present referent, the INDEX finger can serve also as a 'demonstrative pronoun' (the movement pattern is usually observed to be more intense and sometimes repeated) or a 'locative adverb' (Baker & Pfau, 2016:106). Cases identified as demonstrative pronouns were included in the category of determiners, while cases of locative adverbs were included in the class of adverbs. During glossing, cases of different handshapes used for the first person personal pronoun[19] were included in the comment tier for future research purposes. One of the signers alternated between different handshapes for first person reference during the narration of a fairy tale (P4: Narrative).

The class of determiners consists mainly of pointing signs that function as determiners of a referent who appears to be known or easily assumed, or a

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[19] +1H and -2H in accordance with the Auslan annotation guidelines (Johnston, 2016).

previously mentioned location. The class also includes possessive determiners such as MY, YOURS, HIS/HERS, THEIRS etc., which are easier to identify as they are not (usually) articulated with an INDEX pointing handshape (Hatzopoulou, 2008).

4.6.2.3 Negators (negative particles)

For expressing negation, SLs usually use a manual negative sign accompanied by several other manual and non-manual negators (Pfau & Bos, 2016). Citing examples from Hong Kong SL, TID and GSL, the researchers note that, in some cases, negation is performed only through non-manual elements, simultaneously with content signs or is embedded morphologically in the verbal sign (see also Section 4.3.3). For GSL sentential negation is realised with the addition of a negative particle after the predicate of the sentence (Antzakas, 2008; Efthimiou et al., 2004).Several negators have been identified by Antzakas (2008) including cases such as ΔEN (NOT), MHN (DO-NOT), TIΠOTA (NOTHING), AΔEIO (EMPTY), etc. Pfau and Bos (2016:139) characterize GSL as a "non-manual dominant SL", thus highlighting that non-manual negation is quite frequent for GSL. They present examples in which the head tilt or the headshake spread "over (part of) the sentence".

(22)

Mouthing						"όλοι"
						"all"
Manual		[PHONE	PT:DET/LOC	NOTHING]	[DAYS-PASSING]	[ALL

Mouthing				"πώς"	
				"how"	
Manual	PEOPLE-LOSING-	[BE-HUNGRY]	[FOOD	HOW]	
	WEIGHT]				

Meaning: '(They) could not call anywhere, the days were passing and the people were losing weight, they were hungry. How were they going to get food?' (P3: Narrative).

The manual sign 'PHONE' is identified here as verbal because the movement pattern is directed towards different locations in space, to which the signer points as well. The sign NOTHING is identified as a negator in this instance.

(23)

Mouthing						
Manual	[PT:PRO1SG	BE-	[AGREE]	[BE-	[CA:EYE-	[INFECT	NOTHING]
		PATIENT]		PATIENT]	HANGING]	

Meaning: 'I am patient, I agree, I am patient (while his) eye is hanging out, (I hope) he does not infect me' (P2: Narrative).

The addition of the negator NOTHING is negating the sign INFECT, which is thus identified as a verb. The signer is pointing to herself to denote who is the one being patient, while the reference to the second person is accomplished by a slight move of the torso, aiming to maintain reference (CA). Interestingly, the verb INFECT is inflected, i.e. the start and ending point of the movement pattern encode the information regarding the verb's arguments. A particular negator recognised for GSL, as for other SLs (see also Section 4.4.2), is glossed as NEG-EXIST and is used mainly to negate the existence of tangible objects but also as a more general negator (Sapountzaki, 2015).

(24)

Mouthing		"σοκ"			"μπορώ-να-δω;"	
Manual		"shock"			"can-I-see?"	
	[PT:PRO1SG	SHOCKED]	[ASK	PT:BODYeye]		[MOBILE

| Mouthing | great | | Greece | has-not | |
| Manual | BE-GREAT] | [G:DAMN | GREECE | NEG-EXIST] | |

Meaning: 'I am shocked, I ask (him): "May I see the mobile?" It is great! Damn, (it) does not exist in Greece' (P1: Narrative).

The signer is negating the existence of this type of modern mobile device in her country.

As discussed in Section 4.3.3, some predicates also allow for negation to be expressed morphologically as part of the form of the sign. Woodward (1974), Sutton-Spence and Woll (1999), Atzakas and Woll (2003), Sapountzaki (2015), etc. describe a reversed movement pattern of the initial starting position of the sign. In GSL for instance, for the sign WANT-NOT the place of articulation is the same, as is the handshape, but during the movement the thumb moves upwards instead of downwards. Predicates of this category are glossed here as demonstrated above, including the verb and the negation particle linked by a hyphen.

4.6.2.4 Interjections

The class of interjections is not very homogenous (Nadolske & Rosenstock, 2007). Signs classified as interjections include instances such as PLEASE, OH, SO, ATTENTION, NO-BIG-DEAL, OK, I-SEE. It is hypothesized for such interjections not to be part of a non-conversational dataset, such as the present one. Nevertheless, in instances when the signer addresses the (perceived) audience through the

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camera, signs like OK, SO, ATTENTION (P5, P2: Narrative), etc. do occur.

4.6.2.5 Question-signs

Literature in sign linguistics dictates that the signs included in this class are usually- but not exclusively- found in the "right periphery" of signed utterances (Branchini et al., 2013:5). In the present dataset instances of wh-signs being duplicated in the right as well as the left edge of the signed sentence have been noted, as in other SLs. The class includes signs like WHAT, WHO, WHERE, etc.

As Schwanger and Zeshan (2008) point out, at first glance, determining a sign's grammatical class can be quite misleading. In my attempt to classify the signs in the current dataset I found that to be true. Therefore, I attempted firstly to break down the utterance at a clause-level provisionally (see Section 4.2) and then to proceed to a grammatical class classification of its constituents. I have not pre-supposed grammatical classes of spoken Greek and applied them to GSL, I am simply attempting to test classes proposed by similar projects (Nadolske & Rosenstock, 2007), in comparison to the GSL data. Assigning a grammatical class to all signs analysed in this project will provide me with the opportunity to test the (potential) influence of the factor of grammatical class on mouthing behaviour and the distribution of these classes across the informative and the narrative register.

4.7 Hypotheses

My first hypothesis relates to the statistically observable presence of mouthings alongside manual signs for the entire dataset (see Table 7 in Section 7.1). This is based on previous findings for other SLs, since research on mouthing rates for

GSL is non-existent (their characteristics are briefly discussed in Papaspyrou, 1997 and Efthimiou et al., 2001). Although cross-linguistic research regarding the use of mouthing is limited, the varying percentages reported for SLs studied to date seem to support reports that the use of mouthings is more favoured for some SLs (e.g. DGS) and less favoured for others (e.g. ASL), for a number of reasons. Looking, for instance, at DGS, the country's strong oralist methods in deaf education is often discussed for the strong presence of mouthings during language production, frequently reported for DGS (Hohenberger & Happ, 2001; Keller, 2001). On the other hand, for ASL, scholars historically argued that the use of mouthings was strongly disfavoured in the language (Padden, 1980; Baker-Shenk, 1983), arguments that have been challenged by Nadolske and Rosenstock's findings (2007). The frequent use of another language contact phenomenon, i.e. fingerspelling, is frequently discussed as a factor that could explain this (Boyes Braem, 2001). Despite the documented variation in mouthing rates cross-linguistically, mouthings are "presumably ubiquitous in many other SLs" (Johnston et al., 2015:32). The percentages of mouthing occurrence for the GSL dataset will be discussed in comparison to other SLs in Section 7.1.

Moreover, I hypothesise that the rates of mouthings co-occurring with manual signs are influenced by the linguistic factor of register. As previously discussed (see Section 3.1.1), the influence of this factor has been observed for several SLs. This study is the first to examine this link for GSL, drawing from two distinct data sources: informative and narrative registers. The distributional patterns of mouthings across different registers are documented and comparisons with other SLs are made where possible (see Section 7.2). Based on previous findings for Auslan, BSL, NGT, ASL etc. (see Section 3.1.1 and 7.2) the informative register is

hypothesised to favour mouthings more strongly than the narrative register.

In terms of grammatical class, I hypothesise that an observable link between the manual sign's grammatical class and mouthing rates will be observed for the GSL data, as has been noted for other SLs (Sutton-Spence and Day, 2001 for BSL, Johnston et al., 2015 for Auslan, etc.). Lexicalised nouns and morphologically simple signs are expected to be accompanied by mouthings more frequently than morphologically complex signs, such as depicting verbs (Johnston et al., 2015 for Auslan). Hohenberger and Happ (2001:165) argue for DGS that classes like nouns, verbs, adjectives and adverbs generally "tolerate" mouthings, whereas function signs are observed to resist mouthings for BSL (Sutton-Spence & Day, 2001) and for Auslan (Johnston et al.,2015).

Finally, I hypothesise that the two linguistic factors of register and grammatical class are related, in the sense that e.g. an informative register is expected to include more nouns, which are thought to co-occur with mouthings more frequently and therefore higher mouthing rates are expected to be observed for informative registers. Taking also into consideration the nature of the signed texts comprising, for instance, the informative registers, i.e. the majority of them are translations of UN articles on human rights, and therefore the frequent occurrence of technical concepts is expected. This specific vocabulary may yield the need for semantic clarification and consequently a more frequent use of mouthings (see Section 7.2). I also expect the occurrence of the grammatical classes studied here to be distributed differently across the two registers (see Figure 5 in 6.1.2). Rbrul statistical analysis is used to confirm the significance of these two factors and whether they can be treated as important predictors of mouthing   rates   for   GSL.

5 METHODOLOGY

In this chapter, the methodological approach adopted is described in some detail. Starting with the description of the data sources, I then focus on the participants, before I proceed to the description of the annotation practices relevant to the present study. Altogether, 45 minutes of data produced by deaf native and near-native signers were analysed for the purposes of this project. The analysis resulted in 3052 tokens from which 2704 constituted the main body of data, following the exclusion of a number of signs that indicated uncertainty and therefore their presence would skew the results of the analysis (such as false starts and examples which raised doubt as to what was being signed or mouthed). The data were obtained from existing sources and were categorised as informative and narrative registers, with each signer producing a sample from both registers. In doing so, I aim at focusing on the comparison of mouthing occurrence rates while controlling, as much as possible, individual variation. All manual signs and mouthings were classified for their grammatical class in an effort to map specific distributional patterns of mouthings co-occurring in higher or lower frequency with certain grammatical classes.

5.1 Data sources

In the current project, I performed a systematic analysis of video recordings showing deaf signers signing in GSL. Due to time and budget limitations, the elicitation of videos specific to the current project was not deemed possible. Alternatively, carefully selected videos available online or provided to me by one of the few private institutions licensed to teach GSL in Athens. The latter were

filmed for educational purposes by the tutors of the language school and were made available to the researcher strictly for the purposes of this project.

All the recordings of these videos were filmed under formal or semi-formal circumstances planned by the Ministry of Education (http://prosvasimo.iep.edu.gr/el/), the Hellenic Federation of the Deaf (HFD) or the private institution licensed to teach the language. The collected videos were categorised in the two registers mainly based on the nature of the signed texts and the perceived intention of the signer, i.e. whether the goal of the communicative instance was the provision of information about a specific subject or the narration of a story. The two registers are termed as follows: the 'informative register', which includes non-interactive signing and translations in GSL and the 'narrative register', which includes non-interactive retellings of stories, children's fairy tales and personal vignettes (see also Section 3.1.1.2, table 1).

For the informative task:

- For P1, P3, P4 and P6 videos of them interpreting UN articles on the Human Rights of People with Disabilities were obtained from the website http://prosvasimo.iep.edu.gr/el/. The website was designed in the context of a governmental project aiming at the provision of accessible teaching and other material to students with disabilities.

- For P2 and P6, I used videos uploaded online, on www.youtube.com and on the websites of the two private institutions teaching GSL. The videos depict the signers introducing the two institutions and presenting the curriculum for the new academic year.

For the narrative task:

- For P4, P5 and P6 videos of fairy tales uploaded on http://prosvasimo.iep.edu.gr/el/ were used. All fairy tales can be found in the section labelled 'Children's Fairy tales & Stories in GSL' ('Παραμύθια και Ιστορίες στην ΕΝΓ). Two of those videos are included in the subsection of 'Children's Literature' ('Παιδική Λογοτεχνία'), while the third can be found in the 'Anecdotes' ('Ανέκδοτα') section.

- For P1, P2 and P3 I used videos of personal vignettes recorded as teaching material by a private language school designed to prepare students to take the GSL proficiency exams. For these videos, signers were instructed to sign a short personal story of their choice. Therefore, we can assume that they were aware of the fact that they addressed students with an advanced level of GSL knowledge.

The use of previously recorded videos for a linguistic analysis is not rare. Similarly, for GSL, Andrikopoulou (2015) analyses children's stories and fairytales from http://prosvasimo.iep.edu.gr/el/, various narratives collected from www.youtube.gr, and video recordings of deaf native signers used as examination material for the interpreters" exams, for her doctoral thesis on 'Compounding and Compounds in GSL'. For ASL, "commercially available" videos entitled 'ASL Storytime' were selected by Nadolske and Rosenstock (2007:39) to represent the narrative register of their dataset.

All of the videos were selected due to a number of reasons relating to the background of the signers themselves and the material's relevance to this project. My first goal was to achieve a more in-depth understanding of the influence of the factor of register and to control as much as possible the factor of individual variation. As previously mentioned, the way to achieve that goal was by including

recordings of both informative and narrative registers from each of the six signers. Therefore the signers selected were those for whom it was possible to find both an informative and a narrative video recording. As Nadolske and Rosenstock (2007:40) point out, this course of action is significantly "beneficial" in terms of focusing on the factor of 'situational variation' (their preferred term), while simultaneously aiming at controlling (as much as possible) individual variation.

All the videos were filmed with the signer facing the camera directly as part of videos of translated UN articles, announcements, fairy tales, personal vignettes and anecdotal narrations. For the situational circumstances surrounding the elicitation of these videos see Table 1 in Section 3.1.1.2.

5.2 Participants

There is an observable uniformity regarding the sociolinguist characteristics of the signers whose videos were selected for the current dataset. The dataset includes videos of two female and four male deaf adults. The younger signer is 32 years old, while the older is 52.All of them are white and right-hand dominant signers. All six of them were or are still teachers of deaf and hearing L2 students, with deep ties to the core deaf community. All of the signers work or own the sign language schools they work in, one of them works as a teacher in a public school, and all six as GSL interpreters. All of them have been selected for official governmental projects to carry out the translation of UN articles, the narration of stories, fairy tales and fables, the creation of a small online dictionary of GSL signs (http://prosvasimo.iep.edu.gr/el/), etc. Therefore, it is safe to say that they are recognised by other members of the Greek deaf community and the wider Greek community as competent signers. The signers' profile is known to me through my

personal affiliation with those individuals as three of these signers were my language tutors. All six signers are leading members of various deaf clubs in Athens; therefore my interaction with them has been frequent. The following table summarises these characteristics:

Table 3: Participants' information

Signer	Hearing status	Profession	Education	Gender	Age	Total number of tokens	Tokens per register
P1	deaf-native	Teacher Interpreter	Tertiary education (University graduate)	Female	30-35	732	Inf.:518 Nar.:214
P2	deaf-native	Teacher GSL Interpreter	Secondary education (High School graduate)	Female	45-50	273	Inf.:109 Nar.:164
P3	deaf-native	Teacher Interpreter	Tertiary education (Diploma)	Male	40-45	489	Inf.: 159 Nar.:330
P4	deaf-native	Teacher Interpreter	Tertiary education (University graduate)	Male	35-40	243	Inf.: 135 Nar.: 108
P5	deaf-native	Teacher Interpreter	Secondary education (High School graduate	Male	50-55	554	Inf.: 392 Nar.:162
P6	deaf-native	Teacher Interpreter	Polytechnic school	Male	45-50	413	Inf.:302 Nar.: 111

5.3 Processing the data

Annotation systems should be thoroughly described since they can shape the research results in general and the consistency of the observed mouth movements in particular (Cormier et al. 2015). The major goal of any annotation process is to achieve the desired consistency. A large number of sign language researchers argue that this kind of consistency and continuity in SL research can be achieved through ID glossing (Johnston, 2008b). ID glosses are "unique identifiers of sign types" (Johnston, 2012:106) used in SL corpora to form a lexical database for the language. They are used in order to represent a lexeme and all its variant forms (Fenlon et al., 2013). That particular type of glossing constitutes a useful tool for any researcher to build on and work towards a detailed annotation of SL data in a machine-readable form. Nevertheless, ID glossing has received some criticism according to which, this type of annotation leads to semantically broad tokens that have to be further analysed quantitatively to highlight slight differences between seemingly identical signs (Johnston et al., 2007). Furthermore, multiple annotators may employ different glossing techniques, resulting in substantial diversity in the glossing process. I chose not to assign an ID gloss to each sign due to reasons pertaining to practicality; the ID-glossing process can be a time-consuming one, as noted by Fenlon, et al., 2014) and therefore it would not be possible to adopt this kind of glossing in the course of this study. It was rather decided that the assignment of a contextual gloss used consistently would serve the purposes of a small scale project like this one. Those glosses were designed to comply with the instructions regarding the glossing of different sign types of manual signs and grammatical classes as described in the 'Auslan Corpus Annotation Guidelines' (Johnston, 2016, November edition). Glosses for manual signs are written in

capital letters and mouthing glosses are written in lowercase letters, e.g. TREE is the manual sign, "δέντρο" ("tree") is the mouthing (TREE/tree) (P6:Narrative).

During coding, any lemmatization issues regarding, for instance, the gloss assigned to tokens whose grammatical function was not clear (i.e. NorV), were dealt with the use of a double gloss, such as WALK/WALKING (P6: Narrative). This principle was eventually generalised for all glossing instances of manual signs whose variants appeared throughout the current dataset, as in the case of TRIP/TRAVEL (P1: Narrative). In that particular example, even if I felt comfortable identifying the grammatical class of the sign, both variants were used as the manual sign's assigned gloss in order to minimise diversity in the coding process. The grammatical function of the sign was then overtly identified in the SIGNGRAMMATICALCLASS tier (see Section 5.3.1 for a detailed discussion of the several tiers used) denoting whether the intended meaning (in that particular context) was actually the noun TRIP or the verb TRAVEL. Examples included are presented with their contextual gloss throughout the thesis and not with the double glosses used in ELAN, in order to ensure that their meaning is clear to the reader.

The data were coded by the author, an L2 signer, therefore, in various cases, it was deemed necessary to consult with a native signer, teacher of GSL to hearing adults (but not an expert on sign linguistics). The annotation process and, by extension, the results depend to a significant extent on the annotator's interpretation of the signed utterance. Issues of reliability are always a serious concern for this kind of project (Cormier et al., 2015). Due to temporal constraints and lack of resources, the provision of a peer sample analysis (usually 10% of the dataset) in order to ensure reliability, was not possible. For those cases in which it was not clear what the signer was signing or what he/she was mouthing, my basic

point of reference was the linguistic instinct of the native consultant. Those instances that raised doubt, in reference to the movement of the mouth, to both the author and the native signer were glossed using a question mark (?) and were excluded from further analysis. The identification of the sign's grammatical class was done provisionally by the annotator, who chose to refrain from categorising a sign for its grammatical class in instances that raised serious doubt (See Section 7.6.2). Those signs were also glossed with a question mark (?) for their grammatical class and were also excluded. I focused on a number of grammatical classes (see Section 4.6, Table 2), which were assigned to the various manual signs. Representative examples of data coding for each grammatical class are included in the following table.

Register	Gloss	Mouth	Manual sign grammat. class	Mouthing grammat. class	mout hing	No-mout hing
1. Inf.	EXPRESSION ΕΚΦΡΑΣΗ	expression έκφραση	Noun	Noun	1	
2.Inf.	FREE/UNMARRIED ΕΛΕΥΘΕΡΗ	free/unmarried ελεύθερη	Pred. Adj	Adj.	1	
3.Inf.	BY-CHANCE ΤΥΧΑΙΑ	by-chance τυχαία	Conj.	Noun	1	
4. Nar.	SMALL ΜΙΚΡΟ	small μικρό	Adj.	Adj.	1	
5. Nar.	CAN ΜΠΟΡΩ	can μπορώ	Verb	Verb	1	
6. Nar.	ACCESS/HAVE-ACCESS ΠΡΟΣΒΑΣΗ/ΕΧΩ ΠΡΟΣΒΑΣΗ	access πρόσβαση	NorV	Noun	1	
7.Inf.	PT:DET	contract συμβόλαιο	Det.	Noun	1	
8. Inf.	HELP ΒΟΗΘΕΙΑ/ΒΟΗΘΑΩ	help βοηθ(άω)	Verb	Verb	1	
9. Nar.	ALWAYS ΠΑΝΤΑ	always πάντα	Adv.	Adv.	1	
10.Inf.	WHAT ΤΙ	what τι	Quest-sign	Pronoun	1	
11.Inf.	TWELVE ΔΩΔΕΚΑ	twelve δώδεκα	Numeral	Adj.	1	
12.Inf.	NO/NOT ΟΧΙ/ΜΗΝ/ΔΕΝ	not δεν	Negator	Negator	1	
13. Nar.	OK	n/a	Interj.	n/a		1
14. Nar.	PT:PRO1SG	n/a	Pronoun	n/a		1
15. Nar.	DS:HUMAN-FALLS-FROM-MOTORCYCLE DS:ΑΝΘΡΩΠΟ-ΠΕΦΤΕΙ- ΑΠΟ-ΜΗΧΑΝΗ	n/a	Depicting verb	n/a		1

The first column provides information about the register from which each sign was chosen. The second column includes the gloss that was assigned to each sign, while the third one offers information about the gloss that was given to the mouthings. The grammatical class of the manual sign and the mouthing are recorded in the next two columns. It is obvious that the grammatical class of the manual sign and the mouthing in some cases do not correlate. In the final two categories, it is noted explicitly whether the manual sign is co-articulated with a mouthing or whether no mouthing occurrence is observed.

5.3.1 ELAN annotation software

The data were analysed using ELAN multi-media annotation software (Wittenburg et al., 2006), while the tokens were then exported to an Excel spread sheet for further statistical analysis. For illustration, consider the ELAN example in the following figure.

Figure 1: The ELAN annotation window

The glossing and grammatical class tiers included the following: a separate tier was used for each hand to caption cases of simultaneous

articulation of different signs in each hand in English: right hand (RHGLOSSENGL) and left hand (LHGLOSSENGL) glosses. Two similar tiers for each hand were also used for the Greek glosses (RHGLOSSGREEK and LHGLOSSGREEK). Two tiers were added for mouthings in English and in Greek (MOUTHINGEGLISH and MOUTHINGGREEK) and another two regarding the mouthing's and the manual sign's grammatical class (MOUTHGRAMCL and SIGNGRAMCL). Mouthings were identified for their grammatical class for future projects. Finally, a tenth tier was added for further comments (COMMENTS). Following the extraction of the current data into an Excel spread sheet, those tiers constituted the columns found in the spread sheet. A separate column on the Excel spread sheet characterising the annotated videos for their association to written sources was initially deemed necessary due to the differences in the structure and the purposes of the elicitation tasks of these videos. Therefore, for both registers, a separate column entitled 'WRITTEN/NOT-WRITTEN' was included to demonstrate whether the source of information was written Greek texts or not. Since the data were collected and not elicited I could not know with certainty the relation of each signed text to written or non-written sources. Therefore the assumed influence of a written source in the rates of mouthing occurrence during sign language production (Sutton Spence & Day, 2001) is not studied further at this stage (see Section 7.2.2).

5.3.1.1 Annotating mouthings

As far as the types of mouth movement are concerned, mouth gestures, mouthing variants (such as partial/reduced mouthings, instances of stretched mouthings, etc.) and instances in which the mouth remains stationary are not

noted. Since the focus of the study was solely on mouthings, it was considered more appropriate to include a gloss describing every identified mouthing and a pre-set gloss reading as 'NO- MOUTHING' for every other mouth activity (linguistically significant or not) or instances of the mouth being stationary. The glossing of mouth gestures constitutes a challenging task by itself that exceeds the purposes of this project.

In terms of deciding the beginning and end points of mouthings, I applied the guidelines for manual sign annotation as described by Johnston (2016). In that sense, the mouthing starts when the mouth in the video frame starts moving towards the articulation of the target form, while the ending point is recognised by the "return" of the mouth to its neutral position and/or the start of a new mouthing.

Instances of reduced/partial mouthings, as well as mouthings spreading across adjacent signs were observed but they did not constitute a point of focus for this project. A reliable analysis of mouthing variants should not be solely based on the visual observation of articulated mouthings captures by a single camera facing the signer. Projects focusing on mouthings usually employ multiple cameras capturing the signer from various ankles (e.g. Banks et al., 2016) Johnston et al. (2015) also note that many annotators, especially L2 users of the language, tend to mistake mouthings for mouth gestures. Other scholars have also pointed out that annotators frequently tend to transcribe what they think is being uttered by the signer and not what is actually articulated (Mohr, 2014; Johnston et al., 2015). Mouthings were transcribed as complete words in Greek and English. Nonetheless, in an effort to create well-rounded and detailed glossing, cases in which I was confident that part of the mouthing was

not uttered, the non-visible part of the word was enclosed in parentheses. Parentheses were also used to mark those cases of mouthings spreading over adjacent signs, so as to make it visibly clear which part of the mouthing is articulated with each manual sign it spreads over. Both cases were marked during transcription to facilitate future research on these elements, but they were not analysed further during the course of this project.

Throughout the dataset Greek orthography was used to transcribe mouthings (see Section 2.1.4.1). An English translation was also provided in a separate tier. I adopted the orthographical approach for the transcription of mouthings for the current project, in lack of a more standardised, widely-accepted transcription scheme for these elements originating from SpL (see Section 4.1).

5.3.2 Statistical analysis

For the statistical analysis, Rbrul multivariate regression (developed by Johnson in 2009) and mixed-effects modelling were used for the identification of possible predictors of mouthing occurrence based on the current data. Using log odds and factor weights, the program reports its results regarding the significance of the factor/factors (linguistic or social) in question. Positive or negative values demonstrate which factors favour and which of them disfavour the given realization of the variable studied. For factor weights, values between 0-.50 indicate a negative effect, i.e. a factor that disfavours the occurrence of the variant in question, while values between .50-1.00 present a positive effect, i.e. the influential effect of a certain factor. The threshold for significance for the factors I focus on is set at 0.05 (Johnson, 2009). Rbrul requires a binary

dependent variable, which in the current case was based on the presence ('present') or the absence ('absent') of mouthing. Fixed effects include the dependent variables of register and grammatical class, while the factor of 'signer 'was analysed as a random effect factor. The overall percentages of mouthings that co-occurred with manual signs at the informative and narrative registers, as well as the rates of mouthings co-occurring with the various grammatical classes were statistically tested (see Sections 6.1.1 and 6.1.2).

6 RESULTS

6.1 Descriptive analysis

In the following chapter I provide the results of the statistical analysis regarding the significance of the factors of 'register' and 'grammatical class', in terms of their influence on mouthing occurrence. The following graphs and tables show the relative proportion of mouthing occurrence, as well as the actual numbers of tokens mouthed and those not accompanied by a mouthing (cases of mouth gestures and of the mouth remaining stationary are included here) for the entire dataset (Figure 2), numbers of mouthed tokens and the percentage of mouthing co-occurrence across the informative and narrative registers for all the signers (Figure 3), their distribution across the different grammatical classes (Figure 4) and finally a cross tab analysis of the two factors (Figure 5). The percentage contribution of mouthing and no-mouthing occurrence is included within the bar for all data points. All the graphs are organised by increasing rate of mouthing occurrence denoting the percentage of their occurrence in reference to different factors. Figure 1 presents the distribution of mouthing and no- mouthing occurrence rates across the 2704 tokens analysed.
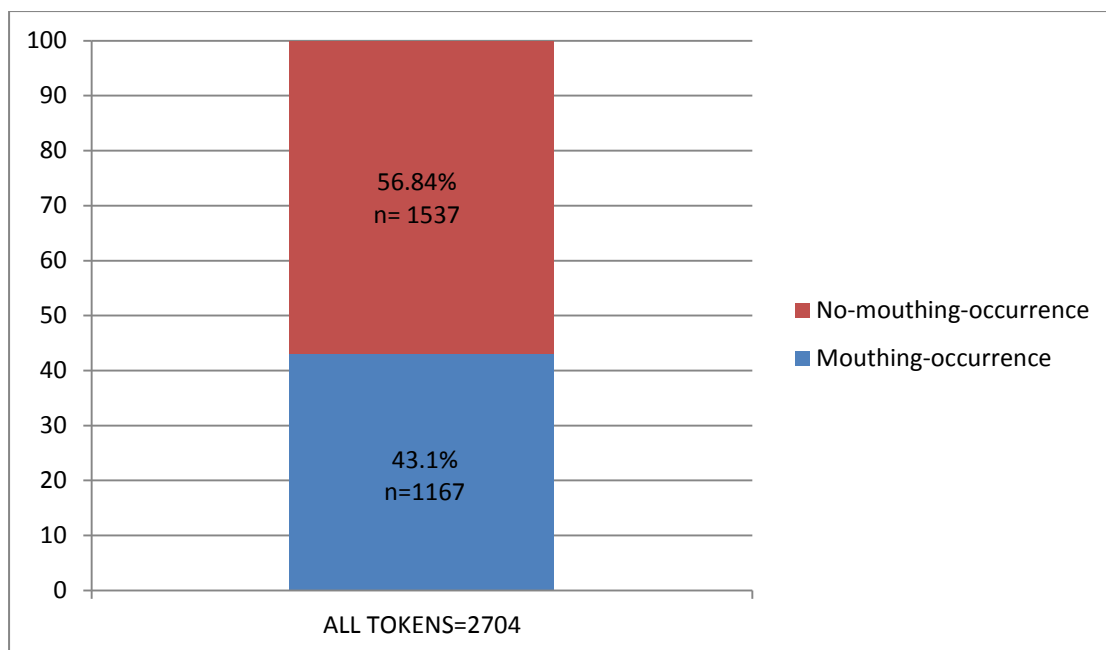
Figure 2: Overall percentage of mouthing and no-mouthing occurrence in data.

The results reported here stem from a multivariate statistical analysis performed using Rbrul. Based on the results of the statistical analysis, both linguistic factors, i.e. register and grammatical class, hypothesized (see Section 4.7) to affect mouthing rates have been found significant for the GSL data ($p<0.001$), as has been claimed for other SLs (see also Sutton-Spence & Day, 2001; Nadolske & Rosenstock, 2007; Johnston et al. 2015).

6.1.1 Distribution by register

As previously noted, the current dataset consists of two registers; the informative register consisting of 1614 tokens and the narrative register of 1090 tokens. My hypothesis concerning the factor of register was that mouthings would be more prevalent in the informative rather than the narrative register; a hypothesis which was upheld by the results presented here. I report a clear difference in mouthing occurrence rates between the informative and the narrative register (see Figure 3).

The results of the analysis indicate a high significance value for the variant of register (7.63e-07) and therefore the factor can be viewed as a significant predictor of mouthing occurrence. More than 50% of the tokens found in the informative register are accompanied by mouthings (50.8%), while the equivalent percentage for the narrative register is less than 30% (28.9%). As noted in the methodology chapter, the two registers are treated here as comparable, since each signer has examples of production in both registers.
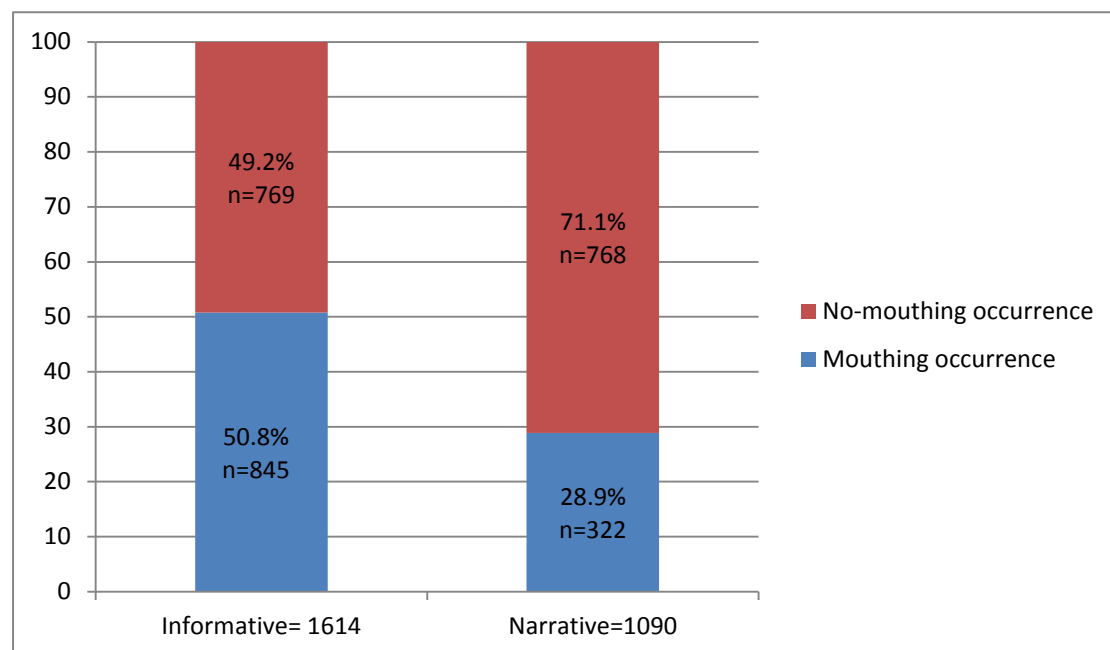
Figure 3: Distribution of mouthings across different registers.

The presence of mouthings is the dependent variable in the current multivariate logistic regression model. Table 5 presents the exact number of tokens, the log odds and centred factor weight values, as well as the mouthing co-occurrence percentages for each register.

Register	Log Odds	Tokens	Mouthing Percentage	Centred Factor Weight
Informative	0.253	1614	50.8%	0.563
Narrative	-0.253	1090	28.9%	0.437

6.1.2 Distribution by grammatical class

I continue my analysis by focusing on the relation of mouthings with the grammatical classes of the manual signs. The point of focus here is whether mouthings tend to occur more frequently with certain grammatical classes. Results of the logistic regression analysis also report a significance value of 2.35e-110 for the factor of grammatical class. Figure 4 shows that mouthing rates in the GSL data varied considerably in relation to the grammatical class of the manual sign they accompanied. Mouthing occurrence rates are included within each bar. Log odds, n values and percentages are included in table 6.

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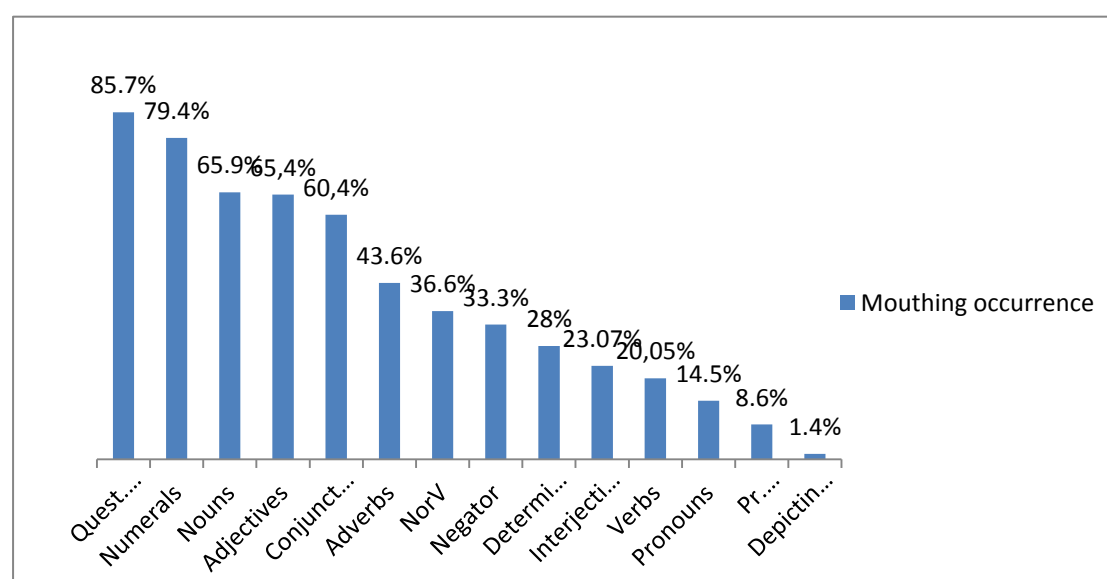
Table 6: Grammatical class and mouthings

Application value: Presence of mouthings

Factor Groups: Significant

Factor Group	Factor	Log odds	Tokens in both registers	Tokens mouthed
Grammatical class	Numerals	2086	34	27
	Question signs	2.040	14	12
	Nouns	1.253	897	591
	Adjectives	1.157	150	98
	Conjunctions	1.095	61	37
	Adverbs	0.553	111	51
	Determiners	-0,201	138	43
	Negators	-0,257	24	8
	Interjections	-0.281	41	18
	Verbs	-0.712	683	137
	Depicting verbs	-3.509	142	2
	Pronouns	-0.991	83	14
	Predicate Adj.	-1.805	78	8
	NorV	0.153	132	52

As seen on table 6 nouns and verbs constitute the majority of extracted tokens: with 897 and 683 tokens respectively. The percentage of mouthings co-occurring with nouns was 65.9%, while the same percentage for verbs was significantly lower, at 20.9%. As discussed in Section 4.6.1.1.1, the decision behind the inclusion of a category classified as NorV was based on the large number of tokens included in this category, which consists of 132 tokens, and the frequently cited observation that for certain pairs of signs a clear distinction between nominal and verbal function can be challenging (Schwager & Zeshan, 2008). A similar category is also included in the Auslan corpus annotation guidelines (Johnston, 2016-November edition), alongside information regarding the annotation of those signs.

The other category of verbs identified in the current study, i.e. depicting verbs, consists of 142 tokens. From those tokens, only 11 were classified as nominal but, due to their infrequent nature and the fact that the vast majority of the signs articulated with a classifier handshape were classified as verbal; a separate category of depicting nouns was not included in this analysis. The cross- tabulation revealed important information for the class of depicting verbs, which is seen here as nearly categorical. This information is important as it shows that depicting verbs are the least favourable environment for mouthings. For such instances, Daleszynska (2016:4) notes that, although these results could be eliminated, "leaving out this knockout could potentially skew the overall result". It is decided for them to be maintained here and discussed in correlation to the overall situational context of the annotated data (see Section 7.3).

6.1.3 Grammatical classes across registers

Following the individual examination of each linguistic factor and their influence on mouthing occurrence rates, on this section I present the results of a cross-tab examination of the factors of register and grammatical class. Cross-tabulation is an important step of the data analysis as it allows the researcher to trace for interaction of the variables studied and to show a proportional relationship between them (Tagliamonte, 2006). The statistical analysis indicates that the two factors interact in the sense that some grammatical classes are favoured or disfavoured in the two registers correlate as shown on figure 5. Upon reviewing this figure one should bear in mind that 62% of the dataset consists of data produced in the informative register. The actual numbers of tokens for each register are included in Table 7. Following a further exclusion of tokens which raised doubt as to their grammatical class and the exclusion of fingerspelled tokens (as they do not constitute a grammatical class), the total number of tokens is 2634.

Table 7: Sign Grammatical classes across registers

Sign Grammatical Class	Tokens		
	Informative Register	Narrative Register	Total
Question Signs	12	2	14
Numerals	20	14	34
Nouns	638	259	897
Adjectives	118	32	150
Conjunctions	34	28	61
Adverbs	53	58	111
NorV	86	46	132
Determiners	103	35	138
Negators	21	3	24
Interjections	13	28	41
Verbs	319	364	683
Pronouns	21	62	83
Pred. Adj.	60	18	78
Depicting Verbs	29	113	142
Total	1572	1062	2634

Consider also Figure 5 for illustration:

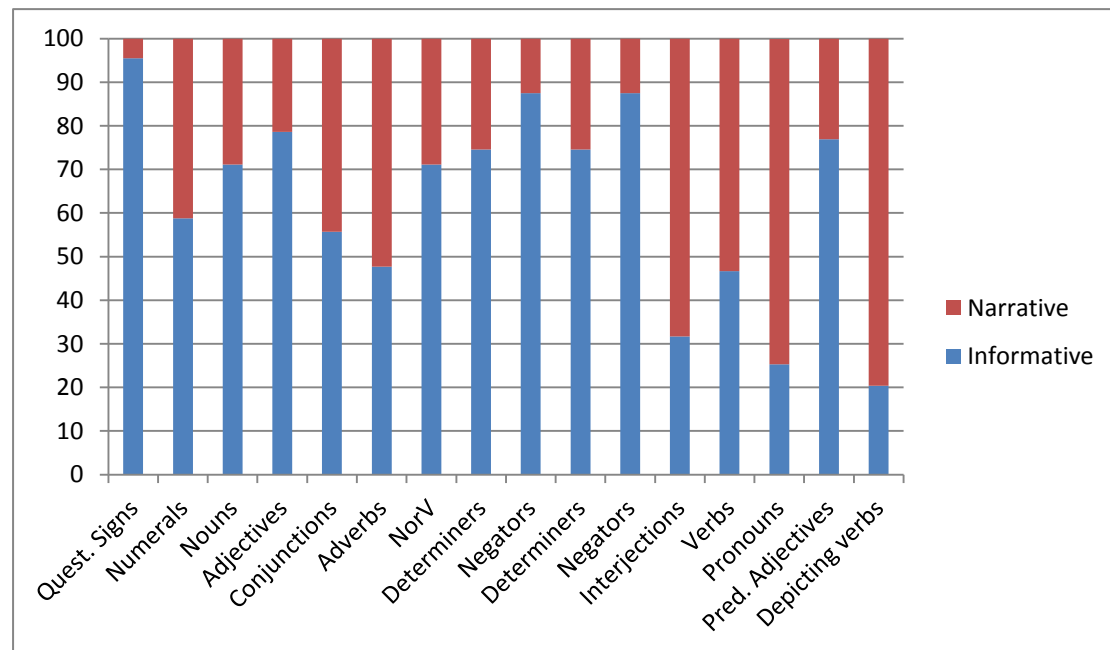**Figure 5: The distribution of grammatical classes across different registers**

6.2 Variation in mouthing rates by signer

Figure 5 shows the variation in mouthing use for each signer. Rates vary from 28.4% to 50.5% mouthing occurrence rates for both registers. The percentages of all data points are included within the bar (see Section 7.4).
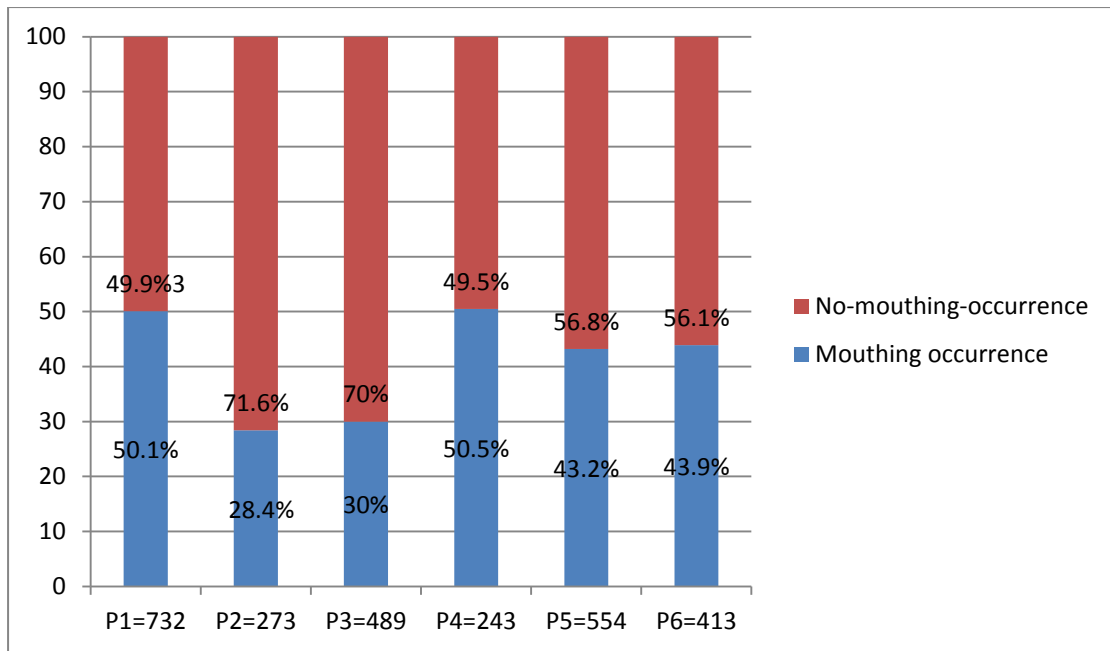
Figure 6: Percentages of mouthing occurrence for each signer.

7 DISCUSSION

In the current chapter I discuss how the results reported in the previous chapter relate to my hypotheses and to similar studies on other SLs. I also discuss (briefly) the linguistic status of mouthings in the light of the data presented.

Overall, looking at the two factors, a strong association between mouthing occurrence and both factors studied is observed. With regard to register, I hypothesised that mouthing occurrence rates would be higher for the informative register in comparison to the narrative register. In reference to grammatical class, I expected mouthings to co-occur more frequently with lexicalised nouns and other morphologically simple verbs ('plain verbs', see Section 4.6.1.1.1)and less frequently with morphologically complex signs, such as the class of indicating (or agreement) verbs (which in the current dataset are not distinguished from plain verbs; both are included in the class termed 'verbs') and the class of depicting verbs, a class I assumed to be associated with mouthings the least.

Finally, with regard to their interaction, I hypothesised that the two factors interact in the sense that certain grammatical classes are found more frequently in one than the other register. Multivariate statistical analysis on Rbrul confirmed my hypotheses and yielded similar results as those observed for other SLs such as Auslan (Johnston et al., 2015), BSL (Sutton Spence& Day, 2001) and ASL (Nadolske & Rosenstock, 2007). The statistical analysis demonstrates that both factors in question could be treated as significant predictors of mouthing occurrence, since they both reached significance ($p = <0.001$).

7.1 Overall mouthing occurrence

Figure 2 (in Section 7.1) shows the percentage of mouthing occurrence for the entire dataset, i.e. across both registers. The fact that mouthings are found to accompany nearly half of the transcribed data (43.3%) highlights the notion that they are undoubtedly "a widespread feature" of GSL production, just as they are for BSL (Sutton Spence, 2007:156), for Auslan (Johnston et al., 2015), for NGT (Bank et al., 2016)and other SLs. The following table presents mouthing occurrence rates for SLs cross-linguistically.

Table 8: Mouthing occurrence rates for other SLs (data taken from Johnston et al., 2015:15).

	Auslan	BSL	NGT	SSL	HKSL	NGT-2	GSL(current study)
Mouthing percentages	73.6%	51%	39%	57%	35%	80%	43.3%

Mouthing frequency rates reported cross-linguistically vary considerably, with percentages ranging from 35% to 80%. Variability in the mouthing frequency percentages could be explained by a variety of factors, such as the nature of the data sources analysed (see Section 7.2), differences in the elicitation tasks of the video recordings, differences in the sample of the participants (see Section 7.4), differences in the annotation schemes used, other cross-linguistic differences (see Section 2.3.3), etc.

The results I report here are broadly similar to what has been observed for other SLs. In comparison to the most recent studies for Auslan (Johnston et al., 2015) and NGT (Bank et al., 2015) the mouthing frequency percentages reported here for the entire dataset are relatively low. This could be explained by the nature of the current dataset. For GSL, all transcribed videos include only monologues

and no conversational data. The latter have been shown to favour mouthing frequency more than data stemming from narratives, as described by Nadolske and Rosenstock (2007) and Johnston et al. (2015). A similar argument is also made by Banks et al. (2015) in their attempt to offer an explanation for the two vastly different results presented for NGT by two projects on mouthing frequency. According to the researchers, the fact that the first project (Crasborn, van der Kooij et al., 2008) focused on narrative data and did not include conversational data could explain the difference in the mean proportion of mouthings for NGT in their project, which focused heavily on conversational data. Therefore, Bank et al. (2015) argue that the significance of register must be taken into consideration when one compares overall mouthing occurrence rates, even for the same SL. In that sense, I predict that the percentage of mouthings reported here for GSL would be higher if I drew from a dataset consisting of some conversational data as well.

Another reason which could explain differences in the amount of mouthing reported for the current dataset in comparison to other SLs has to do with differences in the number of participants included in the various studies. For the present study, the analysis was based on data collected only from six signers, while for other corpus-based projects (such as the Auslan and NGT-2 project) the number of participants was larger and their sociolinguistic background was significantly variable. Johnston et al. (2015) note that a large number of participants can yield more representative results in reference to the variable studied. They note characteristically that a random choice of two individuals from their dataset would yield very different results than those reported for their entire dataset. On that note, I predict that data stemming from a larger number of signers could yield different overall mouthing occurrence for GSL as well. The following

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table includes percentages of mouthing occurrence for a number of SLs.

Apart from these factors, as mentioned in Sections 2.2.3 and 4.7, some SLs have been reported to generally make more extensive use of mouthings than others for reasons pertaining to the educational policies of different countries, the intention of signers to associate themselves with a specific SpL (especially in communities with more than one dominant SpL), the intention of the signer to highlight his/her bilingualism (tightly related to the overall context of the communication), the extensive or limited use of other language contact mechanisms, such as fingerspellings.

7.2 Register variation

Looking firstly at the factor of register, I see that the rate of mouthing occurrence nearly doubles for the informative registers (such as interpretation of UN articles and presentations of sign language schools and their educational curriculums), with a rate of 50.8% of manual signs being co-articulated with a mouthing. The same percentage of relative frequency for narrative registers (such as fairy tales for children or personal vignettes) drops to 28.9%. With a difference of approximately 22% between the two registers, it is clear that register constitutes an important factor influencing the frequency of mouthings. The influence of register becomes even more prevalent when percentages of mouthing occurrence from each signer for both registers are examined. As previously mentioned (see Section 5.2), all six signers have examples of production in both the informative and the narrative register as shown on Figure 7.
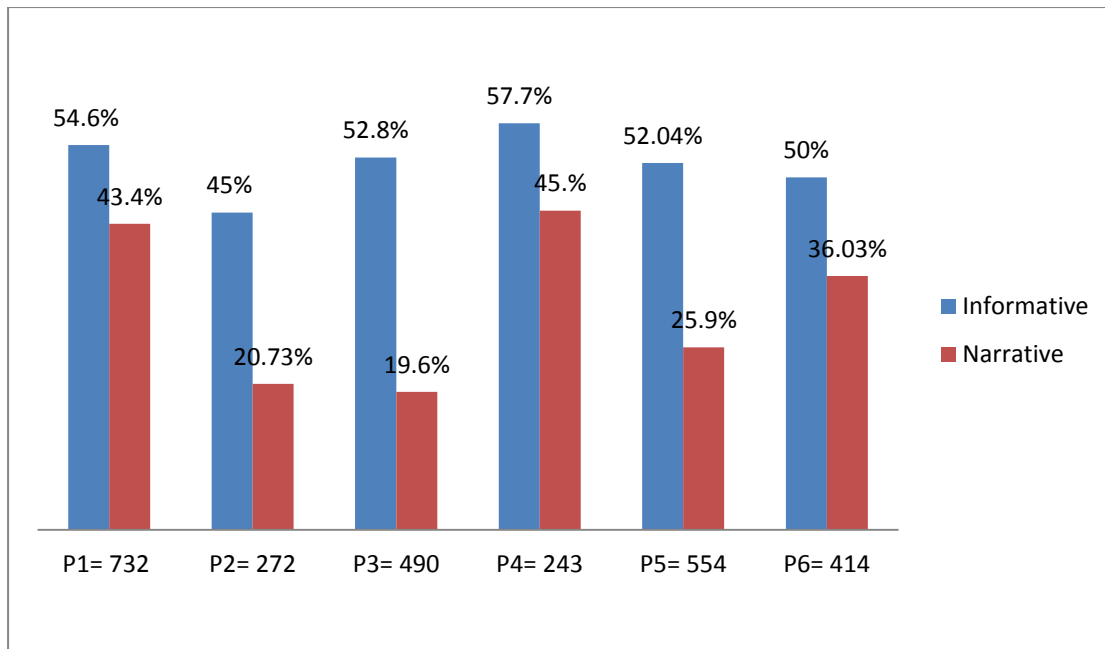
The actual numbers of tokens mouthed across registers for all six participants are included in the following table:

Table 9: Mouthed tokens for each signer across registers

Signers	Tokens Informative	Tokens Informative mouthed	Tokens Narrative	Tokens Narrative mouthed
P1	518	283	214	93
P2	109	45	164	34
P3	159	84	330	149
P4	135	78	108	65
P5	392	84	162	65
P6	302	151	111	40

All six signers show a difference in mouthing rates in the same direction, i.e. higher mouthing percentages are noted for the informative registers for all signers. The data from each signer support my observations regarding the influence of register and give me confidence to claim that this documented difference of 22%

in mouthing frequency rates between the two registers is not driven merely by individual variation, but mainly by the linguistic effect of register. This was also confirmed by the fact that signer was a random effect. If the variation was due to one or two individuals skewing the results, register and grammatical class would not have been shown to be significant factors of mouthing frequency.

Upon close examination of Figure 7 the differences in the percentages of mouthing rates for each signer are worth noting. For instance, the factor of register appears to exert a stronger influence for participants 2, 3 and 5. All three participants are close to or over 50 years old, they all come from deaf families, in which both parents and their siblings are deaf and therefore GSL is their first language. As seen in the graph, the three signers exhibit similar percentages of mouthing use for the informative register to the rest of the participants but smaller percentages of mouthings for the descriptive narratives. Similarly for BSL, Sutton-Spence and Day (2001) note that, although some small differences in mouthing rates are observed between younger and older signers in general (the latter generally use less mouthings than the younger signers for BSL), the most observable differences are noted for the descriptive narratives. In the BSL project the older signers from deaf families also exhibited similar mouthing rates for the informative registers to those reported for the younger signers, as is observed in this project as well (Figure 7). Sutton- Spence and Day (2001:83) argue that in descriptive narratives older signers from deaf families access their "repertoire" of mouth gestures, which they consider "register-appropriate" for the descriptive narratives. According to the researchers, these observations could be perceived as an indication that older signers form deaf families are more sensitive to register differences. Further research based on larger numbers of participants is needed to

get a better understanding of the potential influence of age and linguistic background to mouthing rates across different registers for GSL.

As noted on Section 3.1.1.1 the study of register in SpLs closely relates to the study of grammatical class (Biber & Conrad, 2019). In this project, differences in the occurrence of mouthings across registers can be explained by the way the two factors of register and grammatical class interact with one another (Figure 5). Since the occurrence of certain grammatical classes (e.g. nouns, adjective, etc.) was found to be more prominent in the informative register, and these classes have also been observed to co-occur with mouthings more frequently (Figure 3), higher mouthing frequency rates for the informative register can be expected.

Biber and Conrad (2019) note that "higher rate of occurrence equals "greater need for the functions associated with that feature" (2019:11). For instance, looking at the linguistic variable of mouthings and their occurrence rate, a higher rate of mouthings observed for the signed texts that comprise the informative register could be associated with the basic function of mouthings, i.e. semantic clarification (Ebbinghaus & Hessman, 1996; Boyes Braem, 2001; Sande & Crasborn, 2009) (see Section 2.2.2). In that sense, where there is informational density and therefore specific information has to be clarified, the mouthings occur more frequently to assist in this task. The fact that nouns, nominal constructions and noun-modifying features (e.g. adjectives) are favoured in the informative register (Figure 3) indicates an informational communicative purpose (see Section 3.1.1.2, Table 1) and could be viewed as consistent to the general situational circumstances, the nature of the data, the topic in discussion and the intention of the signer. As discussed in Sections 3.1.1.2 and 6.1 the informative register consists mainly of UN article translations of human rights and the presentation of

the curriculum of private institutions licensed to teach GSL. In the former case, due to the nature of the topic, the occurrence of abstract notions usually classified as nouns, such as the signs "ΙΣΟΤΗΤΑ/ισότητα" ("EQUALITY/equality"), "ΔΙΚΑΙΩΜΑ/δικαίωμα" ("RIGHTS/rights"), "ΣΥΜΒΟΛΑΙΟ/ συμβόλαιο" ("CONTRACT/contract"), etc. is frequent. These specific examples occur frequently throughout the signed texts and are, in most instances, accompanied by a mouthing. As for the class of adjectives, examples frequently found in the UN translations include cases such as "ΙΔΙΩΤΙΚΟ/ιδιωτικό" ("PRIVATE/private"), "ΠΑΓΚΟΣΜΙΟ/παγκόσμιο"("GLOBAL/global"),"ΟΙΚΟΝΟΜΙΚΟ/οικονομικό" ("FINANCIAL/financial"), "ΑΝΑΠΗΡΟΣ/αναπηρία" ("DISABLIED/disability"), etc. Adjectives are favoured in the signed texts comprising the present informative register (Figure 5) and they in turn favour the occurrence of mouthings (Figure 4). Although lexical evidence could be viewed as register indicators, when studied in isolation they may be inconclusive, therefore they should be viewed in association to the overall situational context (Shaw, 1987).

As previously mentioned (see Section 3.1.1.2) the topic could also be indicative of the formality of the situation (Shaw, 1987), while links between formal instances and higher mouthing rates have been made for a number of SLs (see Sections 3.1.1.5 and 7.2.2). According to Hudson (1994), the informative register is usually more formal and a language variety of higher social status is usually used in formal context. Mouthings derive from the dominant spoken language, which usually holds a higher social status, a fact that could explain higher mouthing frequency rates in formal context (e.g. in this project, the UN translations are treated as the most formal situation, see Table 1 in Section 3.1.1.2). For BSL, the occurrence of mouthings has been discussed as an indicator

of raised register (Sutton- Spence & Woll, 1999). Nevertheless, Nadolske and Rosenstock's (2007) findings for ASL seem to somewhat challenge these observations (see also Section 2.2.3).

Looking at the second group of signed texts comprising the informative register, high percentages of mouthing frequency could be explained by the informative nature of the data, i.e. the signers explain the necessary steps for the enrolment process, they provide dates, times, numbers of students, etc. and the signers' intention is to inform the viewers by repeating and stressing the information provided (example 25) (P5: Informative), or addressing the (perceived) audience directly in a more spontaneous form than the UN translations (example 26) (see Section 7.2.2 for the potential influence of audience for this project).

(25)

Mouthing	"προσοχή"	"σημαντικό"
	("careful")	("important")
Manual	[BE-CAREFUL]	[BE-IMPORTANT]

Meaning: "Be careful, this is important"

(26)

Mouthing		"κατάλαβες"
		"understand"
Manual	[PT:PRO3SG	UNDERSTAND]

Meaning: Did you understand? (P2: Informative).

Here, the signer points to the camera and asks the viewer if everything is understood. The verb mouthed is inflected in Greek for the second person singular.

Nevertheless, the fact that the GSL dataset comprises mainly of informative signed texts could account, to an extent, for the higher mouthing frequency rates reported for the informative register. However, the mouthing frequency rates reported for each signer individually (Figure 7) showing higher mouthing frequency rates even for those participants for whom I analysed mostly data from narrative registers (P2 and P3) (see Section 5.2, Table 3) give me confidence to report that mouthings are more frequent in the informative register.

The same principle applies to the narrative register. Classes, such as the class of verbs or depicting verbs, which are more frequent in the narrative register (Figure 5), have also been observed to disfavour mouthing frequency (Figure 4), and in the case of depicting verbs quite strongly. Depicting verbs are morphologically complex signs, which occur more frequently in storytelling genres and are usually co-articulated with mouth actions of a more expressive nature, i.e. mouth gestures (Sande & Crasborn, 2009). For instance, in one of the personal vignettes included in the narrative register the helicopter is flying in the sky, gets trapped in a thunderstorm and crashes violently on a mountain side. In this story the use of depicting verbs is prominent. These manual signs are accompanied mainly by mouth gestures adding adverbial information regarding, for instance, the force of the wind. Therefore, mouthings are expected to co-occur less frequently than mouth gestures in the narrative register. While the main communicative purpose for the informative register is the transmission of information, the main purpose here is the narration of stories. The lower percentage of mouthings observed for this register implies a higher percentage of mouth gestures. Let us now compare these findings to previous projects focusing on mouthing frequency across different registers.

Register	NGT	Auslan	BSL	ASL	GSL(current project)
Informative	n/a	n /a	77%	60.45%	50.8%
Narrative	47%	20.4%	50%	42.4%	28.9%

The results reported here (Table 9) for GSL are broadly similar to what has been previously observed for other SLs. The informative register is associated with mouthings more than the narratives register, cross-linguistically. Here I compare the informative register with Nadolske and Rosenstock's (2007) most formal discourse setting (their preferred term), i.e. the lecture, and the narrative register with their story. I make this comparison confidently since Sutton-Spence and Day (2001) have also included lectures as part of their 'information-giving' register (their preferred term). I also compare, Sutton-Spence and Day's 'information giving" register, which includes video recordings of demographic interviews, news interpreting and lectures, with the informative register. As for the narrative register, the children's fairy tales and personal vignettes are compared here with stories from ASL and news stories and retellings of a fantasy story from BSL (see also Section 3.1.1.4).

For all three languages the same "pattern" is observed, i.e. higher mouthing frequency rates for the informative register. Nevertheless, the percentages presented here differ in each sign language dataset. Differences in the particular context of the video recordings included in both registers may account for some of the variation observed for these studies. For instance, Sutton-Spence and Day

(2001) include in their narrative register a set of video recordings entitled 'News Story'. In reference to the particular nature of those videos they note that this story required signers to provide a lot of information concerning the circumstances surrounding the event they were narrating. It was the dramatic nature of the event that led the researchers to include those videos in the narrative register. Therefore, the higher percentages reported for the informative register for BSL most probably stem from the nature of these videos. In that sense, when we make cross-linguistic comparisons of mouthing frequency rates, we have to take into consideration this variability in the context of the various video recordings.

Moreover, differences in the reported mouthing frequency rates could be attributed to individual variation (see Section 7.4). Some of those participants could also be viewed as experienced storytellers, a fact that has been observed to influence the amount of mouth gestures these signers use during their dramatization of a narrated event (Earis & Cormier, 2013). This factor could explain differences in mouthing frequency rates in narrative registers cross-linguistically (see Section 7.2.2 for further discussion of this factor). These factors may be particularly influential in small-scale studies drawing data from a limited number of participants.

To sum up, cross-linguistically mouthings are reported to frequently accompany nominal signs, thus offering semantic clarification to complex terminology, abstract notions, a specific reading to a sign, while mouth gestures are usually described for their expressive and descriptive nature. Due to their nature, the latter are more likely to be found accompanying sign predicates in narratives. Therefore, mouth gestures appear more frequently in instances where a signer is re-enacting a character in a story, while mouthings are more frequent in

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informative registers, such as a UN article on human rights. Since the mouth can perform only one action at a time, the higher the number of mouth gestures the lower the number of mouthings and vice versa (Sutton-Spence & Day, 2001).

All the formerly-mentioned studies on mouth actions (Sutton-Spence & Day, 2001 for BSL; Nadolske & Rosenstock, 2007 for ASL and Johnston et al., 2015 for Auslan) report on the influence of register[20] .Various other discourse factors relating to register, which are observed to influence mouthing frequency, but were not studied here, are discussed in the following section.

7.2.2 Other factors known to affect mouthing frequency

As discussed in Section 3.1.1.5 a variety of discourse factors could affect mouthing frequency rates. These factors are not isolated and studied further at this point but they will be briefly discussed here in reference to the current dataset.

Looking firstly at narrative registers and the production of mouthings, instances of the dramatic re-enactment of a character in a story (Nadolske & Rosenstock, 2007), the use of direct speech as part of role shift (Sutton-Spence, 2007), or the experience of the storyteller in narrating stories (Earis & Cormier, 2013) are all assumed to play a certain role in mouthing frequency. Cases of character re- enactments and role shifts are observed in the current dataset, not only in the narrative register, but also in one of the informative video recordings as well. Instances of role shifting occur frequently, especially in the narrative register. More extensive research is needed to focus on role shifting, the use of direct speech across registers, etc.

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[20] For more studies reporting on the influence of register see Section 3.1.1

With regard to the experience of the participants in narrating stories, all six signers could be viewed as experienced storytellers since they are regularly recruited for the elicitation of new video-recordings by the Hellenic Federation of the Deaf and Hard of Hearing (HFD), from governmental bodies etc. Nevertheless, one cannot focus on the factor of the experience of the signer in narrations, if their narrating skills are not studied comparatively with other, less experienced individuals.

Moreover, the overall situational context surrounding the elicitation of the analysed data is also a factor which may influence mouthing frequency. As described in the methodology, in the current project I used already available videos (see Sections 3.1.1 and 6.1) and therefore the exact circumstance of the elicitation of the videos, e.g. whether the signers were given written sources or pictures as a stimulus before the elicitation of the video recordings, are unknown. Specifically for the translations of UN articles, the source is assumed to be written Greek. Nevertheless, since I do not know with certainty the circumstances of the elicitation of every video recording included in the dataset, this factor cannot be isolated and studied further at this point.

Another factor that could influence mouthing frequency is the effect of the (perceived) audience (Bell, 1984; Quinto-Pontos & Mehta, 2010). In the current dataset, videos publicly available at the governmental website "http://prosvasimo.iep.edu.gr/el/ " aim at introducing variable (educational and other) material, which could be easily accessible by everyone, deaf, HoH or Hearing, GSL signers and non-signers alike. That is why most of the videos are accompanied by written text, voiceovers and/or subtitles. For the three out of six video recordings of the narrative register I can assume that they address

individuals who acquired GSL as a L2, since the videos were recorded as teaching material for the sign language proficiency exams. For the rest of the narrative video recordings, i.e. the children's fairy tales, I assume that the signer is aware that he/she is mainly targeting deaf or HoH children, as the fairy tales are filmed to be included in the section entitled 'Children's stories' and 'Children's literature'. This assumption is also based on the overall topic and the characters features, e.g. a lumberjack talking to a tree (P5: Narrative). As mentioned on Section 3.1.1, Sutton-Spence and Day (2001) report on higher mouthing percentages for child-directed signing, although their focus was on cases in which the audience was present at the time

With regard to the informative register, it is likely that for all the UN interpretations the signer is aware of the fact that the video recordings are accessible by everyone, but he/she is possibly targeting his/her signing towards their deaf viewers. This assumption is also based on similar remarks made by Sutton-Spence (2007) for a deaf signer appearing on television, who was aware of the existence of hearing viewers but was assumed to target his/her signing towards deaf viewers. For the rest of the videos in the informative register I can also assume that they are addressing mainly non-signers (deaf or hearing). Therefore, due to the diverse nature of the data I cannot focus specifically on whether the signer's perception of the audience is a factor influencing his/her production of mouthings. I can only argue at this point that the videos are not targeting exclusively deaf signers.

Finally, another factor that has been observed to influence mouthing rates in literature is whether the analysed material stems from a monologue or a dialogue, since the first is reported to disfavour mouthings (Johnston et al., 2015).

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The video recordings that constitute the current dataset involve the signer facing the camera and delivering his/her intended message as a monologue. Dialogical video recordings were not included in the current project. An inclusion of conversational data could allow us to also study the factor of formality as discussed in Section 3.1.1 and by various researchers such as Zimmer (1989) and Nadolske and Rosenstock (2007) for ASL, etc. The latter argue that formal instances seem to have a stronger influence to sign language production than spoken language. As the formality of a situation rises, so does the percentage of mouthing frequency, an argument that seems plausible if one considers that more formal situations are usually of a more informative nature. In Nadolske and Rosenstock's (2007) project conversations were treated as the least formal situation but they were found to favour mouthings more than narratives. Further research is needed to focus on any one of these factors, as the extent of their effect cannot be studied further at this point.

7.3 Grammatical class variation

Turning to the second factor, my hypothesis, according to which mouthing rates vary considerably with regard to the grammatical class of the manual sign they accompany, was supported by the analysis of the data. As has been observed for a number of SLs in the past (Rainò, 2001 for FinSL; Ebbinghaus & Hessman, 2001 for DGS; Sutton-Spence & Day, 2001 for BSL; Boyes- Braem, 2001 for DSGS; Nadolske & Rosenstock, 2007 for ASL, Johnston et al., 2015 for Auslan etc.), multivariate regression analysis of the same factor for GSL indicates that it is significant for the current study as well.

Although Rbrul analysis found grammatical class to be a significant predictor

of mouthing frequency for GSL, some classes discussed here are represented by small numbers (e.g. only two question signs and three negators are reported for the narrative register, see Table 7 in Section 6.1.3). This is highly dependent on the choice of data for the current project and therefore the data reported here should be compared to larger- scale projects for GSL. Nevertheless, especially for negators, one could argue that non- manual negators are more commonly used in GSL than manual negators (see Section 4.6.2.4) and therefore even larger-scale projects would not produce large numbers of these signs. Moreover, for classes such as determiners, interjections, adverbs and NorV the data reported here are not conclusive so they are neither considered to favour nor to disfavour mouthing frequency rates. For the classes for which larger numbers are observed (see Table 7), such as nouns, verbs, adverbs, depicting verbs etc. stronger claims on whether they can be considered to favour or disfavour mouthing frequency rates can be made (see Section 7.3).

Table 11 presents the percentages of mouthing frequency across the major grammatical classes for four different SLs, namely BSL (Sutton-Spence & Day, 2001), ASL (Nadolske & Rosenstock, 2007), Auslan (Johnston et al., 2015) and the results reported here for GSL.

Table 11: Mouthing frequency across major grammatical classes; cross-linguistic comparison. Dashes are used when the mouthing frequency rates are not reported by the researchers.

Grammatical class	Mouthing frequency for different SLs (%)			
	BSL	Auslan	ASL	GSL(current study)
Numeral	n/a	89.5%	n/a	79.4%
Noun	88%	81.2%	80%	65.9%
Verbs (plain and indicating/agreement)	60%	38.2%	39%-53%	20.1%
Adjective	77%	67.6%	79%	65.3%
Adverbs	n/a	47%	61%	45.9%
Depicting verb	n/a	2.9%	7%	0.7%
Pronoun	53%	30.2%	33%	14.5%

The percentages reported in table 11 demonstrate similar patterns of mouthing frequency across major grammatical classes, observed cross-linguistically. Major differences in the documented percentages for these SLs can be due to a variety of reasons, such as differences in the nature of the analysed data, differences in the annotation process, differences in the categorisation schemes and generally cross-linguistic differences, etc. (see Section 2.2.1). For instance, the grammatical class of verbs in the current dataset is far more inclusive than the equivalent class of verbs included in the ASL and the Auslan project[21]. For BSL, Sutton Spence and Day (2001) note that, in their project, nouns were associated with mouthings significantly more than verbs and that verbs were

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[21] For BSL, Sutton-Spence and Day (2001) do not discuss different categories of verbs.

associated with mouth gestures more than any other class. The researchers argue that morphological complexity is the decisive factor when it comes to mouthing frequency, not only across different grammatical classes, but also within the same grammatical class. The factor of grammatical class is relevant to the factor of morphological complexity, in the sense that morphologically complex classes have been found to co-occur more frequently with mouth gestures and less frequently with mouthings (and vice versa) (Sutton-Spence, 2007).

Morphologically more complex classes like the categories of verbs and depicting verbs were found here to co-occur with mouthings in less than 20% of the times. Nadolske and Rosenstock (2007) also identify the three morphologically more complex classes of directional verbs, classifiers and pronouns (their preferred terms), as exhibiting low percentages of mouthing frequency. Verbs are usually expected to carry more complex morphological information than other grammatical classes (Ebbinghaus & Hessman, 1996) and therefore to be accompanied by mouth gestures, especially since the latter have been frequently observed to add important adverbial information regarding the way an action is performed (Crasborn et al. 2008). Nevertheless, scholars have shown that some classes of verbs are accompanied by verbal mouthings with a very high frequency (e.g. plain verbs) (Vogt-Svendsen, 2001). Other verbal categories can be accompanied by a variety of mouth actions depending on all the possible ways they operate in a signed utterance (i.e. whether they inflect for the arguments of the sentence or whether they encode spatial information, etc.) (Sutton-Spence & Day, 2001). For NGT, Vogt-Svendsen (2001:17) goes as far as to claim that nouns and "non-modified verbs" are the two grammatical classes associated with mouthing frequency the most. As previously noted, separate classes of plain and

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indicating verbs are not identified in this project, so further research is needed to study the rates of mouthings co-occurring with plain and indicating/agreement verbs for GSL.

Looking at depicting verbs, their co-occurrence with mouthings in this project is remarkably low (1,4%). The same percentage for Nadolske and Rosenstock (2001) is 7%, while in Johnston et al. (2015) the percentage is 2.9%. Several instances of depicting signs are discussed by Cormier et al. (2015), varying between signs which had to be glossed with the use of several words and others whose transcription almost resembled a lemmatised version of the sign and were thus viewed as more lexicalised. For instance, in the current dataset, the sign glossed as DSM: AIRPLANE- FLYING (P3: Narrative) was classified as a depicting verb which was accompanied by the mouthing "αεροπλάνο"' ("airplane"), whereas in the same narrative the depicting verb glossed as DSM: AIRPLANE-GOING-IN-CIRCLES-AND-CRASHING was paired with a mouth gesture congruent with the violent nature of the crash. In the first instance is considered more lexicalised than the latter.

Nadolske and Rosenstock (2007) also note that only a small number of lexical items of the category of "classifier signs" allows for the simultaneous articulation of mouthings. These types of signs were observed to occur with a mouthing of a specific element of the depicting sign, either the entity depicted (e.g. the AIRPLANE in the previous example), or in some cases the "verb component", of the morphologically complex sign (Sutton-Spence & Day, 2001:76). Therefore, morphological complexity plays a significant role even when we look at different signs of the same class.

The low percentage of mouthing frequency for depicting verbs reported here justifies my decision to exclude those signs featuring a classifier handshape and classed as nominal from a larger class, which could be termed 'depicting signs'. As noted previously, the handshape of a depicting verb encodes information about the object or the entity, the way in which it is "handled" and/or the way it moves in space. All this information translates to a morphologically complex sign glossed using multiple words, e.g. DSM (2-BENT): HUMAN-GOING-DOWN-STAIRS-SLOWLY (P5: Narrative). It is intuitively logical to anticipate that this amount of information could not be included in a single mouthing.

Turning to pronouns, Sutton-Spence and Day (2001:76) note that they "are not completely lexicalised but they rely on context for meaning". The researchers note that pronouns do not usually co-occur with mouthings either because the referent is present at the time or due to the fact that they rarely encode extra morphological information. Nevertheless, the researchers do report on a significantly high percentage of mouthings (53%) co-occurring with pronouns. Their percentage may be surprisingly high in comparison to the other three projects, but it is in sync with a general pattern of high mouthing frequency across all major grammatical classes in their project. Other researchers have also characterised the relationship of pronouns and mouthings as "atypical" (Nadolske & Rosenstock, 2007:46) since their interaction is not standardised and varies significantly with regard to the register they are found. Nadolske and Rosenstock (2007) note than, although pronouns are observed to favour mouthings (60%) in the formal situation (i.e. the lecture), they are found to be strongly disfavoured (10%) when the pronouns occurred in the storytelling situation. The percentage of mouthing co-occurrence alongside pronouns reported for the GSL data is low

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(14.5%,), but it's worth mentioning that most pronouns are found to occur mainly in narrative registers (see Figure 5 on Section 6.1.3).Further research is needed in order to study the interaction pronouns with various mouth actions across different registers in order to focus on their potential "atypical" occurrence as described for ASL.

Looking at adjectives and adverbs, the percentages of mouthing co-occurrence are quite similar across the four SLs reported on table 7. As for adjectives, Boyes Braem (2001) notes that they are observed to favour mouthing frequency in DSGS. Sutton-Spence and Day (2001) argue that, according to their findings, only a few instances of signs classified as adjectives occurred so frequently with mouthings so as to be considered obligatory. Amongst the few cases they report are the two frequently cited 'multifunctional signs' DEAF and HEARING (see Section 4.6.1.2). In the dataset, the sign glossed as DISABLED, in most cases occurring after the sign HUMAN/PERSON, is usually classified as an adjective and it co-occurs with the nominal mouthing "αναπηρία" ("disability"), 98 out of 104 times. The frequent occurrence of the sign is explained by the fact that a large portion of the data constitutes translations of UN articles entitled "Human Rights of Persons with Disabilities". The other adjectival category included in this project, i.e. 'predicate adjectives', exhibits a significant difference in mouthing frequency rates in comparison to the category of adjectives (see Figure 5 in Section 6.1.2). The category functions syntactically as a predicate on the sentential level. Therefore, substantial differences in mouthing frequency across the two classes are justified.

For the BSL and the ASL project detailed percentages of all grammatical classes (such as interjections, conjunctions etc.) are not included. Percentages of

mouthing co-occurrence with function signs observed for the present dataset do not vary significantly with what has been reported for Auslan. It is worth mentioning though that the current analysis of the correlation of the two factors indicates that conjunctions do occur on both registers (see Figure 5 in Section 6.1.3), in contrast to Nadolske and Rosenstock's (2007) claims that this class mainly occurs on the narrative register.

Interestingly, these observations regarding the classes that favour or those that disfavour mouthings are reportedly "reversed", in cases of mouthings being articulated without any manual signs for NGT (Schermer, 2001). Let us discuss these cases briefly here.

7.3.1 Mouthings with no manual sign

An interesting observation regarding the effect of grammatical class on mouthings which are not accompanied by a manual sign was made for NGT (Schermer, 2001). The researcher points out that when it comes to these mouthings, their distribution in relation to the factor of grammatical class is reversed. In some detail, 28.25 % of those mouthings were verbs and only 11.75 % of them were nouns. Schermer (2001), Keller (2001) and Vogt-Svendsen (2001) characterise the occurrence of those mouthings as bimodal code-switching. This type of mouthing use is considered highly influenced by the spoken language (Sutton- Spence, 2001; Schermer, 2001). Schermer reports that most of the cases of mouthings articulated without a manual sign in her dataset were classified as verbal, not nominal, in contrast to what has been observed for mouthings in general. The researcher does not discuss in detail the basis of such classification but it is assumed that it based (mainly) on the grammatical classes of the spoken words in the dominant SpL.

In the dataset, only a few cases of mouthings being articulated without a manual sign were noted. Following the exclusion of four indecipherable mouthings articulated without a manual sign, only eleven cases of mouthings with no manual sign are left for further analysis. Six examples are found in the informative and five in the narrative register. Most of them were classified as verbs or different function words, such as "λοιπόν" ("so"), "αλλά" ("but"), etc. There were also a few instances of small phrases articulated without any manual sign, e.g. "δεν με νοιάζει" ("I do not care"), "δεν πειράζει" ("it does not matter"), etc., which were mainly treated as metalinguistic remarks. Their classification was made based on the grammatical classes used for spoken Greek (see Section 4.1). For Banks et al. (2015:91) these mouthings constitute a form of feedback, a "backchannel" provided to show that the interlocutor is following the conversation.

The specimen is very limited but further research on the correlation of the factor of grammatical class and mouthings with no manual signs could test Schermer's observations.

7.4 Individual variation

Significant variation in mouthing production by each participant is also reported by Johnston et al. (2015) and Nadolske and Rosenstock (2007).As far as the first study is concerned, for the large number of participants included in the study, the observed variation ranged from 5% all the way to 85%, whereas for the latter study, those percentages ranged from 30% to 60%. In the current study, the observed variation ranges from 28.4%- to 50%. A number of reasons could explain why the documented percentages are not so variable here. Firstly, the small size

sample of participants included in the study may not be representative of how the language is used by its signers (Banks et al., 2015).

Moreover, the somewhat similar sociolinguistic background could explain why the documented percentages of individual variation are not so variable. Higher education as a sociolinguistic variable that could explain higher mouthing frequency rates has been frequently discussed in literature (e.g. Zeshan, 2001 for IPSL, Banks et al., 2015 for NGT, etc.) in the sense that more systematic exposure to advanced vocabulary leads to a better language proficiency of the dominant SpL. Interestingly, for NGT, Banks et al. (2015) report on an observable link between highest education and increased use of mouthings, but for signers with higher education they actually report that these signers use less mouthing. Deaf informants consulted on this issue argued that a better grasp of both languages equips signers with a higher education to better separate between the two languages. Zeshan also notes for IPSL that although an effect of higher education is observed, older signers without any formal education were still found to mouth a lot. Therefore the potential effect of this factor is not straightforward.

In this project, four out of six signers have attended university, college or polytechnic schools, while the other two are high school graduates. They all attended deaf schools growing up, in which a mixture of spoken Greek, some signed and fingerspelled elements were used (Sapountzaki, 2015) (see Section 1.1). None of them attended the strictly oralist private schools for the deaf and HoH (which existed until the mid-80s), but they all describe the constant presence of Greek, especially prior to 1990s when some changes towards bilingualism were made under the direction of Dr Kourbetis (Sapountzaki, 2015). In this project the

higher percentages of mouthing use observed for P1 and P4 could be explained by their exposure to higher education or by the fact that they are younger than the rest of the participants. At this stage it is hard to say which of these factors causes this effect. Moreover the fact that they work as language tutors teaching GSL to hearing, deaf or HoH individuals is considered irrelevant here as only one of them (P4) works as a certified teacher in a public school. The rest are not trained teachers (they are high school graduates or they have degrees on unrelated fields), but they teach the language in private language institutions as native signers. As reported in Section 5.2 the choice of the signers was based here on the fact that they are all profoundly deaf native and near-native signers, they are active members of the Greek deaf community and they are perceived as competent signers by the rest of the community. Based on these, acquiring video recordings of them signing in both registers was considered possible. A larger sample of participants is needed to draw more representative results of GSL production and to focus on the potential effect of different sociolinguistic variables on mouthing behaviour.

7.5. Linguistic status of mouthings

In reference to the linguistic status of mouthings, Vinson et al. (2010) note:

"Researchers know little about how mouthings are linked to manual elements of lexical signs and how retrieval of mouthings and manual component is orchestrated in sign production" (2010:1159)"

This study aims at observing specific distributional patterns of mouthings influenced by the register and the grammatical class of the manual sign they co-occur with. Therefore, the analysis is mainly a descriptive one as I report

percentages of occurrence, while attempting to explain the observed patterns. Although the aim of this study is not to come to a conclusion regarding the linguistic status of these controversial mouth actions, I will briefly discuss a few instances of mouthing frequency from the current dataset, which could support different argumentations regarding this debated topic.

Specific patterns of mouthing distribution have been observed in the course of this study as well; a fact that suggests that mouthings do exhibit some characteristics of conventionalised use, but at the same time it is unlikely that they can be considered inherently obligatory to sign language production, especially since evidence of individual variation between signers, ranging from 28% to 50%, has been observed for the present study, as for a number of SLs. Moreover, as mentioned in Section 2.2.3, cases of mismatches of mouthing frequency with the manual sign may indicate that the signer's mental representation of the two lexicons (from the matrix SpL and the minority SL) is separate (Vinson et al. 2010). In this dataset such cases have also been noted, as in the case of a signer manually signing IT-MATCHES, while mouthing "εύκολο" ("easy") (P2: Informative), or a signer manually signing UNTIL while mouthing "πότε" "when" (P5: Informative).

On the other hand, cases of mouthings being articulated with high frequency with specific signs are usually cited as phenomena supporting the argument that mouthings could be viewed as an inherent part of the language, they can be treated as "fully integrated" and "near obligatory" (Sutton-Spence, 2007:148). High occurrence of mouthings has been noted mostly in the case of "standard mouthings" (Banks et al., 2011) and cases of fingerspellings (Johnston et al. 2015). Let us now examine cases of very high co-occurrence of mouthings in

the present dataset.

Looking at instances of mouthings co-occurring with certain signs in high frequency ("standard mouthings"), although they do not constitute a point of focus for the current study, such cases have been observed. A characteristic example is the manual sign I glossed as GOAL/AIM-AT, which occurs in twenty five (25) instances in the current dataset and is articulated with the mouthing "στόχος" ("goal") in twenty four (24) of these instances. Another example is the verb HAVE which is mouthed eight out of the nine times it occurs in the current dataset. The example of the verb HAVE is also mentioned by Johnston et al. (2015) as one of the very frequently mouthed signs in their analysis. Nevertheless, even for the signs associated with a standard mouthing, if more samples of these signs are studied in larger datasets, instances of these signs not being mouthed at all still occur (Bank et al., 2011). Bank et al. also discusses cases of manual signs being paired with high frequency with more than one lexicalised mouthing. Two such cases occur in the current dataset: the manual sign SIBLING occurring here either with the mouthing "αδερφός" ("brother") or the mouthing "αδερφή" ("sister"), or the manual sign ELDER occurring with the mouthings "γιαγιά" ("grandma") or "παππούς" ("grandpa"), depending on context (see example 21).

It is noteworthy that in the current dataset, only five cases of non-lexicalised fingerspelling occur; one is used to spell a writer's name, one is used to describe an acronym, another one accompanies a proper name, one is used to specify a technical term and the last one is a fingerspelled verb, directed towards a deaf character in one of the narratives (P6: Narrative). All five of them are mouthed and seem to operate in combination with the mouthing to clarify the intended message. A larger dataset is required to draw more solid conclusions

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about fingerspelling and its use, but those few examples seem to validate previous arguments on the observable link between fingerspelling and mouthing. Except for Johnston et al. (2015), Sutton-Spence and Day (2001) also report on a very high percentage of mouthing frequency with cases of fingerspelling, at 99%, with the vast majority of these instances being classified as nominal.

Except for instances of variable or more conventionalised use of mouthings, in the current dataset I have regularly come across mouthings which could be treated as instances of code blending (Emmorey et al., 2008). A few cases of mouthings viewed as code-blending will be discussed here in relation to the lexical functions they serve in specific instances.

7.5.1 Instances of code-blending

As previously discussed (Section 2.2.2) mouthings are generally used to "increase identification of signed lexical items" (Sutton Spence, 2007:147), to provide semantic clarification and a specific reading of the manual sign. For instance, specific readings of the semantically wide sign glossed as LIST are offered by several mouthing pairings of this manual sign, such as "μέτρα" ("measures") (P1: Informative), "πρόγραμμα" ("program") (P1:Informative), "σύστημα" ("system") and "ατζέντα" ("agenda") (P3: Informative, both examples).

Other examples include the manual sign LOCATION being paired with mouthings such as "μέρος" ("place") (P2:Narrative) or "φορείς" ("governmental bodies") (P5: Informative), the manual sign THINGS being mouthed with mouthings, such as "πράγματα" ("things") (P4: Informative) or "προϊόντα" ("products") (P6:Informative), the manual sign GROUP being paired with

mouthings such as "γκρουπ" ("group") (P1:Informative), "άνθρωποι" ("people"), (P4:Informative) "ομάδα ("team") (P2: Narrative), "επιτροπή" ("committee") (P3: Informative) and the manual sign CHANGE, which was paired with mouthing such as "αλλαγή" ("change"), "μετατροπή" ("alteration") (P1:Informative, both examples) and "προσαρμογή" ("adjustment") (P6: Informative). In such instances the signer seems to access his/her spoken language lexicon, so as to provide a specific reading to a particular manual sign.

In some of these cases, the mouthing variants occurring with these semantically wide manual signs seem to be driven by the specific context of the signed instance, such as the cases of "ΑΛΛΑΓΗ/μετατροπή" ("CHANGE/alteration"), "ΑΛΛΑΓΗ/προσαρμογή" ("CHANGE/adjustment") or "ΤΟΠΟΘΕΣΙΑ/φορείς" ("LOCATION/governmental-bodies"), all of them encountered in the translations of the UN articles. These instances could be viewed as indicative of the influence of the written texts, nevertheless, sentences in which these examples occurred seem to follow the grammatical structure of GSL and therefore they are not treated as instances of Signed Greek. As a method of communication Signed Greek is briefly mentioned by researchers such as Kourbetis (2002) and Karpouzis et al. (2007), in the context of such instances being removed from further analysis in order for the scholars to focus more on native GSL. For GSL there is no formal system of Signed Greek equivalent to "Signing Exact English in North America", as described by Gustason, Pfetzing, & Zawolkow (1975), nevertheless the researchers' references to Signed Greek focus on utterances in which the word order derives from spoken Greek while some content words are signed for semantic clarification. Terpstra and Schermer (2006) (cited in Bank et al., 2015) in their discussion of speech-supported Dutch they describe this communication

method as a continuum in which Dutch is treated as the main language and signing occurs in varying levels. Banks et al. (2015) discuss the possibility of this notion being explored differently, i.e. with the SL (NGT) as the main language and spoken Dutch elements, mainly mouthings, blending with signing to serve a variety of functions. In that sense the researchers argue that the grammar of NGT creates sentences that do not follow the structure of spoken Dutch, manual signs still have the primary role, while mouth movements function as a secondary source of information. In this project utterances that followed the word order of spoken Greek were not noted, nevertheless I argue that examples like the ones included in this section should better be viewed under Banks et al.'s (2015) "mirrored" analysis of blended spoken and signed elements.

Considering all the aforementioned cases of mouthing use, I postulate that their occurrence could be considered both conventionalised to a certain degree (for cases such as the "standard mouthings" or cases of mouthing articulated with fingerspelled items), but also quite variable (since phenomena like individual variation, or mismatches of mouthings and manual signs are observed). What becomes clear from projects like this one is that there are factors which influence their frequency and therefore specific distributional patterns of mouthings can be detected. In the course of this study my goal was to observe the linguistic phenomenon of mouthing frequency from different angles and map any observable distributional patterns of their occurrence in correlation to the nature of the signed text and the grammatical class of co-occurring manual sign. Aiming at a better understanding of the way and the frequency in which they are used during sign language production could also help us have a better understanding of their linguistic status.

7.6 Concerns, Limitations and Methodological issues
7.6.1 Dataset

With regards to the dataset, the main concern for this project is the issue of representativeness of the signed texts comprising the informative and the narrative registers. Although spoken and signed language researchers (e.g. Biber & Conrad, 2019 and Johnston et al., 2015 respectively) highlight the importance of small-scale projects, it is of vital importance that the results drawn from a small-scale project like this one are not overgeneralised or treated as indicative of the way the linguistic variable(s) behave across the studied registers (Biber & Conrad, 2019). One should keep in mind that the results reported here describe the occurrence of mouthings for these specific types of signed texts studied, i.e. translations of UN articles, curriculum presentation, personal vignettes and narrations of children's stories. For a more generalized view of the frequency of mouthing across the informative and the narrative registers a larger-scale project has to be conducted for comparison.

In Section 6.1 the nature of the video recordings that constitute the current dataset is thoroughly described. The difficulties a researcher faces when using pre-existing material are inevitable. It is apparent that, the conditions surrounding the recording of those videos vary and are not always known, making the study of certain factors quite challenging (see Section 7.2.2). The elicitation of videos specific to the purposes of a study, as well as the recruitment of participants that meet a combination of criteria set by the design of the study would constitute the ideal course of action. While reviewing the validity of results reported here, one should bear in mind the situational variability regarding the elicitation of these video recordings. Nevertheless, publicly available material is frequently used in a

number of research projects (such as Nadolske & Rosenstock, 2007; Andrikopoulou, 2015 etc.) yielding valid results. In the case of this study, the use of pre-existing videos gave me the opportunity to choose participants with a somewhat similar sociolinguistic background and -more importantly- it offered me the opportunity to choose only those participants for whom I could obtain videos for both registers. I chose these specific signers mainly because they are accepted by the deaf and hearing community as competent signers and as such they have been the main participants/ informants of new governmental websites with educational and other material. Since their participation in official GSL projects is so frequent, these individuals were also the signers for whom I could find a larger variety of videos, enough to "compose" a dataset of two registers.

`A successful analysis of the mouth movements of a signer is based on the ability of the researcher to discern all the possible ways the mouth moves during sign language production. The videos I used were recorded by a single camera facing the signer from only one angle. Obviously the inclusion of multiple cameras recording the facial details from a different ankle would have been ideal, but nevertheless the high quality[22] of the video recordings made the difficult task of discerning mouthings possible. Most of the videos were recorded for an official governmental website, but even for the rest of the videos the circumstances including their recording were formal or semi-formal and thus designed to be watched by a lot of people. Since the focus of the current study was solely on mouthings I deemed that they could be identified even from a single camera angle.

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[22] By "high quality" I mean that the recording of the video was carried out by professionals, with a white background and professional lighting, as described to us by one of our participants would no longer suffice for a detailed mapping of all the possible ways the mouth moves during sign language production.

If the project included the identification of mouth gestures and a categorisation scheme of all these movements, a single faced camera.

7.6.2. Second analyst

The data were analysed exclusively by the researcher, a hearing signer, who acquired GSL as an additional language (a certified teacher of deaf and HoH students in Greece). Due to time and budget limitations, the recruitment of a second annotator who would analyse part of the data and provide a peer sample in order to compare his/her findings to the researcher's findings, was not possible. As previously mentioned (see Section 5.3), I had the opportunity to consult regularly, throughout the whole annotation process, with a deaf informant for instances that needed clarification. Issues surrounding the challenging task of grammatical class classification were not discussed with the informant. Only those instances for which his perception, as to what was mouthed or signed, was similar to mine were used in the final analysis. All the rest were transcribed with a question mark (?) and were later excluded from further analysis. Excluded cases pertained mainly to the grammatical class assignment task rather than the identification of mouthings. One should keep in mind that grammatical class tagging is a significantly under-represented subject in sign linguistics (Schwager & Zeshan, 2008) and therefore previous research on the subject, from which I could draw valuable information, was limited (see Section 4.5). I proceeded to a provisional classification of manual signs and mouthings for their grammatical class based on the grammatical classes proposed by Nadolske and Rosenstock (2007). A more differentiated and systematic way to classify signs for their grammatical class would be necessary for further research on the subject of the interaction of mouth movements and

grammatical classes.

Moreover, due to my personal affiliation (see Section 5.2) with the signers it is conceivable that- at least at a subconscious level- I anticipated which of the participants would exhibit high or low percentages of mouthings.

7.7. Further research

The focus of this study is mouthings and their distributional patterns throughout different registers and grammatical classes. During this project, the study of different instances of mouthings, such as partial/reduced mouthings, standard mouthings (i.e. mouthings observed to occur with a specific manual sign almost in an obligatory manner) or mouthings stretching over to adjacent signs were not identified. Further study on these areas would potentially shed more light in the relationship between the signed and the matrix spoken language (Lucas & Valli, 1989).

Except for mouthings, different categories of mouth gestures and their frequency throughout different registers and grammatical classes could be analysed alongside mouthings, in order to gain a better understanding of mouth movements in general for GSL. For the transcription of both categories of mouth actions a transcription system which could be considered suited to their nature should be selected. Especially for mouth gestures, their transcription based on spoken language orthography has been heavily criticised by various scholars (e.g. Sutton- Spence & Day, 2001, etc.). Therefore a mapping of all mouth actions for GSL requires a solid argumentation in reference to the selected transcription schemes.

7.7.1 Grammatical class classification

As far as the grammatical classes are concerned, as was discussed, the set of classes included in this project is provisional and quite limited to fit the purposes and the time frame of a master thesis. The assignment of grammatical classes to each sign was included in the analysis but it was not my sole focus. My focus was to examine how mouthings interact with different classes and whether previously attested data of this interaction for other SLs could be compared with the current results for GSL.

Further research on the subject of grammatical classes and the criteria behind their assignment to different manual signs would be beneficial for a better understanding of the correlation between grammatical classes and mouthings as well as a better understanding of structure of the language in general. A more inclusive set of grammatical classes would include separate verbal categories for plain and indicating verbs, instead of the variable category entitled "verbs" I used here to distinguish between depicting verbs and every other verbal category. A detailed classification could also make a distinction between other classes such as modal verbs, stative verbs and/ or auxiliaries etc. and include them in a more detailed classification scheme. For instance, Nadolske and Rosenstock (2007) identify five distinct types of verbs in their project on ASL and they report quite variable mouthing percentages across these classes.

7.7.2 Sociolinguistic aspect

By design, the number of participants included in the study is quite small to yield any noteworthy sociolinguistic results. Further research could expand the number of participants and focus not only on linguistic but also on sociolinguistic factors

that favour mouthings (see Rentelis, 2011). Additionally, other situations which could favour mouthing frequency could be included in a study of mouthings. Factors such as the relationship between sign language production and written sources, the influence of (actual or perceived) audience, the influence of monologues and dialogues, the level of formality of the situation etc. could also be included in a project that focuses on mouthings and their interaction with manual signs.

7.8 Conclusion

Research on the co-occurrence of non- manual elements to manual signs needs to take into consideration the co-occurrence of mouthings with manual signs and within this framework the factors that influence their frequency. The data reported here provide a detailed description of the distributional patterns of mouthings throughout different registers and grammatical classes for GSL. Although not an inherent part of the signed language structure, the nature of the mouthings is not straightforward. Quite the contrary, mouthings are observed to serve multiple purposes throughout sign language production. They constitute a unique language contact phenomenon (Lucas & Valli, 1989), in the sense that they exhibit both conventionalised and variable characteristics. The data described here support previous claims in reference to the influence of register and grammatical class for other SLs (Sutton- Spence& Day, 2001; Nadolske & Rosenstock, 2007; Johnston et al. 2015). Therefore, I can confidently claim that the two factors can be viewed as significant predictors influencing mouthing frequency, alongside several other linguistic and sociolinguistic factors, not studied here. Reaching a decisive conclusion with regards to the nature of mouthings is not the purpose of this study. Nevertheless, the specific patterns of mouthing frequency highlighted here

demonstrate that mouthings are an important part of SLs. Further research on the phenomenon of mouthings is necessary for the study of the controversial nature of mouthings.

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