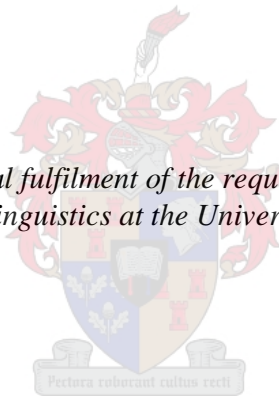


A lexical comparison of South African Sign Language and potential lexifier languages

by
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Masters in General Linguistics at the University of Stellenbosch*



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DECLARATION

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ABSTRACT

South Africa's history of segregation was a large contributing factor for lexical variation in South African Sign Language (SASL) to come about. Foreign sign languages certainly had a presence in the history of deaf education; however, the degree of influence foreign sign languages has on SASL today is what this study has aimed to determine. There have been very limited studies on the presence of loan signs in SASL and none have included extensive variation. This study investigates signs from 20 different schools for the deaf and compares them with signs from six other sign languages and the Paget Gorman Sign System (PGSS).

A list of lemmas was created that included the commonly used list of lemmas from Woodward (2003). The signs were elicited from informants and documented based on their phonological properties: handshape, movement, location, and orientation. SASL lexical variety was documented. Sign types were identified by comparing the different signs for a lemma with each other; signs that differed in more than one phonological parameter were classified as different sign types. These sign types were then compared with counterparts in six potential lexifier sign languages, American Sign Language (ASL), British Sign Language (BSL), Irish Sign Language (ISL), German Sign Language (DGS), Flemish Sign Language (VGT), and Dutch Sign Language (NGT) and PGSS. Signs that are heavily influenced by iconic devices were removed from the final comparison. Loan signs were identified on the basis of phonological similarity.

The results showed the highest percentage of borrowings from BSL at 15.9%, followed by ASL with 12.6% and VGT at 11.7%. The results indicated that 65.4% of the sign types were influenced to some degree by foreign sign languages or PGSS. There is a substratum of signs that did not match with any of the potential lexifier languages or PGSS and their origins are uncertain; they possibly emerged naturally or were borrowed from a language that was not included in this study.

OPSOMMING

Die geskiedenis van segregasie in Suid-Afrika was 'n groot bydraende faktor tot die leksikale variasie in Suid-Afrikaanse Gebaretaal (SAGT). Buitelandse gebaretaal het beslis 'n teenwoordigheid gehad deur die verloop van dowe onderwys; die invloed wat vreemde gebaretaal op SAGT vandag het, is egter waarop hierdie studie fokus. Daar is beperkte studies oor leen-gebare in SAGT, en nie een van hulle het die uitgebreide variasie inherent in SAGT ingesluit nie. Hierdie studie ondersoek gebare van 20 verskillende skole vir dowes en vergelyk dit met gebare uit ses ander gebaretaale asook die Paget Gorman Sign System (PGSS).

'n Lys van lemmas is opgestel wat die algemeen gebruikte lys uit Woodward (2003) bevat. Die gebare is vanuit informante ontlok en gedokumenteer op grond van die volgende fonologiese eienskappe: handvorm, beweging, ligging en oriëntasie. SAGT leksikale variasie is gedokumenteer. Gebare tipes is geïdentifiseer deur die verskillende gebare vir 'n lemma met mekaar te vergelyk; gebare wat met meer as een fonologiese parameter verskil het, is as verskillende gebare klassifiseer. Hierdie gebare tipes is vervolgens vergelyk met eweknieë in ses gebaretaale, Amerikaanse Gebaretaal (ASL), Britse Gebaretaal (BSL), Ierse Gebaretaal (ISL), Duitse Gebaretaal (DGS), Vlaamse Gebaretaal (VGT), en Nederlandse Gebaretaal (NGT) en PGSS. Gebare wat sterk beïnvloed is deur ikoniese stelsels, is uit die finale vergelyking verwyder. Leen-gebare is op grond van fonologiese ooreenkomstes geïdentifiseer.

Die resultate toon dat die hoogste persentasie lenings vanaf BSL is met 15,9%, gevolg deur ASL met 12,6% en VGT met 11,7%. Die resultate het aangedui dat 65,4% van die gebare wel tot 'n mate beïnvloed is deur vreemde gebaretaale of PGSS. Daar is 'n substraat van gebare wat nie ooreenstem met enige van die moontlike gebaretaale of PGSS nie, en die oorsprong daarvan is onseker; hulle het moontlik natuurlik na vore gekom of is geleen uit 'n taal wat nie by hierdie studie ingesluit is nie.

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The support I received from colleagues were invaluable and my thanks go to Ilse Bloem, Lynette Victor, Van Zyl Naude, Dirkie Ebersohn, and Simon Ndaba. As many researchers in sign language are aware, videography is a key part; my thanks go to Jaco Engelbrecht for his exceptional standard of video recording and editing.

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Chapter 1

Introduction

1.1. Background

The National Institute for the Deaf (NID) in the Western Cape, South Africa has a department that provides post-school training to Deaf people. As part of their orientation programme, students from different schools for the deaf from different provinces across South Africa are asked to stand up on the stage and show the signs for a few basic words as used at their school. The students regularly express amazement at the variety of signs that emerge. The lexical variation within South African Sign Language (SASL) is in fact apparent to any observer.

SASL is the language of the South African Deaf community. The number of users vary depending on the source consulted; 243 000 (SA Census 2011), 500 000 (DeafSA in Magongwa, 2010), 1 000 000¹ (DeafSA). SASL has been recognised by the 1996 constitution of South Africa as a minority language and further by the South African Schools Act of 1996 as a language of teaching and learning. Apart from these policies, very little has been done in terms of language planning until SASL became recognised as a school subject, with nationwide SASL curriculum rollout in 2015 (see Morgan, Glazer & Magongwa 2016). SASL learning materials are currently distributed to all the schools for the deaf by the Department of Basic Education; all schools will have materials utilising the same lexicon and this will undoubtedly have an effect on the variation found in the language.

It is an interesting question where the current lexical variation in SASL may come from. The variation appears to be linked to the history of SASL and that in turn is closely linked to the history of deaf education in South Africa which has been influenced by several different European countries.

The Irish Dominican Order established the first school for the deaf in South Africa in 1863. This school was a signing school (Aarons and Akach, 1998) until 1880 when an international conference was held in Milan, Italy. At this conference it was argued that sign languages were not equal to spoken languages and that deaf children would be disadvantaged if they used a sign language. This conference proposed that only spoken languages be used in deaf education; sign languages were then forbidden.

South Africa is one of the countries that adopted the resolutions of this conference and sign languages were then not allowed in schools for the deaf. This was enforced in schools with

¹ DeafSA presentation to the Joint Constitutional Review Committee

white deaf children, but not very strictly in schools with other races² (Aarons and Akach, 1998). This provided ample opportunity for lexical variation which was further exacerbated by the government policy to assign specific racial groups to specific schools (Van Herreweghe and Vermeerbergen, 2010). Despite SASL being forbidden at school it was still being used between deaf people (Aarons and Akach, 1998) and more so at schools that were less strictly monitored. However, there was limited contact between the different schools and thus the language variants at the various schools for the deaf developed largely independently from other schools for the deaf, more so between schools with children of different races. There was very little opportunity for SASL users to be exposed to other variants.

Schools for the deaf were primarily established and run by religious organisations (Aarons and Akach, 1998). Parents who were averse to their children attending the Irish Dominican Catholic school approached the Dutch Reformed Church who established the second school for the deaf in 1881. Throughout the 20th century, many more schools were established, the clear majority by religious orders: Dutch Reformed Church, Irish Dominican, German Dominican. Given the history of SASL and deaf education, it is reasonable to assume that there would be large variation in, at least, the lexicon. Schools for black children used the Paget Gorman Sign System, a sign system invented to manually represent English, while other types of communication were introduced in other schools. Signed Exact English (SEE) was introduced into the VN Naik school for the deaf. SEE is a form of simultaneous communication where English is the primary language; the English word order is used. Signs are used at the same time as the English is spoken and all of the signs are borrowed from American Sign Language (Van Herreweghe and Vermeerbergen, 2010).

There are several factors that may have contributed to the lexical variation in SASL. It is likely that the lack of contact between schools for the deaf was the primary factor that contributed to the variation. A second factor is that schools for the deaf sent staff to other countries to learn about deaf education or invited experts and likely appropriated the country's sign language resources. These teachers and administrators likely had little knowledge of SASL and possibly learned a few signs from other sign languages which had then been introduced into SASL as borrowings. A third factor is the institution that established the school for the deaf. The institution may have had its own prescribed materials and resources; the Irish Dominican Order even provided nuns to manage the schools, who may, for example, have

² Including race as a factor in SASL variation is vital due to South Africa's history of segregating different racial communities.

introduced their own signs into the varieties used at the schools they were responsible for. It is regrettable that the history of the schools has not been well documented.

The Wikipedia entry for SASL³ mentions that it is a part of the BANZL language family i.e. British Sign Language, Australian Sign Language, and New Zealand Sign Language; this claim is unsubstantiated. There is nothing known about the history of signing in South Africa before the nineteenth century. There is also not much known about the current influences on SASL; one can make assumptions based on the history of the schools. The Dutch Reformed Church established many schools for the deaf and one may assume that Dutch Sign Language had a large influence. British Sign Language and American Sign Language were not so prominent in the history of schools for the deaf and one might assume less of an impact from these two sign languages. The Dominican orders provide grounds for possible influences from Irish Sign Language, and German Sign Language. This study aims to provide a clearer understanding of the influence that other sign languages have had on SASL.

1.2. Aim of the research

This thesis will investigate lexical borrowing, as related to lexical variation, in SASL. It aims to determine the extent of lexical borrowing by comparing signs used at identified schools for the deaf in different provinces of South Africa with signs from other sign languages that were deemed likely to have influenced SASL. The identified sign languages are American Sign Language (ASL), British Sign Language (BSL), Sign Language of The Netherlands (NGT), Flemish Sign Language (VGT), German Sign Language (DGS), Irish Sign Language (ISL), and a sign system known as the Paget Gorman Sign System (PGSS).

The signs will be phonologically described and compared with counterparts from other sign languages; similarities and differences will be documented, and the results will indicate the extent of lexical overlap between SASL and the other sign languages.

1.3. Outline of the thesis

In chapter two a review will be done of the literature on variation in sign languages and sign language lexical comparisons. This review will result in a presentation of the research questions that the study will seek to answer. Chapter three will lay out the methodology and analysis procedure and outline the NID dictionary project which provides the data for this study, elaborating on the informants and data collection procedures followed in the project.

³ https://en.wikipedia.org/wiki/South_African_Sign_Language - this is included to illustrate the misinformation on SASL.

The core of the methodology revolves around the phonological parameters of signs and these parameters will be described. The results will be presented in chapter four and will be discussed in chapter five.

Chapter 2

Literature Review

This chapter will review other research that has examined variation within a sign language and research that has involved a comparison of the lexicons of languages, focussing on sign languages. In 2.1 the variation in sign languages is discussed. Secondly, in 2.2, the field of comparative lexicostatistics will be discussed. In 2.3 the comparison of sign language lexicons will be detailed and in 2.3.1 the studies of one of the pioneers of this field in sign languages, James Woodward, will be reviewed. Important work has been done with Australasian sign languages and section 2.3.2 is devoted to this. The studies on other sign languages are discussed in 2.3.3 and followed, finally, by a review of studies on South African Sign Language in 2.3.4, and a brief conclusion in 2.4. The chapter ends with a section (2.5) detailing the research questions that the study seeks to answer.

2.1. Variation in sign languages

Variation is predominantly observable in the lexicons for sign languages, although morphological and syntactical variation also occur.

The history of SASL (see chapter 1) with the segregated schools for the deaf, lack of contact between the schools, and apparent influences from foreign sign languages, provides the background for variation to exist. The establishing organisations possibly introduced their own learning material and sign languages to the schools they established. A second, and arguably more prominent, factor in the variation is the schools for the deaf themselves. Sutton-Spence and Woll (2010) coined the term schoolization to explain the changes a sign language undergoes as it is primarily transmitted through interaction with peers at a school for the deaf. This can be seen in NGT where regional variants of this sign language developed at schools for the deaf in the Netherlands (Schermer, 2004). It is also a logical assumption that South Africa's 43 schools for the deaf, which includes units for deaf children at schools for hearing children, across an extensive geographical area has resulted in considerable variation.

Penn and Reagan (1994) discuss lexical variation within SASL, in a report which was the culmination of a seven-year project to document sign varieties of SASL. Data for 2500 lexical items were collected from deaf adults in eleven Deaf communities across South Africa. The researchers found on average six variants per word. This variation raised questions about the number of sign languages in South Africa. Aarons and Akach (1998) disputed notions of

multiple sign languages in South Africa ascribing variation to the history of deaf education in South Africa.

Standardisation is a process which can lead to a decrease in variation. It can occur in a direct or indirect manner. Signers who frequently have contact outside of their locale may readily adopt new signs while others who are more isolated may not (Sutton-Spence and Woll, 2010); this is an example of natural standardisation. The contribution of the internet allowing exposure to other SASL variants and the transfer of students between schools further allows for natural standardisation. In contrast to this, authorities may direct standardisation by prescribing dictionaries and learning material, and this is generally highly controversial (Baker, van den Bogaerde, Pfau, Schermer, 2016).

The Netherlands underwent a process of directed standardisation despite objections from sign language researchers and the deaf community. The deaf community experienced standardisation as a system where correct signs were identified and promoted as the standard and other variants deemed incorrect. This was not the intention of the government and even less so of the working group that was established to drive the process. This illustrates the pitfalls of directed standardisation.

What is the current status of SASL in terms of standardisation? There is no official process of standardisation, yet directed standardisation is to a certain extent indeed occurring. SASL has become a school subject (Steyn, 2015) and the learning material used is approved by a central committee. This committee is effectively contributing to the standardisation of SASL by approving specific materials to be used at schools for the deaf.

The lexical variation in SASL creates a conundrum for lexicographic research; which sign to select as representative of a lemma which is the dictionary form or citation form of a word. The present study does not select a single sign to represent a lemma, but rather uses all the available signs in the data and compares them individually with the potential lexifier languages. This is done within the framework of comparative lexicostatistics.

2.2. Comparative lexicostatistics

The method of comparative lexicostatistics is most commonly used when comparing the lexicons of languages to determine if there is any relationship between the languages. Swadesh (Starostin, 2000), who pioneered comparative lexicostatistics, developed lists of 100 lemmas and 200 lemmas. The lists of lemmas consist of core vocabulary, so named because the words

are core to the human experience; these lists include lemmas like *tooth* and *sky* (Shosted, 2000) and therefore likely to be part of the lexicon. This method compares core, stable vocabularies to establish cognates, that is word pairs from different languages that may have similar linguistic roots. By examining cognates, it is possible to establish the relationship between the two languages or varieties. Cognates are word pairs from different languages that may have similar linguistic roots.

The percentage of similarity gives an indication of the relatedness of the languages being compared (Gudschinsky, 1956). Previous researchers have determined that dialects of the same language should have an 81% to 100% rate of cognates, 36% to 81% indicate that the languages are from the same language family, and less than 36% means that the languages are unrelated (Crowley, 1992). There are criticisms of this method, most notably by Dixon (1997) who argues that comparing core vocabularies, which is what the Swadesh list claims to be, is no guarantee of genetic relationships.

This study will not be attempting to identify cognates. Finding cognates is a different process and includes more than merely performing phonological comparisons (Parkhurst and Parkhurst, 2003) while this study focuses chiefly on phonological features. This study does not have sufficient historical data to reliably determine cognates which is a limitation as cognates is a more accurate representation of historical language contact. However, the methodology used in cognate studies is very relevant to this study.

2.3. Comparative lexicostatistics in sign languages

The original Swadesh wordlist is not immediately applicable for comparisons of sign language lexicons. Sign languages are different from spoken languages in the medium of their production and transfer. There are different lexemes in a spoken language, articulated by audible phonemes. Iconicity is quite low in spoken languages. Iconicity is the degree to which a sign is conformant with the real-world object it symbolizes (Baker et al., 2016). If someone with no knowledge of SASL was asked to produce the sign for *sleep*, they could be expected to produce it accurately. It is not necessary to know SASL to be aware of the gesture that is prevalent in society for the concept *sleep*.

Sign languages utilise the arms and hands as visual phonemes (called cheremes by Stokoe and Kuschel, 1979) and utterances are produced in the space in front of or in contact with the body. Whereas in spoken languages the names of different body parts e.g., *ear*, *arm* and so on, are not interpretable to anyone unfamiliar with the language sign languages are different in this

respect. The vast majority of sign languages refer to different body parts by pointing at the relevant body part with the index finger. A person totally unfamiliar with the sign language would very likely be able to decipher the meaning.



Figure 2.1 EAR in Syrian Sign Language (left) and Russian Sign Language (right)⁴

Thus, the sign EAR⁵ in two sign languages is very likely to be identical without there being necessarily any relationship between these languages (see Figure 2.1). To address this issue with the Swadesh list, Woodward (1978) modified the list (see Table 2.1) in order to compare American Sign Language (ASL) and French Sign Language (LSF). Comparing these two sign languages without excluding the indexical signs would result in false positives. This list from Woodward has been a basis in comparative lexicostatistic research for sign languages.

⁴ Signs sourced from www.spreadthesign.com

1. all	26. grass	51. other	76. warm
2. animal	27. green	52. person	77. water
3. bad	28. heavy	53. play	78. wet
4. because	29. how	54. rain	79. what
5. bird	30. hunt	55. red	80. when
6. black	31. husband	56. right	81. where
7. blood	32. ice	57. river	82. white
8. child	33. if	58. rope	83. who
9. count	34. kill	59. salt	84. wide
10. day	35. laugh	60. sea	85. wife
11. die	36. leaf	61. sharp	86. wind
12. dirty	37. lie	62. short	87. with
13. dog	38. live	63. sing	88. woman
14. dry	39. long	64. sit	89. wood
15. dull	40. louse	65. smooth	90. worm
16. dust	41. man	66. snake	91. year
17. earth	42. meat	67. snow	92. yellow
18. egg	43. mother	68. stand	93. full
19. grease	44. mountain	69. star	94. moon
20. father	45. name	70. stone	95. brother
21. feather	46. narrow	71. sun	96. cat
22. fire	47. new	72. tail	97. dance
23. fish	48. night	73. thin	98. pig
24. flower	49. not	74. tree	99. sister
25. good	50. old	75. vomit	100. work

Table 2.1 Woodward (2003) wordlist for research with sign languages

2.3.1. Early sign language comparative studies

Woodward's (1976) pioneering comparison of American Sign Language (ASL) and French Sign Language (LSF) was not based on the Swadesh list. Woodward aimed to determine the historical relatedness between ASL and LSF. There was plausible basis for there being a relationship between these two languages due to French deaf education having influenced deaf education in America. It would therefore be unlikely for similar signs between these sign languages to be due to chance. Woodward used data from an LSF dictionary containing 873 images. However, Woodward did not have ASL data for all of these dictionary entries. The purpose of the research was to identify similar signs across the two languages and, additionally, to determine how the sign may have changed over time.

Woodward compared signs based on the four phonological parameters: handshape, location, palm orientation, and movement; Woodward does not provide reasons for excluding non-manual markers. Each pair of signs that exhibited similarity was described and the differences documented. Initialised signs are produced with a handshape from the manual

alphabet that corresponds to the written translation of the word. Woodward listed, but did not discuss changes in initialised signs because he wanted to exclude the influence of other languages. This study (Woodward, 1976) was not strictly a comparison, but rather an investigation into the history of ASL and found 54 signs that were related through a process of historical change with LSF tending to have the older form.

In later work Woodward did use an adaptation of the Swadesh list. For example, sign language varieties in Costa Rica were investigated in Woodward (1991). Signs were collected from deaf signers in various geographical areas of Costa Rica. The modified Swadesh list (Woodward, 1978) was the only data used in the paper. It is relevant to highlight that Woodward could not elicit signs for all of the lemmas. This research identified four different sign language varieties in Cost Rica based on Gudschinsky's (1956) stipulations (see section 2.2). The four sign language varieties had similar signs for *rain*, *wide*, *wind*, and *vomit* amongst others. Woodward makes specific mention of the possibility of the influence of iconicity. Woodward did not describe the methodology used.

The relationship between sign language varieties in India, Nepal, and Pakistan was studied by Woodward (1993). The list of 100 lemmas used in this study was the same as the Woodward (1991) study. Sign language varieties of Indian Sign Language examined were those based in New Delhi, Bangalore, Mumbai (formerly known as Bombay), and Calcutta; for Pakistani Sign Language the variety examined was that based in Karachi; for Nepalese Sign Language the variety was based in Kathmandu. Woodward used previously created dictionaries for all of these varieties; the data only had lexical items for 62 lemmas on the list. Printed dictionaries have inherent challenges when used in sign language research. The movement parameter is complex, and it is unlikely that a person unfamiliar with a sign would be able to accurately reproduce the movement of a sign from written instructions. Woodward makes no mention of challenges faced in making the comparison.

Woodward compared all varieties of Indian Sign Language and Pakistani Sign Language with the Kathmandu variety of Nepalese Sign Language in order to determine relatedness as per norms (Gudchinsky, 1956; section 2.2). The results indicate cognates between the other varieties and Kathmandu: Karachi (68%), New Delhi (71%), Mumbai (68%), Calcutta (60%), Bangalore (63%). Woodward concluded that the three sign languages belong to the same language family due to the high percentage of cognates. Woodward did not explain how the comparison between sign languages was done. What is clear though is that using four sign

language varieties to represent Indian Sign Language in the data presented a more accurate result. A language comparison that selects a specific language variety to represent a particular language is essentially claiming that the other variants are different languages. Language comparisons should therefore aim to include as many variants as possible in order to have a more complete representation of the language as a whole.

Thai Sign Language (TSL) and its relationship to ASL was investigated by Woodward (1996). Similar to the previous studies mentioned, the modified Swadesh list of lemmas was used. Data was sourced from published materials. For this study, Woodward referred to a standard variety of TSL as Modern Standard Thai Sign Language (MSTSL); this variety was compared with ASL and a 57% rate of cognates was found indicating that the two languages belonged to the same language family (Gudchinsky, 1956). In this study, Woodward verified the data from the dictionaries by recording four signers, the hearing status of these informants were not indicated. The possibility of false cognates was identified which may be due to iconicity. To address this, older signers were interviewed who used a variety prior to the arrival of ASL in Thailand. With these older signers there was a cognate rate of 10% of the 100 lemmas; these ten signs were the same in ASL. These ten lemmas were removed from the comparison and were categorised as being highly iconic; one could not reliably state that the signs were identical due to language contact because the older signers used a variant that existed prior to the arrival of ASL. The previous rate of 57% rate was reduced to 52% after removing the lemmas that resulted in false cognates, which results in a more accurate evaluation of the influence of ASL on MSTSL.

The studies by Woodward (1978, 1991, 1993, 1996) were methodologically similar in nature. All the studies used the wordlist that was adapted from the Swadesh list of 200 lemmas. However, Woodward did not consistently note the hearing status of informants and rarely provided information on whether the signers were native signers or had acquired a sign language later. The data is meant to be representative of a language which is why the hearing status and signing level of informants are important. None of the studies discussed went into any detail on how the comparison between lexical items was conducted. Woodward did include sign language varieties of a national sign language in the comparisons, most notably the four Indian Sign Language varieties (Woodward, 1993).

2.3.2. Comparisons of Australian, New Zealand, and British Sign Languages

McKee and Kennedy (2000) compared signs from ASL, British Sign Language (BSL), Australian Sign Language (Auslan), and New Zealand Sign Language (NZSL). The list of lemmas in Table 2.2 was used and was heavily influenced by Woodward's modified Swadesh list (Woodward, 1978).

1. all	26. grass	51. other	76. warm
2. animal	27. green	52. person	77. water
3. bad	28. heavy	53. play	78. wet
4. because	29. how	54. rain	79. what
5. bird	30. look for	55. red	80. when
6. black	31. husband	56. correct	81. where
7. blood	32. ice	57. river	82. white
8. child	33. if	58. bug	83. who
9. count	34. kill	59. salt	84. wide
10. day	35. laugh	60. sea	85. wife
11. die	36. leaf	61. sharp	86. wind
12. dirty	37. lie	62. short	87. with
13. dog	38. live	63. sing	88. woman
14. dry	39. long	64. sit	89. wood
15. boring	40. string	65. smooth	90. worm
16. dust	41. man	66. snake	91. year
17. earth	42. meat	67. snow	92. yellow
18. egg	43. mother	68. stand	93. full
19. grease	44. mountain	69. star	94. moon
20. father	45. name	70. stone	95. brother
21. feather	46. narrow	71. sun	96. cat
22. fire	47. new	72. tail	97. dance
23. fish	48. night	73. thin	98. pig
24. flower	49. not	74. tree	99. sister
25. good	50. old	75. vomit	100. work

Table 2.2 McKee and Kennedy (2000) wordlist used to compare ASL, BSL, Auslan and NZSL

Comparing this list to the list used by Woodward (1978) there are relatively few differences: the lemmas *rope*, *louse* and *dull*, were changed to *string*, *bug* and *boring*; *hunt* was removed and *look for* was added.

McKee and Kennedy collected data from dictionaries for all four languages compared. It is not clear if these were video dictionaries. In their study, the phonological parameters of each sign were identified, i.e. the handshape, orientation, location, and movement. If the two signs being compared were the same, the two signs were said to be identical. If the two signs differed in one parameter, the signs were considered to be different but related. If two or more

parameters differed, the signs were said to be completely different. There was an ‘other’ category added for signs that were different, but not in any of the four parameters, e.g., two signs were phonologically identical, but one was produced with one hand and the other with two hands.

McKee and Kennedy found that, if ASL was included in the comparison, there were only 19 signs that were identical across the four languages. Excluding ASL drastically increased this to 64 identical signs. NZSL and Auslan had 77 identical signs; NZSL and BSL had 69 identical signs. The percentage of signs that were cognate, including both identical and related signs, were 87% for NZSL and Auslan and 79% for NZSL and BSL. McKee and Kennedy found a high degree of similarity when comparing signs using the modified Swadesh list.

However, they echoed a concern which had been raised by Dixon (1997), namely that a comparison using only data from the modified Swadesh list may result in a higher incidence of similarity. In order to more accurately compare the lexicon of NZSL with those of ASL, Auslan, and BSL, 200 random everyday lemmas were included in the comparison. Including the random lemmas reduced the rate of cognates for NZSL and Auslan from 87% to 65.5% and for NZSL and BSL from 79% to 62.5%. This may be attributed to the Swadesh list containing lemmas that are seen to be stable (Starostin, 2000). According to Starostin (2000) these stable lemmas tend to be resistant to change and comparisons using these lemmas would tend to yield more similarities. McKee et al. concluded that Auslan, BSL and NZSL were separate languages, but closely related.

Johnston (2003) does not agree with the findings of McKee and Kennedy (2000). Johnston made the same comparison of signs from Auslan, BSL and NZSL but included all variations of a lexeme. Johnston approached the comparison differently and claimed that McKee and Kennedy (2000) compared signs as they were listed in the dictionary and as per the English gloss i.e. the meaning of the sign in English; they did not consider other variants of the sign or other relevant signs with different glosses. Johnston’s approach disregarded the gloss if two signs were the same but had different glosses. Additionally, Johnston identified specific handshapes that were commonly interchangeable and disregarded differences with these specific handshapes, i.e. signs that differed only in one of these handshapes were counted as identical.

Johnston compared the languages using the modified Swadesh list and then 100, 200, and 300 randomly selected entries in the NZSL dictionary. Johnston also did not include

handedness in his comparison, i.e. a sign that is signed with one hand, mirrored on two hands, or two-handed with one being a weak hand. Johnston illustrated the importance of identifying meaningful phonological variation, which is not always where one phonological parameter is different. He elaborates on this by explaining how signs can be modified for aspect or number, but that this does not modify the base sign. For example, a sign that is modified to indicate plurality should not be used to represent a lemma, but the base sign should be used.

Similar to McKee and Kennedy (2000), Johnston found significant lexical overlap between the languages when using the modified Swadesh list; more than 90% across the three languages. Results for the randomly selected words were also significantly higher than McKee and Kennedy. Johnston states categorically that BSL, Auslan, and NZSL are not separate languages, but rather sister languages with BANZSL (British, Australian and New Zealand Sign Language) as the ‘mother’ sign language.

The reason for the differences between Johnston (2003) and McKee and Kennedy (2000) may be attributed to several factors. Johnston did not limit the comparison to gloss entries and had a wider definition of what would constitute identical or similar signs. Johnston gave no weight to certain attributes of a sign, e.g. whether a sign had a base hand, and points out the variation in a sign’s production between native signers. However, neither Johnston nor McKee and Kennedy made mention of the possibility of false cognates.

2.3.3. Comparisons of the lexicons of other sign languages

Al-fityani and Padden (2008) compared signs from ASL and five sign languages in the Middle East: Jordanian Sign Language (LIU) was compared with Al-Sayyid Bedouin Sign Language (ABSL), Kuwaiti Sign Language (KSL), Libyan Sign Language (LSL), and Palestinian Sign Language (PSL). Signs from published dictionaries for these languages were used with the exception of one, ABSL, where signs were elicited from a native signer. Al-fityani and Padden do not describe the detail of their phonological comparison process. They do mention that they used four phonological parameters: handshape, orientation, location and movement. However, it is not clear if, for example, the phonological parameter of orientation includes both the orientation of the palm and the fingers.

Al-fityani and Padden found that LIU and PSL had 58% cognates which they did not find surprising due to the Jordanian and Palestinian communities being close-knit. KSL and LSL followed with 40% and 34% cognates respectively while ABSL and ASL were at 24% and 17% respectively. Al-fityani and Padden found a higher degree of lexical similarity between

two unrelated sign languages, such as LIU and ASL, than would be the case for two unrelated spoken languages. The two unrelated sign languages they argued were more similar due to the abundance of iconic motivations in sign languages.

Miyamoto and Mori (2015) compared signs from Kenyan Sign Language (KSL) and ASL. They used a dictionary of 2,894 signs but did not rely only on the dictionary entries. All 2,894 lemmas were used to elicit signs from six native signers again. If the newly elicited sign was different from the dictionary, both signs were completely removed from the data. The native signers participated in a workshop prior to the elicitation which taught them about linguistic research principles and in which it was specifically mentioned that influences from other sign languages were to be avoided. It is not clear if signs that are used in KSL but are borrowed from another sign language other than ASL, were excluded in this research purely on that basis, despite being part of the KSL lexicon. In their final comparison only 100 lemmas were used. Miyamoto and Mori found that ASL and KSL had between 13% and 22% cognates (see Table 2.3) although this is only for 100 lemmas and not the entire list of lemmas; it is not clear why the comparison was not done with the entire data set.

	1. all		31. husband		61. sharp		91. year
	2. animal		32. ice		62. short		92. yellow
	3. bad		33. if		63. sing	✓	93. full
	4. because		34. kill		64. sit		94. moon
	5. bird		35. laugh		65. smooth		95. brother
	6. black		36. leaf		66. snake		96. cat
	7. blood		37. lie		67. snow		97. dance
	8. child		38. live		68. stand		98. pig
	9. count		39. long		69. star		99. sister
✓✓	10. day		40. louse	✓	70. stone	✓✓	100. work
	11. die		41. man		71. sun		
	12. dirty		42. meat		72. tail		
	13. dog		43. mother		73. thin		
✓✓	14. dry		44. mountain	✓	74. tree		
	15. dull		45. name		75. vomit		
	16. dust	✓✓	46. narrow	✓✓	76. warm		
	17. earth		47. new	✓	77. water		
	18. egg		48. night		78. wet		
	19. grease		49. not	✓✓	79. what		
	20. father	✓✓	50. old	✓	80. when		
	21. feather		51. other	✓✓	81. where		
	22. fire	✓✓	52. person		82. white		
	23. fish		53. play		83. who		
	24. flower	✓✓	54. rain	✓✓	84. wide		
	25. good	✓✓	55. red		85. wife		
	26. grass		56. correct	✓	86. wind		
	27. green	✓	57. river	✓	87. with		
✓✓	28. heavy		58. rope		88. woman		
	29. how		59. salt		89. wood		
	30. hunt	✓	60. sea		90. worm		

✓✓: Complete cognates
 ✓: one parameter is different

Table 2.3 Cognates between KSL and ASL (Miyamoto and Mori 2015:21)

Su and Tai (2009) followed an approach that investigated the role of iconicity in comparative studies for the purpose of establishing historical relationships. In their study they compared Taiwanese, Chinese, Japanese, and American Sign Languages. Similar to the current study, the researchers presented results that included signs with iconic motivations as well as with these signs excluded.



Figure 2.2 An iconic sign SCISSOR with the relevant handshape in Taiwanese Sign Language (Su and Tai 2009:153)

Su and Tai found 53% of signs to be identical between Taiwan and Japanese sign languages when iconic signs were included; this reduced to 44% when iconic signs were excluded. As expected, there was a reduction in identical signs for all sign languages compared. Woodward's modified Swadesh list was used, which they claim is insufficient to establish language relationships, but which can partly be addressed by increasing the sample size. However, they also assert that the majority of signs have iconic motivations to different degrees. The presence of iconic motivations does not automatically exclude the possibility of cognates and researchers need to pay attention to the historical relationship between languages.

Parkhurst and Parkhurst (2003) highlights the complexity of determining cognates. It is not merely a matter of determining lexical similarity, but of historical relatedness. Two languages that are related will share more than just lexical items; relatedness will be evident in the morphology, syntax, etc.

Comparing the signs in A and C in Figure 2.3 would result in characterising them as different signs because two phonological parameters are different, the handshape and palm orientation. It is possible to deny that these two signs are cognates if the decision is based solely on the phonological comparison. However, if one is to take into account historical factors, assuming that the variety represented in C is a later variety than that represented in A, mediated by the variety represented in B in Figure 2.3 one can clearly see the link between A and C.

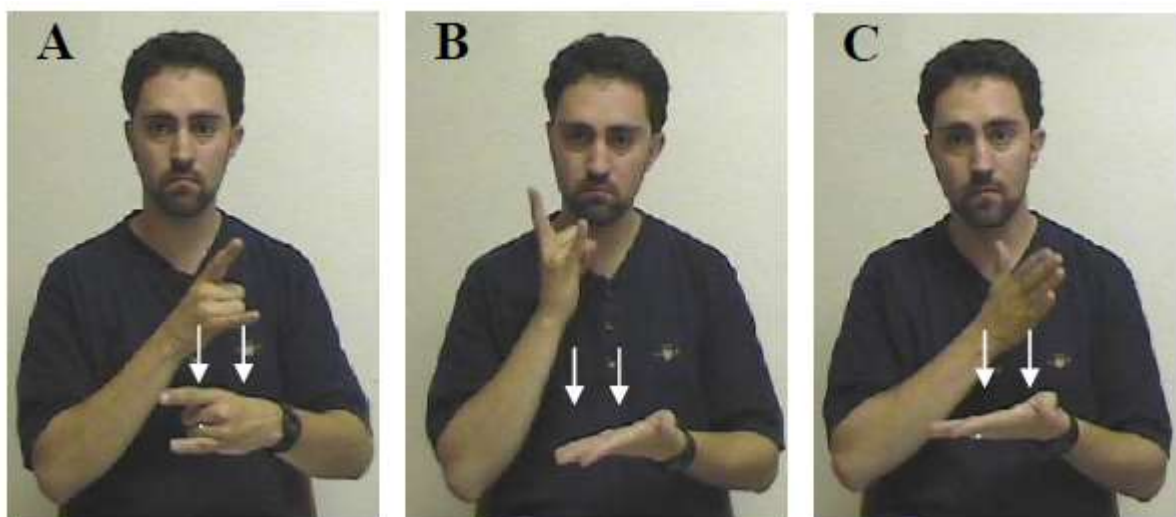


Figure 2.3 MEAT in three dialects of Spanish Sign Language (Parkhurst and Parkhurst 2003:2)

Parkhurst and Parkhurst compared signs from Spain, Northern Ireland, Finland, and Bulgaria. Their methodology allowed for signs to be cognates, even if they were not similar and therefore, they found a higher rate of cognates than of similarity because they took historical interactions between languages into account. The authors considered historical data and considered the phonological changes signs underwent and if a plausible link could be established, the signs were then marked as cognates. Signs were labelled as “identical or very similar”, “somewhat similar”, or “quite different”; a similar scale to previous research (McKee and Kennedy, 2000; Johnston, 2003). However, it is not made clear what “very similar” or “somewhat similar” would mean. The researchers found a higher incidence of cognates than similar signs for all sign languages compared. Signs with iconic motivations were removed from the comparisons and, as expected, resulted in lower cognate rates due to false cognates being removed.

2.3.4. Comparisons involving South African Sign Language

Nokwazi (2017) is the only traceable study that has compared the SASL lexicon with other sign languages. Nokwazi used the modified Swadesh list and compared signs from SASL to ASL, BSL, ISL, PGSS, and English signs. English signs were defined as signs that are either fingerspelled with the manual alphabet or initialised, i.e. signs where the handshape corresponds to the first letter of the English translation. FAMILY (see fig 2.4) is an example of an initialised sign because the handshape is the same as the manual alphabet letter ‘f’ which is the first letter of the English word ‘family’.



Figure 2.4 FAMILY in SASL

Nokwazi does not elaborate on why this distinction was made as initialised signs are an intrinsic part of SASL.

Nokwazi used data from four informants, selected on the basis of school attendance: two who attended Wittebome School for the Deaf, which was established by the Irish Dominican order in Cape Town, one who attended Hammanskraal School for the Deaf, which was also established by Irish Dominicans in 1962, and one who attended St Vincent school for the Deaf in Johannesburg (Nokwazi herself). It is not clear why these schools were chosen. The historical background of these schools makes it probable that a bias towards ISL would be found but Nokwazi does not mention this. Nokwazi sourced signs for ASL from www.lifeprint.com and www.handspeak.com, and BSL from <http://bsl.signbank.ucl.ac.uk>. ISL data was provided by an Irish SL signer; it is uncertain if this person is a native signer.

Nokwazi sent the list of lemmas in English to her informants and seemingly had them record the signs by themselves. It would not be possible to say for certain that the signs were elicited without another person's involvement. It is also unclear if the informants received any instructions on their signing, i.e. should they use their everyday signs or attempt to recall the signs from the school they attended.

Nokwazi followed the McKee and Kennedy (2000) protocol where signs that differed in two or more phonological parameters were categorised as different. Nokwazi does not elaborate on her description of phonological parameters, e.g., whether the location of a sign recorded where the sign starts or where it ends or whether this is addressed in the movement parameter.

The similarity that the Wittebome signers have with ISL is explained through the school's history with Irish Dominicans. However, one of the signers was 78 years old and had moved to Johannesburg after school. It may therefore not be accurate to still equate the signer's signs as representative of Wittebome. This is supported by the fact that the two signers from Wittebome had different signs for WHERE.

While Nokwazi (2017) does mention iconicity as a limitation of her study, she fails to mention the influence it may have had on the findings. Table 2.4 below presents the overall findings of Nokwazi (2017), while table 2.5 presents the findings according to province (the total number of lemmas and signs elicited is not clear).

	Identical signs	Similar signs	Total
ISL	14	11	25
BSL	19	9	28
ASL	11	5	16
PG	3	0.3	3.3
English (fingerspelling/initialised)	7	1	8
			80.3

Table 2.4 Nokwazi (2017) findings – Percentage of similar and identical signs

The percentages indicate the borrowings from the various languages identified in the first column. A total of 80.3% is given as borrowings from other sign languages; this is the total of identical and similar signs. It is not clear what Nokwazi did in instances where there was overlap with multiple sign languages e.g. one lemma may have a sign that is similar to both BSL and ISL and should therefore not be counted twice. The wordlist consisted of 100 words; it is not explained how a percentage of 0.3 was determined for similar signs in PGSS.

	Western Cape	Gauteng
ISL	14%	18%
BSL	14%	27%
ASL	4%	15%
PG	1%	4%
Initialised	5%	6%
Total Borrowing	38%	70%

Table 2.5 Nokwazi (2017) findings – percentage of borrowings per province

In table 2.5 the Gauteng column combines the results using data from St Vincent and Hammanskraal schools for the deaf and the Western Cape column shows the results comparing data from Wittebome school for the deaf. Once again, any overlap is not indicated, and totals are simply added up. The Western Cape has five schools for the deaf and Gauteng has seven schools for the deaf; one cannot attribute the variety used at one school as representative of the entire province.

2.4. Conclusion

Comparing the lexicons of sign languages has frequently been done in order to determine if the languages have a historical relationship. Woodward (1978, 1991, 1993, 1996) compared signs from various sign language varieties, yet provided very little information on methodology. Johnston (2003) stated very clearly the importance of determining the phonological significance of a sign's features and suggests disregarding handedness. It is not known if Woodward included handedness in the comparisons nor if handedness was evaluated for phonological significance. The current study subscribes to Johnston's methodology to a larger degree than to that of McKee and Kennedy (2000). Both of these studies included lemmas in addition to the Swadesh list and Johnston included variation as it was recorded in dictionaries.

Su and Tai (2009) raised the importance of iconic motivations within signs. If a study's purpose is to determine the historical relatedness between sign languages one must pay specific attention to signs that are highly iconic. The current study identifies signs that are highly iconic, but only excludes signs if multiple sign languages have the same sign; the sign may therefore be highly iconic but still related to a sign from another language. The question on how to

determine if a sign is iconic is not clearly answered by Su and Tai. Al-fityani and Padden (2008) found higher than expected similarities between two sign languages that appeared to be unrelated and attributed this to iconicity. Su and Tai had a very clear focus on identifying iconic signs while Al-fityani and Padden makes mention of iconicity influencing the results. As the current study aims to identify loan signs, it will be necessary to provide details on the influence of iconicity on the results.

It is vital that data be gathered from reliable sources that are accurate representations of the sign language studied. Nokwazi (2017) elicited data from informants who were obviously no longer representative of the language variant. Various studies discussed here used dictionary entries as data sources, yet Johnston (2003) argued against this as the citation form of a sign may have variations in different settings.

Parkhurst and Parkhurst (2003) suggest a methodology that is more qualitative than quantitative. They emphasised that cognates can be signs that differ significantly in form. However, the current study is not attempting to identify cognates. While identical signs may indeed be cognates, Parkhurst and Parkhurst elaborated on a process of comparing historical and regional signs to identify signs that underwent phonological changes but had the same or similar roots. The current study uses signs used by college students who had finished school within the past several years, and who identified the signs as those used at their respective schools.

2.5. Research Questions

Given the preceding discussion, and the aim of the research outlined in chapter one, the research questions for this thesis are:

1. What is the extent of lexical variation in SASL?
2. What is the evidence for lexical borrowing in SASL?
3. What is the distribution of these loan signs across the identified schools?

The first research question forms a background to the following two by examining how many different sign types are found for the lemmas tested. The charting of this variation is essential for the comparison with potential lexifier languages. The second question aims to find evidence for borrowing by comparing SASL signs with the signs from potential lexifier languages and PGSS. The role of iconicity is recognised, and the methodology allows for this influence to be eliminated as far as possible. Answering the third research question will indicate the spread of these borrowings across the schools for the deaf in the data.

Chapter 3

Methodology

In this chapter, the methodology of this study will be described. An approach was followed that was similar to Johnston (2003), as discussed in the previous chapter.

In section 3.1, the informants from which data were gathered are described. Section 3.2 provides detailed information on the materials used and elicitation, and the procedure is described in section 3.3. Finally, in section 3.4, the process of analysis is explained, including a description of SASL phonology.

3.1. Informants in the dictionary project

The National Institute for the Deaf (NID), South Africa, is continuously developing an on-line bilingual dictionary of SASL and English (www.nid.org.za/dictionary). NID has a training college on its campus and provides training and accommodation to between 120 and 140 deaf students annually. These students are the source from which data are being gathered to fill the dictionary.

Data available for the current study were taken from the data of NID dictionary project. These data were collected from 50 students who attended the NID College and who had previously attended a school for the deaf (see Table 3.1). The informants in the project needed to have attended the school for the majority of their schooling career to ensure that their lexicon was representative of the specific language variant used at their school. Three rounds of recording were done, but not all informants could attend each session due to scheduling conflicts. This resulted in less data from schools that those informants attended.

Initially informants were limited to one per school and were invited to the studio where recordings were done. By round three the recordings were being done at the College making it possible for more students to participate.

Informants represented a total of 20 schools for the deaf across five provinces in South Africa, Western Cape, Gauteng, Free State, Gauteng, and KZN. According to the Department of Basic Education, there are 43 schools for the deaf in South Africa; five of these are units at mainstream schools and several are schools for the deaf and blind. Four provinces were not represented: Northern Cape, Mpumalanga, Limpopo, and North West, which meant that the other 23 schools for the deaf were not included in this comparative study. The NID did not have students from these schools. In total 50 informants took part in the study with a mean age of 22;3. There were 27 males and 23 females.

Round	Age	School attended	Gender	Province
1	22	Efata	M	Eastern Cape
3	23; 22	Efata	F; F	Eastern Cape
1	20	Reuben Birin	M	Eastern Cape
2	20	Reuben Birin	M	Eastern Cape
1	22	St Thomas	F	Eastern Cape
2	22	St Thomas	M	Eastern Cape
1	26	Bartimea	M	Free State
2	26	Bartimea	M	Free State
1	27	Thiboloha	F	Free State
2	22	Thiboloha	F	Free State
1	20	Dominican Hammanskraal	M	Gauteng
2	20	Dominican Hammanskraal	M	Gauteng
1	24	Filadelfia	F	Gauteng
1	25	Filadelfia	M	Gauteng
1	18	MC Kharbai	M	Gauteng
3	22; 19	MC Kharbai	F; F	Gauteng
1	23	Sizwile	M	Gauteng
2	23	Sizwile	F	Gauteng
1	21	St Vincent	M	Gauteng
3	25; 24	St Vincent	M; M	Gauteng
1	22	Transoranje	F	Gauteng
3	22	Transoranje	F	Gauteng
1	20	Fulton	F	KZN
1	18	Fulton	F	KZN
1	24	Kwathintwa	M	KZN
2	23	Kwathintwa	F	KZN
3	22; 23	Kwathintwa	M; M	KZN
1	22	St Martin de Porres	M	KZN
2	22	St Martin de Porres	M	KZN
3	22	St Martin de Porres	F	KZN
1	26	Vuleka	M	KZN
2	23	Vuleka	M	KZN
3	28; 22	Vuleka	F; M	KZN
3	22; 21	VN Naik	F; F	KZN
1	20	De la Bat	M	Western Cape
2	20	De la Bat	F	Western Cape
3	28	De la Bat	M	Western Cape
1	21	Dominican Wittebome	M	Western Cape
2	20	Dominican Wittebome	M	Western Cape
3	23; 20	Dominican Wittebome	M; F	Western Cape
1	18	Noluthando	F	Western Cape
3	22	Noluthando	M	Western Cape
1	27	Nuwe Hoop	F	Western Cape
2	24	Nuwe Hoop	F	Western Cape
1	20; 23	Nuwe Hoop	M; F	Western Cape

Table 3.1 – All Informants indicated per round of testing, school, age and gender

3.2. Data elicitation materials

In most lexicographical comparison studies, as discussed in 2.3, the Woodward (1978) list of lemmas is used. Multiple studies rely on dictionary data, which is very efficient, but as noted in 2.3.2 there are nuances that go unnoticed when only referring to the citation form of a sign (Johnston, 2003).

Many studies have included additional lemmas (McKee and Kennedy, 2000; Johnston, 2003; Al-fityani and Padden, 2008; Clark, 2017) because a larger lexical sample of the source language would result in a more accurate comparison. While the modified Swadesh list of lemmas contain lemmas that are core to the human experience, this study follows these researchers and added additional basic lemmas. This study was limited to the data available from the NID dictionary project (see 3.1). The lemmas used in this study's comparison are listed in Table 3.2. In total 173 lemmas were used to elicit signs for the dictionary project. Lemmas from the Woodward (1978) list for which data were not available are: *dance*, *grass*, *hunt*, *louse*, *snow*, *sun*, *with*, and *worm*.

Round one of data elicitation for the dictionary project consisted of 47 lemmas elicited from informants from 19 schools for the deaf. Round 2 consisted of 53 different lemmas elicited from 14 schools for the deaf. Round 3 consisted of a further 73 lemmas elicited from 12 schools for the deaf, elicited signs are labelled as tokens. Dependent on the number of schools for each round, the potential number of tokens could either be 19, 14, or 12 for each lemma. Round one potentially has 893 tokens, round two 742 tokens, and round three 876 tokens. The missing data will be addressed in section 4.1.1.

ROUND 1 (47 lemmas – potentially 19 tokens per lemma)					
Apple	Ask	Autumn	Believe	Bird*	Blue
Bread	Butter	Cheese	Child*	Decide	Dog*
Father*	Fish*	Green*	Happen	Help	Like
Live*	Lunch	Make	March	Meat*	Milk
Monday	Month	Mother*	Parents	Play*	Potato
Promise	Rain*	Red*	Sit*	Snake*	Start
Sunday	Wait	Warm*	Week	Win	Wind*
Winter	Work*	Worry	Year*	Yesterday	
ROUND 2 (53 lemmas – potentially 14 tokens per lemma)					
Answer	Aunt	Black*	Borrow	Boss	Breakfast
Bring	Brother*	Brown	Buy	Cat*	Chicken
Cow	Daughter	Day*	Dinner	Elephant	Find
Finish	Follow	Forget	Grandfather	Grandmother	Horse
Hour	Learn	Lion	Lose	Minute	Mouse
Night*	Orange	Pizza	Porridge	Purple	Remember
Rice	Salad	See	Sell	Sister*	Son
Stand*	Summer	Tell	Think	Travel	Try
Uncle	Understand	Use	White*	Yellow*	
ROUND 3 (73 lemmas – potentially 12 tokens per lemma)					
All*	Animal*	Bad*	Because*	Blood*	Count*
Die*	Dirty*	Dry*	Dull (boring)*	Dust*	Earth*
Egg*	Feather*	Fire*	Flower*	Full*	Good*
Grease (oil)*	Heavy*	How*	Husband*	Ice*	If*
Kill*	Laugh*	Leaf*	Lie*	Long*	Man*
Moon	Mountain	Name	Narrow*	New*	Not*
Nothing	Old*	Other*	Person*	Pig*	Right (correct)*
River*	Rope*	Safe	Salt*	School	Sea*
Search	Sharp*	Short*	Sing*	Smooth*	Star*
Stone*	Tail*	Test	Thin*	Tree*	True
Vomit*	Water*	Wet*	What*	When*	Where*
Who*	Why	Wide*	Wife*	Woman*	Wood*
Young					

Table 3.2 Wordlist used in this study (*Lemmas that were part of Woodward (2003))

3.3. Data elicitation procedure

Deaf people adapt their signing when a hearing person is present (Lucas and Bayley, 2005), possibly due to the influence of a spoken language. In order to avoid this influence, a Deaf facilitator elicited the signs. Informants were instructed to look at the flashcard on which the English word was printed and then to show the corresponding SASL sign used at their school. Prior to the elicitation the informants were given some background information on the project. It was explained that their school's sign should be shown and, in cases where it was different, not the sign they were presently using. The informants appeared excited about this project and

discussed with the facilitator the different signs they have encountered and assured the facilitator that they recalled their school's signs very well. However, on several occasions, students could only recall their school's sign after having a discussion with a peer. The reason for this is not clear but may be due to lack of use. During round 3 there was more than one informant representing a school and it was found that it was markedly easier for the students to recall their school's sign when accompanied by a peer.

English was chosen as the elicitation language as it is the language of literacy used at NID. It was considered impractical to use multiple written languages on the flashcards due to the space it would take up. The Deaf facilitator held up flashcards that showed an English word and an image. It was a challenge to find appropriate images for many words, e.g., *if*, *name*, and *wide*. See Figure 3.1 for examples.



Figure 3.1 Examples of images used with lemmas

Informants were additionally asked to sign a sentence to illustrate that the sign was a semantic fit to the flashcard. In cases where the informant did not understand the word, the facilitator would explain the meaning while being mindful of possible influence from their own variety of SASL. In some cases, the meaning could not be conveyed, and no sign could be elicited. Several informants referred to the image first and provided incorrect signs; for example, *sharp* had a knife as an image and elicited the sign for *knife*. The facilitator would intervene in these cases and elaborate.

In rare cases the informant indicated that his/her school had no sign for the lemma. It cannot however be assumed that there is no sign for that lemma in that particular school. There was only one instance where multiple informants from a school indicated that they had no sign (for

sharp). In one instance one informant indicated they had no sign (for *tree*), but the other informant did.

The data were categorised per school for the deaf. The sign from each school was compared with each of the other schools following the analysis to be detailed in 3.4. This resulted in several sign types for each lemma; these sign types were then compared with the potential lexifier languages.

3.4. Analysis

In this section the process of analysis will be explained. A significant part of the analysis was to determine the number of types, i.e. how many different variants each lemma had. To determine this, the phonological features of each lexical item needed to be described prior to a comparison being done (3.4.1). The phonological features allow for a comparison to be done within the SASL lexicon to determine identical and similar signs. Iconicity is then addressed (3.4.2) where the criteria to exclude certain lemmas due to having a high degree of iconicity is discussed. Finally, the comparison to potential lexifier languages⁶ is discussed (3.4.3).

3.4.1. Phonological Description

The phonology of signs is commonly described in terms of four manual parameters: handshape, orientation, location, and movement; each of these will be discussed; non-manual features have a more grammatical function and is not included in a phonological comparison. Lucas and Bayley (2005) propose that there is more to sign language phonology than merely these four parameters. They suggest that the order in which phonological features are produced is indeed phonologically significant. Liddel and Johnson (1989) recognised that there are sequential elements within signs but claimed that the sequentiality is not phonologically important. Due to a lack of a model that sufficiently describes the phonological features of the sequential organisation within signs, this study will refer to the aforementioned four parameters.

The process of comparison on the basis of phonology will be explained and how this resulted in a sign being categorized as either identical, similar, or different to other variants or signs from a potential lexifier language.

⁶ PGSS is not a language, but for the purpose of expediency is included in this statement.

3.4.1.1. Handshape

Handshapes were identified using a special font⁷ that showed the actual handshape image (see Figure 3.2). For one-handed signs, only the right hand was listed. Informants who were left-handed were transposed to right-handed to avoid possible confusion. Two-handed signs were listed with each hand's handshape identified. The data revealed 52 different SASL handshapes.



Figure 3.2 Example of handshapes in the font library

The handshape of each sign was identified based on the initial shape of the hand. Many signs have handshape changes that occur sequentially.



Figure 3.3 Initial and final handshape of UNDERSTAND

⁷ The handshape fonts are created by CSLDS, CUHK (<http://www.cslds.org/v3/resources.php?id=1>)

Figure 3.3 illustrates the change in handshape for the sign UNDERSTAND. The initial handshape was documented as 6 and the final handshape as B. This change in handshape was documented as part of the movement parameter, which will be described in more detail in section 3.4.1.4.

Close inspection reveals that the initial handshape is not exactly the same as the documented handshape 6; the knuckle of the index finger is slightly extended whereas the documented handshape is a fist. In this case it had to be determined whether this specific handshape was phonologically or phonetically different; does the handshape with the knuckle slightly extended carry meaning? To determine this, a minimal pair needed to be found i.e. two signs needed to be found where the only difference was the handshape. A minimal pair could not be found, and this handshape was therefore deemed to be an allophone, the handshape difference does not carry semantic weight, for the documented handshape.

It is commonly known that minimal pairs in sign languages are a rare occurrence. Figure 3.4 demonstrates the purpose of finding minimal pairs. The two handshapes used in the two images are semantically significant because the location, movement, and orientation of the two signs are same with only the handshapes being different. This process was followed for each of the parameters where there was uncertainty on the phonological validity.



Figure 3.4 Minimal Pair APPLE and WHO

3.4.1.2. Location

The location of each sign refers to the area in space or on the body where the sign is performed. There are very specific locations that carry meaning. There are four primary locations where signs are articulated, the head, the upper body, the non-dominant hand, and the neutral space (Baker et al., 2016). These four areas were further divided into phonologically significant locations in the analysis. The initial location of the sign was identified. The top of the shoulder is one such location. Minor variations in the exact location on top of the shoulder do not carry meaning. If a sign moved to another location, it was identified as part of the movement parameter, but only the initial location was documented.



Figure 3.5 GREY

GREY, as shown in Figure 3.5, was articulated in the primary location of the head and the specific location was documented as the temple. Both of the signs in Figure 3.3 above were documented with the location as the chin.

3.4.1.3. Orientation

Orientation refers to the orientation of the palm and fingers. In most of the research reviewed as part of this study, only the orientation of the palm was considered in the comparison, if there was indeed any mention of the parameter details at all. The orientation of the fingers is a phonological part of the sign and cannot be ignored (Baker et al., 2016). The palm orientation could be any of the following:

- Towards signer
- Away from signer
- Up
- Down
- Left
- Right
- Towards each other
- Away from each other

Signs that were oriented diagonally were assigned either the left or right property as these vary phonetically, rather than phonologically. This follows the view that orientation can be more accurately described as the relationship between a part of the hand and the location (Baker et al, 2016). The orientation of the fingers was identified by the direction of the straightened fingers; in a sign that had a closed hand the imagined direction of the straightened fingers was used.

3.4.1.4. Movement

The movement parameter was a complex parameter to describe. The other parameters, for the most part, have quite specific properties, and phonetic variation was simple to detect. The movement parameter however has more options, e.g., speed of the sign, path of the sign, variations in the path, movement of the fingers. The speed of the sign was determined, in this case, to be phonetic and not included in the comparison. The movement path of the sign was described in terms of the general direction. More descriptive words were used as there was too much variation in this parameter to have a pre-determined list. Movements of the wrist or hands that changed shape or orientation were given the movement property of “Hand Internal Movement”.

In Figure 3.6, DIE has a clear movement path. However there is also a change in the orientation of the hands. The fingers are initially pointing up and at the end of the utterance is pointing forward.



Figure 3.6 Initial position of DIE (left) and final position of DIE (right)

**3.4.1.5. The process of determining similarity or identity between signs:
a comparison of two APPLE variants**

To better illustrate the process of determining similarity and differences between signs, the process using the phonological description of two variants of APPLE will be demonstrated.



Figure 3.7.a APPLE-1 start position



Figure 3.7.b. APPLE-1 end position

The handshape was considered first, and the handshape font library was used to determine the relevant handshape, which in the instance of APPLE-1 in figure 3.7 is < . The location is ‘In Front Of Mouth’ and the palm’s orientation is ‘Towards Signer’. The path of the right hand is ‘Up’ with no hand internal movements or orientation changes and repeated twice.



Figure 3.8. APPLE-2

The second variant of APPLE in Figure 3.8, APPLE-2, is clearly different to the previous sign, but similarities are apparent. The handshape is 1 and the location is the chin. The orientation is towards the signer and the movement is a tap which means a movement is repeated twice with contact. Only one phonological feature is identical across these two variants, the palm orientation.

It is important to be sure that only phonological features are listed and not phonetic features. These were distinguished by identifying minimal pairs where possible. Each of the phonological parameters were semantically significant. ‘In Front Of Mouth’ was investigated and two signs needed to be identified that differed only in the location where one location was in front of the mouth. Upon finding two signs that have identical handshapes, orientations and movements but different locations, it was included as a phonological feature.

The phonological descriptions of each token of a lemma were compared with each other to determine identical, similar, and different signs. On the basis of common practice in the literature (e.g., McKee and Kennedy, 2000; Johnston, 2003) signs that were identical or similar, i.e. the signs differed in only one phonological parameter, were counted as a single type. This results in a number of sign types per lemma. Different signs are labelled as different types. For example, the lemma *apple* had three types and these types were used for the comparison to signs from the potential lexifier languages.

3.4.2. Iconicity

As discussed in Chapter 2.3.4, Su and Tai (2009) and Parkhurst and Parkhurst (2003), among others, noted that sign languages exhibit a high degree of iconicity, i.e. there is a resemblance between the linguistic form of a sign and its meaning (Taub, 2001). It is highly likely that a person familiar with Western cultures but unfamiliar with any sign language would still be able to sign SLEEP such that the form overlapped with the sign used in a sign language. It would, therefore, not be accurate to conclude that the signs SLEEP in BSL and SASL are identical due to historical influence.

Iconicity is a scale; signs can exhibit a certain degree of iconicity i.e. signs can be highly iconic, or the iconic motivation could only become clear once the meaning is understood (iconic, but non-transparent). This aspect will be further discussed in Chapter 4.



Figure 3.9 STAND

Figure 3.9 demonstrates the sign STAND which is highly iconic. The vast majority of sign languages use the same sign. For the purposes of this study a sign was considered highly iconic if many sign languages used the same sign. The resource www.spreadthesign.com was used. Many of the sign languages used in the resource are historically unrelated with no contact to allow for borrowing to occur. The reason for the sign languages using the same sign can therefore be attributed to iconic motivation; the two extended fingers in the example STAND emulate the legs of a person standing.

3.4.3. Comparison to lexifier languages

Following criteria determined by McKee and Kennedy (2000), a sign type (see 3.4.1) was compared to the sign used in seven potential lexifier languages on the basis of the four parameters. If there were no differences, the sign was categorised as identical, if there was one difference the sign was categorised as similar, and if there were two or more differences the sign was categorised as different.

Sign language	Source	Variants indicated
American Sign Language (ASL)	www.aslpro.com	No
British Sign Language (BSL)	www.bsllsignbank.ucl.ac.uk	Yes
Dutch Sign Language (NGT)	www.gebarententrum.nl/gebaren/van-dale-ngt-uitgebreid/	Yes
Flemish Sign Language (VGT)	gebaren.ugent.be/	Yes
German Sign Language (DGS)	www.spreadthesign.com	No
Irish Sign Language (ISL)	Irish native signer (p.c.)	No
Paget Gorman Sign System (PGSS)	www.pagetgorman.org/how-to-sign	No

Table 3.3 Possible lexifier sign languages and their sources

Lexifier language	No. lemmas available (max. 173)	No. of sign variants available
American Sign Language (ASL)	173	174
British Sign Language (BSL)	173	397
Dutch Sign Language (NGT)	173	286
Flemish Sign Language (VGT)	171	549
German Sign Language (DGS)	173	173
Irish Sign Language (ISL)	82	91
Paget Gorman Sign System (PGSS)	173	173

Table 3.4 Possible lexifier sign languages and their sources

Table 3.3 lists the languages used in this study as potential lexifier languages for SASL on the basis of the available information on the history of the region in deaf education (see chapter 1). The table also indicates if data on variation in those languages were available. Table 3.4 provides exact figures on the number of lemmas and sign variants that were available in the lexifier languages. Data were available for all lemmas for the languages compared with the exceptions of VGT (171 lemmas) and ISL (83 lemmas). Only limited data from ISL was available; 83 lemmas with 91 sign variants. The BSL, VGT, and to a lesser extent NGT, dictionaries included variation, but the other dictionaries did not.

3.5. Conclusion

The methodology followed in this study was detailed in the previous sections. Ideally the data would be a uniform representation of lemmas and signs, i.e. there would be 173 lemmas and data from 20 schools for the deaf for these 173 lemmas.

It is vital to distinguish between a lexical comparison that identifies similarities between lexicons to identify possible borrowings, and a study that identifies cognates. This study does not attempt to identify cognates.

Chapter 4

Results

In this chapter the results will be presented and discussed in relation to the three research questions (see section 2.5). In 4.1 the lexical variation within SASL as evidenced by the data collected will be outlined; this forms a background to the question of lexical borrowing. In 4.2 the results of the comparison with the six possible lexifier languages will be presented. Additionally, the distribution of identified loan signs across the schools will also be shown.

4.1. SASL lexical variation

In this section the results on the lexical variation in SASL will be displayed and the third research question will be addressed. First, the missing data will be identified in order for the results to be interpreted correctly. In the second part, the variation will be displayed in terms of the sign types.

4.1.1. Missing data

Table 3.1 indicated the schools that were available for each round of recordings in addition to the lemmas used in each of those rounds. This created the possibility of obtaining 2,511 tokens. However, for several schools, it was not possible to obtain a sign for several lemmas. Twenty-five lemmas (see Table 4.1) were less well represented in the data.

Lemma	Potential Number of Tokens	Number of Tokens recorded	Lemma	Potential Number of Tokens	Number of Tokens recorded
<i>Autumn</i>	19	8	<i>Promise</i>	19	18
<i>Butter</i>	19	18	<i>Rope</i>	12	10
<i>Daughter</i>	14	13	<i>Salad</i>	14	12
<i>Decide</i>	19	16	<i>Search</i>	12	10
<i>Die</i>	12	11	<i>Sharp</i>	12	10
<i>Dinner</i>	14	13	<i>Smooth</i>	12	9
<i>Dust</i>	12	11	<i>Son</i>	14	13
<i>Feather</i>	12	10	<i>Summer</i>	14	12
<i>Find</i>	14	13	<i>Tail</i>	12	11
<i>Minute</i>	14	13	<i>Thin</i>	12	11
<i>Narrow</i>	12	5	<i>Travel</i>	14	13
<i>Other</i>	12	11	<i>Wide</i>	12	6
<i>Parent</i>	19	18			

Table 4.1 Overview of the missing data per lemma

As stated above, potentially 2,511 tokens were available (see 3.2), but it was only possible to obtain 2,457.

The number of tokens elicited per lemma, varied from 5 to 20, so for example *narrow*, *wide*, and *autumn* had only five, six, and eight tokens respectively. *Narrow* potentially had 12 tokens, but seven informants could not provide a sign for the lemma; 18 informants provided signs for *butter*, *lunch*, *parents*, and *promise* with no signs being provided by informants from Bartimea, Sizwile, St Vincent, and St Martin de Porres respectively. These missing data do not imply that these schools had no sign for these lemmas, merely that the specific informant could not provide one.

Bartimea	98	Reuben Birin	99
De la Bat	170	Sizwile	96
Efata	119	St Martin de Porres	167
Filadelfia	97	St Thomas	99
Fulton	99	St Vincent	112
Hammanskraal	99	Thiboloha	98
Kwathintwa	171	Transoranje	118
MC Kharbai	118	VN Naik	74
Noluthando	115	Vuleka	172
Nuwe Hoop	169	Wittebome	167

Table 4.2 - Total number of sign tokens successfully elicited

Ideally, there should be data for 173 lemmas across the 20 schools for the deaf, but as was mentioned in section 3.1, not all schools were represented in each round of recording. Table 4.2 lists the number of lemmas for which signs could be elicited from each school. Vuleka provided signs for 172 lemmas with only *autumn* not resulting in a sign.

For five of the potential lexifier languages⁸ data were available for all of the lemmas. ISL did not have data available for all lemmas; only 83 lemmas with 91 variants were available in ISL and VGT had 171 lemmas (2 missing) available with 549 variants. This means that less overlap could be discovered for ISL. The data will be interpreted with this missing information in mind.

⁸ PGSS is not a sign language, but for efficiency in the text all seven will be referred to as lexifier languages.

4.1.2. Variation in Types

A total of 173 lemmas were used (see Table 3.4) and elicited from a total of 50 different informants (see Table 3.1). Taking into account the missing data (4.1.1), this resulted in a total of 2 457 tokens that were recorded. The phonological analysis process was followed (see 3.4), and 630 sign types were identified (see Appendix 1 for a complete overview).

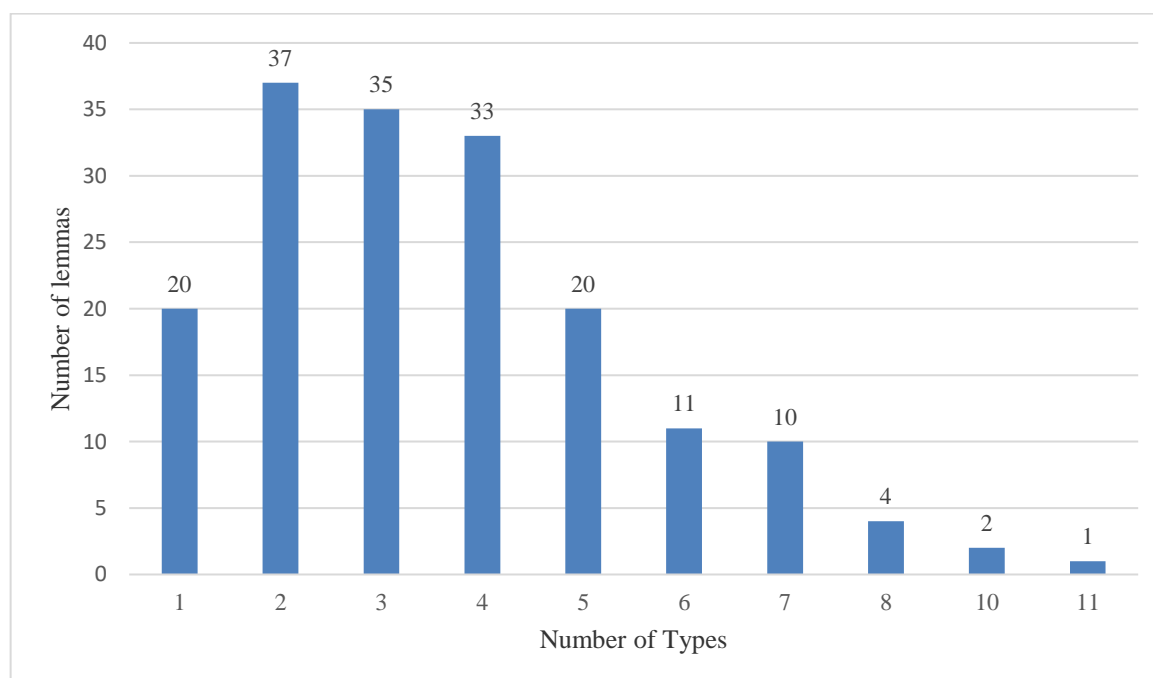


Figure 4.2 The number of lemmas (total 173) related to the number of sign types (630)

In Figure 4.2 the variation in the number of types across all 173 lemmas is indicated. The numbers vary between one and eleven. There were twenty lemmas that had only one type each, i.e. the elicited signs were either identical or similar to each other (see Appendix 2). *Purple* had the most types with eleven different signs; it is interesting to note that this lemma has 17 different sign types in BSL. It is also not unusual for there to be a large number of types for a lemma in spoken languages. *Cheese* and *porridge* had ten sign types each with 19 and 14 schools sampled respectively. The majority of lemmas (60%) had between two and four types.

It is relevant to consider those signs that resulted in only one type being produced. The sign BIRD (see fig. 4.3) is identical across 19 schools; the sign is highly iconic and is similar to the signs used in 22 of the 31 other sign languages on www.spreadthesign.com that have a sign for *bird*.



Figure 4.3 BIRD in SASL

BIRD is one of the few signs with only one type, but it is the only lemma that is identical, not just similar, across 19 schools. Iconicity is likely to be the reason for this as will be discussed when the comparison is made with lexifier languages (see 4.2). Five lemmas for which data were collected from twelve schools were identical across all these schools: *full*, *name*, *person*, *tree*, and *why*. One lemma for which data were collected from 19 schools was identical across 17 schools: *year*. It is not clear why *year* is identical across 17 schools as it does not appear to be highly iconic; *name* and *why* is similarly identical across twelve schools with no apparent iconic motivation. Possibly this is due to being borrowed from one lexifier language. This will be discussed in the next section. *Full*, *person*, and *tree* were identical across twelve schools and here there is certainly a degree of iconicity involved. See Appendix 1 for a complete list of types and tokens.

As can be seen, there is lexical variation in SASL, with an average of 3.9 signs per lemma. In many cases the majority of schools for the deaf use the same sign with a few using different signs, *use* is a good example. There are five sign types for *use* and fourteen schools represented in the data for this lemma; ten schools use the same sign type and the other four are in use at four different schools.

4.2. Comparison to Possible Lexifier Languages

As explained in 3.4.3, the 630 sign types collected were compared to signs from six sign languages and PGSS in order to identify loan signs. Figure 4.4 is a summary of this comparison showing the number of signs that were identical and separately the number of signs that were similar.

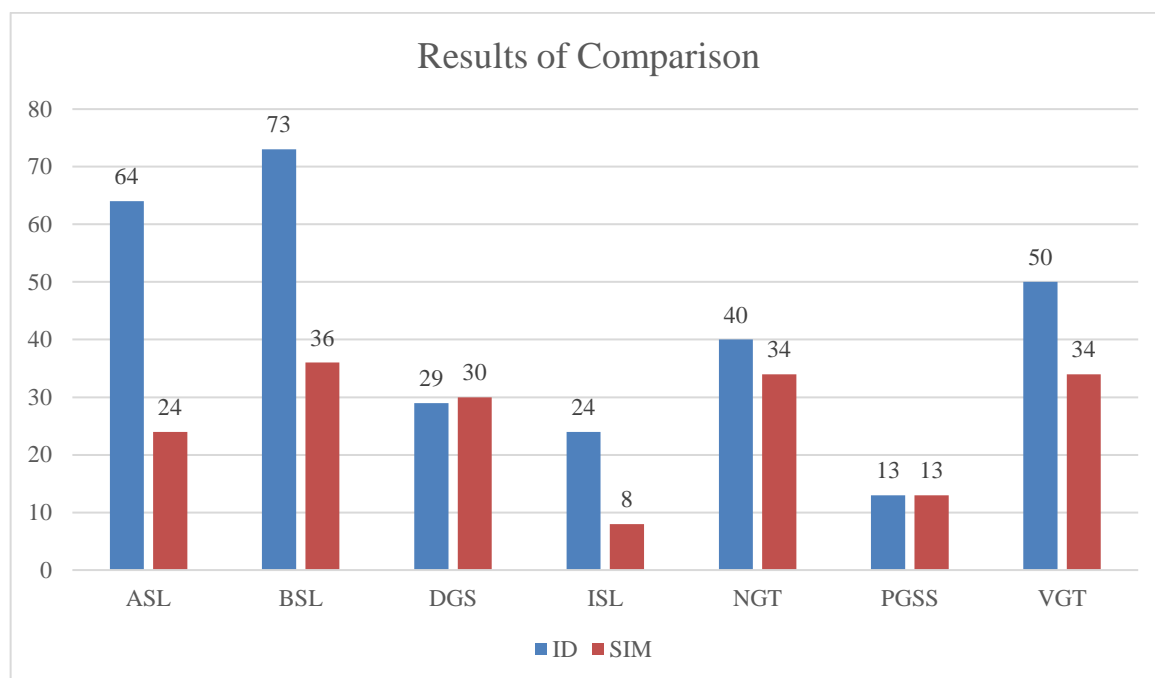


Figure 4.4 Frequency of overlap between SASL sign types and lexifier languages in real numbers

Potential Lexifier Language	Percentage of overlap with SASL types
ASL	14.0
BSL	17.3
DGS	9.4
ISL	11.5
NGT	11.8
PGSS	4.1
VGT	13.7

Table 4.3 Percentage of types that show overlap with SASL including iconic signs. (*calculated based on available lemmas per lexifier language)

The numbers in Figure 4.4 refer to sign types, and not lemmas. The percentages in Table 4.3 are calculated from the total number of types that were used in the comparison, 630, and

not the total number of lemmas, one cannot therefore add the numbers up to arrive at a total percentage of borrowings. VGT and ISL were the only two languages that did not have data for all 173 lemmas (see Table 3.4). In the case of these two languages the percentage was calculated for the number of identical or similar signs for the available data; the calculation for ISL was done with 82 lemmas and VGT with 171 lemmas.

As discussed in section 2.3.4, finding similar or identical signs does not imply that these signs are loans. Nevertheless, Su and Tai (2009) caution researchers not to discard the possibility that identical signs with a high degree of iconicity may indeed have a relationship. Several of the signs are identical or similar in several of the potential lexifier sign languages. This raises the question of the influence of iconicity. The motivation for the sign may be iconic in nature, and thus not be a borrowing. Figure 4.5 shows the number of sign types that are similar or identical to more than one sign language.

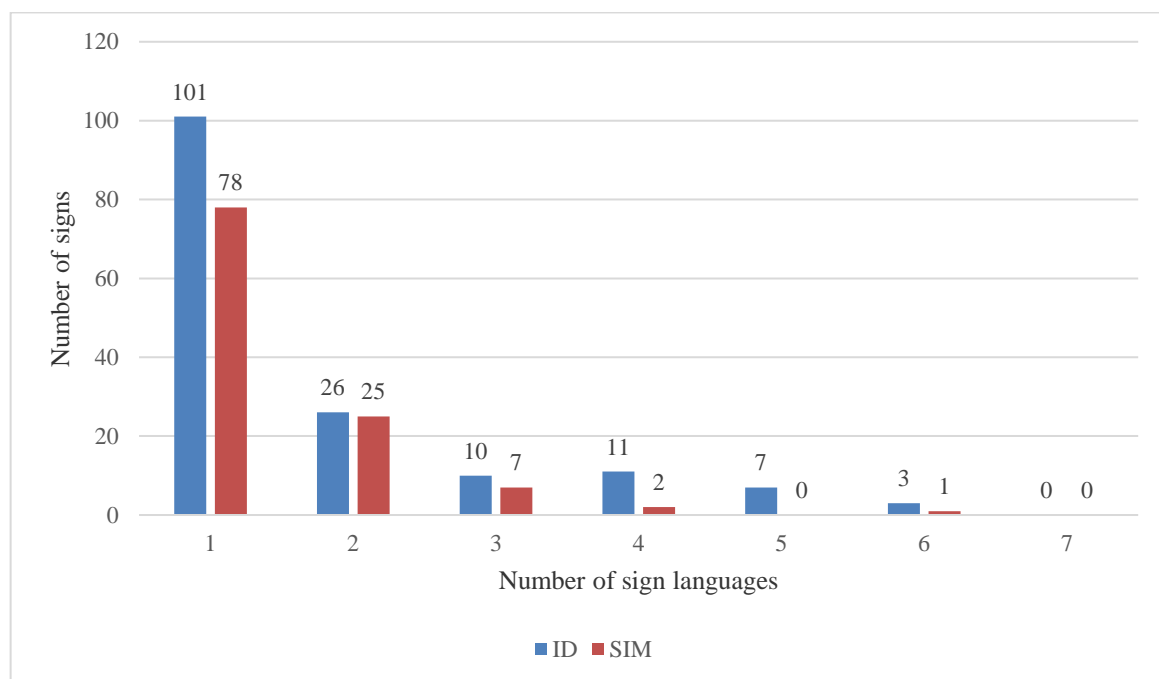


Figure 4.5 – The frequency of ID and SIM signs overlapping with one or more sign language

In Figure 4.5 the number of sign types that were identical (ID) and similar (SIM) is shown in relation to the number of languages. As can be seen, 101 sign types were identical to a sign in only one sign language and 78 sign types were similar to only one sign language. WIFE type 1 (see fig. 4.6), for example, was identical to NGT and different from all the other languages,

and WOOD type 4 was similar to BSL and different to all other languages. SUNDAY type 2 (see fig. 4.7) was similar to two sign languages, DGS and VGT. SUMMER type 1 was identical to two sign languages, ASL and VGT. It is possible that SASL borrowed the sign from ASL which borrowed it from VGT or vice versa; there is insufficient data to make any specific determination. This was therefore categorised as overlap in two lexifier languages. We can see that no sign was either identical or similar to all seven sign languages.



Figure 4.6 WIFE type 1 in SASL (Wrist twists while arm moves forward and inward)



Figure 4.7 SUNDAY type 2 in SASL start position (left) and end position (right)

The results of overlap in terms of percentages is not simple to interpret. For 92 sign types the form was similar or identical to the sign type used in more than one potential lexifier sign

language. This may be attributed to iconic motivation for the signs in these different languages. This would mean that the signs have not been borrowed but have the same form due to iconic aspects.

To determine the extent of iconicity, the signs that are similar or identical to several sign languages were looked up on www.spreadthesign.com. This website contains examples for sign languages in highly diverse locations where it is unlikely that borrowing is the cause of there being similarity. It was therefore decided that, if more than half of the sign languages listed on that website had identical signs and if the author could see iconicity in the sign, the sign was considered to be iconic for this analysis.



Figure 4.8 – *PERSON* (left) and *FISH* (right)

The sign type for *person* for example (see Figure 4.8) has a downward movement making a long thin form resembling the human shape; 20 of the 26 signs on www.spreadthesign.com have the same form. *FISH* has a shape that is thin and vertical, and a movement that mimics the movement of a fish swimming; 17 of the 29 signs on www.spreadthesign.com have the same form. It was therefore decided that these two and ten other sign types could be classed as highly iconic (see Table 4.4).

Lemma	Sign Type
<i>bird</i>	Type 1
<i>elephant</i>	Type 3
<i>fish</i>	Type 1
<i>follow</i>	Type 1
<i>person</i>	Type 1
<i>rain</i>	Type 1
<i>red</i>	Type 1
<i>river</i>	Type 1
<i>see</i>	Type 1
<i>stand</i>	Type 1
<i>think</i>	Type 1
<i>wind</i>	Type 1

Table 4.4 – Lemmas and sign types classed as highly iconic

Each of these lemmas either had no variation, or very minor variation, when compared with multiple other sign languages. For example, ELEPHANT type 3 used the elephant's trunk as motivation for the movement, location, and handshape. *Think* had primarily two different forms, both occurring in the same location, the temple, with the same orientation, but different handshapes and movements. THINK type 1 (see fig. 4.9) had a lesser degree of iconic motivation than ELEPHANT (see fig. 4.10), but with only two different forms among multiple sign languages.



Figure 4.9 THINK type 1 in SASL



Figure 4.10 *ELEPHANT* type 3 start position (left) and end position (right)

A high degree of iconicity means that overlap between a SASL sign type and another sign language cannot be clearly attributed to borrowing. These twelve sign types were therefore removed from the analysis and the percentages recalculated.

Removing these twelve lemmas results in a total of 618 sign types that were compared with potential lexifier languages (Figure 4.11).

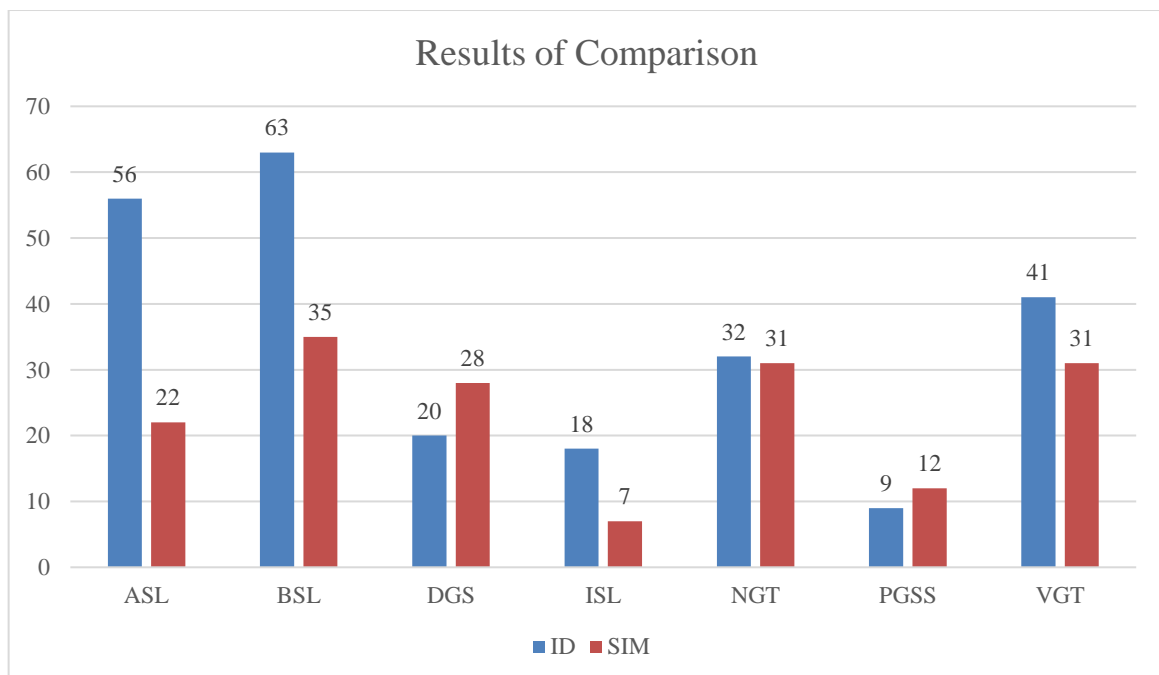


Figure 4.11 Frequency of overlap between SASL sign types and lexifier languages in real numbers excluding iconic sign types

Potential Lexifier Language	Percentage of overlap with SASL types
ASL	12.6%
BSL	15.9%
DGS	7.8%
ISL	9.6%
NGT	10.2%
PGSS	3.4%
VGT	11.7%

*Table 4.5 Percentage of types that show overlap with SASL excluding iconic signs
(*calculated based on total available lemmas per lexifier language)*

The difference in the results prior to removing sign types for iconicity varies between 0.7% and 2.0%. PGSS showed the least difference with a 0.7% reduction in related signs while VGT had the highest difference with a 2.0% reduction in related signs. The other sign languages showed very similar results: ASL (1.4%), BSL (1.4%), DGS (1.6%), ISL (1.9%), and NGT (1.6%). These low numbers bear no relation to the presence of iconicity in the lexicons of any of the sign languages studied. The list of lemmas used for this study was largely based on a list that had attempted to exclude the influence of iconicity (see 3.2).

From the recalculation BSL appears to have had the greatest degree of lexical similarity with SASL at 15.9%, with 63 sign types that were identical and 35 that were similar. ASL is a close second with 56 signs that were identical and 22 signs that were similar. VGT was also a close third with 72 related signs. The least lexical overlap was between SASL and PGSS with 21. The picture could be clouded, however, by the amount of information available on the potential lexifier languages (see 3.4.3). The dictionary data for BSL, for example, includes variation and allows for a lemma with multiple types to be identical to more than one BSL variant; for example, RED type 1 was identical to one variant of BSL and RED type 4 was identical to another variant of BSL.

Lexifier Language	No. lemmas available (max. 173)	No. sign variants available	No. SASL sign types for those lemmas
ASL	173	174	630
BSL	173	397	630
DGS	173	173	630
ISL	82	91	260
NGT	173	286	630
PGSS	173	173	630
VGT	171	549	615

Table 4.6 Available data for lexical comparison

4.3. Distribution of Loan Signs Across Schools Tested

Informants represented 20 schools for the deaf. Table 4.5 shows the percentage of signs from each school that was identical or similar to signs from potential lexifier languages and PGSS. The sign types with high iconic motivation have been removed from the results.

	Bartimean	De la Bat	Efata	Filadelfia	Fulton	Hamnanskraal	Kwathintwa	MC Karbai	Noluthando	Nuwe Hoop	Reuben Birin	Sizwile	St M de Porrse	St Thomas	St Vincent	Thiboloha	Transoranje	VN Naik	Vuleka	Wittebome
ASL	16	12	17	18	13	10	16	16	16	14	13	8.3	15	11	12	15	16	30	19	18
BSL	20	28	27	23	29	22	30	30	32	24	16	10	23	17	29	23	34	27	27	23
DGS	9.2	15	12	11	14	10	11	12	12	14	6.1	7.3	11	7.1	13	9.2	16	8.1	12	11
ISL	3.2	6.6	12	3.2	1	3.1	7.8	14	14	6.7	3.1	4.3	13	3.1	14	3.2	11	18	7.1	9.8
NGT	9.2	19	18	14	14	14	18	16	17	18	8.1	13	15	8.1	19	12	18	16	18	16
PGSS	3.1	2.9	3.4	4.1	1	1	4.1	4.2	4.3	3	5.1	1	4.2	4	4.5	4.1	3.4	4.1	4.1	3
VGT	15	19	20	17	16	18	18	20	20	21	14	20	23	17	19	19	24	17	17	17

Table 4.7 Percentage of overlap with the seven lexifier languages per school (n=20)

The percentages in Table 4.7 were calculated on the basis of the actual number of tokens available from each school (see Table 4.2). Thus, for example, VN Naik was represented in the data by 74 types and 30% of these were identical or similar to ASL signs. This calculation was done to present a more accurate picture of the relationship between the signs used at a specific school for the deaf and the potential lexifier language.

There is clear variation across the schools. Bartimea had a total of 98 signs that were part of the data, 16% of these signs were identical or similar to ASL, contrasting with 30% at VN

Naik, the highest overlap in all schools tested. The second highest ASL influence is 19% at Vuleka. This is a difference of 11% between the highest and second highest and indicates a strong presence of ASL at VN Naik. VN Naik school was established in 1983 by the Irish Dominican Order and an Indian teacher who had been trained at Wittebome was sent there (Aarons and Akach, 1998). The school decided to use the American syllabus “Signing Exact English” as per the oralist tradition of the time (see 1.1 for a brief history).

As can be seen in Table 4.7, there is a pattern of BSL – ASL – VGT in order of influence documented; BSL shows the highest degree of influence followed by ASL and then VGT. However, removing the data from VN Naik changes this order and places VGT overall in the second place after BSL. Only four schools share the pattern of BSL – ASL – VGT with 15 schools having the order of BSL – VGT – ASL.

PGSS had low numbers across the board. PGSS was first introduced in schools for black children (Aarons and Akach, 1998), yet it appears from the data that its use has reduced over the years.

BSL had high numbers across the board with Reuben Birin, Sizwile, and St Thomas the only schools below 20%. Nokwazi (2017) mentions the influence of BSL at St Vincent school for the deaf in the form of a teacher from Britain and St Vincent certainly shows an influence from BSL. Noluthando (32%), MC Karbai (30%), and KwaThintwa (30%) schools for the deaf also showed significant influence from BSL. MC Karbai was, similar to VN Naik, established for the Indian population, yet apparently have not explicitly borrowed from ASL. Noluthando was established in 1986 by the Dutch Reformed Church and KwaThintwa was established by the Roman Catholic Church⁹ in 1981. The author is not aware of any reason for BSL having a notable influence in these three schools, nor in fact in many of the other schools as well.

VGT had the highest influence at Transoranje school for the deaf. Possibly this can be attributed to the Dutch Reformed Church, as similarly high numbers are seen at Nuwe Hoop and Noluthando, also established by the Dutch Reformed Church. However, it would be expected that NGT would have more influence than VGT. It is unclear why there is such a low influence from NGT. The influence of VGT is an enigma.

Sizwile showed the least amount of influence from the potential lexifier languages. Sizwile school for the deaf was established in 1978 by the Flemish Brothers of Charity (Bate, 2017)

⁹ <http://www.catholic-dbn.org.za/kwa-thintwa-school-for-the-deaf/>

and is the only school for the deaf in Soweto. The reason for the low influence from any potential lexifier languages is not known.

Looking at all sign types registered in this study, there are 35.7% that were not influenced by any of the potential lexifier languages investigated. The origin of these signs may indicate the substratum of signs that existed before formal education was introduced, such signing arising through natural processes where deaf people gathered in communities and schools. Some signs may have been influenced by other sign languages that were not investigated as part of this study. However, the majority (64.3%) of sign types revealed an influence from a foreign sign language.

Chapter 5

Discussion

This study investigated the lexicon of SASL to identify possible loan signs from six sign languages and PGSS and to examine the extent of lexical variation in the language. Signs for 173 lemmas were compared with each other and with the seven possible lexifier languages on the basis of their phonological parameters and categorised as identical, all parameters were the same, similar, only one parameter was different, and different, two or more parameters were different. These six lexifier languages and PGSS were chosen because, historically, there is probable cause for an influence to have been exerted on SASL.

The results indicated that most apparent loan signs were from BSL, followed by ASL and thirdly from VGT. The number of loan signs from ASL was considerable in four schools while the majority of the schools showed a higher possible influence from VGT than ASL. Several signs were excluded from the final results due to an uncertainty on their status as loan signs. These signs exhibited a high degree of iconicity and one could therefore not reliably identify them as possible loan signs. The distribution of these loan signs across the schools for the deaf was detailed. The variation in the SASL lexicon was on average 3.9 signs per lemma with the majority of schools using the same sign for each lemma. One can assume that increased access to other SASL variants has had a standardising effect.

In section 5.1 several methodological issues will be noted and elaborated upon. Secondly, the variation that was found in SASL will be discussed under section 5.2, which will be followed by a discussion of the historical background that possibly provided the context for signs to be borrowed in section 5.3.

5.1. Methodological Considerations

This study followed common practices in lexicostatistical research (see 2.3). Despite this, several considerations arose during the methodological process. The first of these concerns the four phonological parameters used in the analysis and comparison. There is an assumption made that all four parameters have the same weight. Two signs that differed in handshape were considered to be as different as two signs that differed in orientation. It is the author's view that handshape is semantically significant to a larger degree than orientation is. Future studies on semantic significance would shed light on possible different weights that should be assigned to the different phonological parameters (see Montefinese, Ambrosini, Fairfield and Mammarella, 2014).

The multiple dimensions of the phonological parameters presented a further concern. The orientation parameter consists of more than the orientation of the palm and includes the orientation of the fingers. To complicate matters further, orientation should be considered in relation to the location of the sign. These three factors need to somehow be condensed into one and compared with another sign; comparing each individual aspect of the orientation parameter with another sign would yield a much higher degree of difference.

The incomplete nature of the data was a concern; incomplete in the sense that the 173 lemmas did not have complete data from the 20 schools for the deaf (see 3.2). The methodological processes would have been simplified and the results more representative had data for all lemmas been available for all 20 schools.

The Swadesh list of lemmas as modified by Woodward is highly pervasive in the literature and aims to remove iconicity as a factor when comparing languages. This study found twelve signs that were highly iconic (see Table 4.4) and proposes that these twelve lemmas be removed from the list. Studies that compare lexemes on the basis of phonological features and that only make use of the modified Swadesh list may possibly identify false cognates or loans. These lemmas had forms that were identical or similar across many unrelated sign languages; one could not attribute similarity to loans or historical roots merely on the basis of phonological comparison. However, multiple studies included additional words (see 2.3) reasoning that a comparison of lexicons should involve more than merely 100 lemmas. In instances where thousands of lemmas are used, the margin of error may be less to an extent where it is negligible, however this study advocates for accurate conclusions which necessarily involves the role of iconicity.

The elicitation of the data presented several challenges. The flash cards consisted of English words and a corresponding image; however, the image and the word could be confused, e.g. KNIFE was elicited instead of SHARP. The image did not serve the intended purpose of supporting the printed word and complicated the elicitation process. A secondary aim of the image was to make up for the lower literacy of several informants, but this was not very successful. Informants often looked at the picture and only at the picture, disregarding the printed word. It is proposed that flashcards with lemmas still be used but be oriented more towards record-keeping purposes; to show to the camera. In a Deaf community where sign language variants are ample, a Deaf facilitator could show their sign for the lemma and then ask the informant what sign was used at their school. The author's experience has been that the majority of informants were very clear on the sign used at their school.

5.2. Reflections on Variation

The lexical variation in SASL can to a certain extent be explained by the history of deaf education in South Africa (section 1.1). The expectation is that schools that were established by the same organisation would exhibit a greater degree of lexical similarity; however, this was not the case. Nine of the schools were established by the Dutch Reformed Church and, as far as the author is aware, provided funds and perhaps infrastructure, but no clear guidance on pedagogy. In contrast to this, the Dominican orders provided funds and infrastructure, but also staff. Each of the Dominican schools had nuns from the order working at the school. One cannot by virtue of the lexical evidence pinpoint the country of the organisation that established the school; VN Naik shows a large influence from ASL but was established by an Indian nun who was trained at Wittebome.

It is the author's view that the past 25 years have done much to allow for natural standardisation to occur (see section 2.1). Once schools were allowed to mix with other schools, there was exposure to other signs and the language communities could naturally appropriate some signs while discarding others. A second influence is certainly the internet and social media platforms; this has increased exposure to other SASL varieties. Finally, Deaf people have risen to prominence in various political structures over the last 25 years, and whenever they attend meetings, they promote a certain variety of SASL. This variety then tends to be used by DeafSA and at national workshops and conferences. This is likely the result of individual Deaf people's signing variety and not a conscious decision. The influence of PGSS seems to largely be disappearing from SASL (Aarons and Akach, 1998).

The sign PIG is an example of a natural standardisation occurring within SASL. Of the twelve schools from which signs were elicited, eleven used the same sign; only one used a different sign. This pattern can be seen in multiple signs: FORGET, DAY, HOW, WHY, BELIEVE, and BROTHER amongst others. CHILDREN had a more even spread between the two types observed with twelve schools using one variant and seven schools using another. MONDAY had three types with 17 schools using the same variant. It seems a reasonable assumption that some manner of natural standardisation is occurring.

Further research on the specific history of each school would yield useful results. De la Bat school for the deaf was one of the schools where SASL was forbidden, yet several teachers disregarded the rule and signed with and to the learners when the stricter teachers were elsewhere. It is possible that several teachers invented signs, borrowed from other sign languages, or borrowed from other schools; the sign LUNCH may be an example of this, as given in Figure 5.1.



Figure 5.1 LUNCH

This sign can be seen at Transoranje school for the deaf, but does not mean *lunch*, it means *bread*. There is a clear link between the two lemmas and raises the possibility that a teacher or learner saw the sign and borrowed it but confused the meaning. Nuwe Hoop school for the deaf did the same and borrowed the sign, but not the meaning; the sign means *cheese* at Nuwe Hoop school for the deaf.

The signs used at Wittebome school for the deaf are different to every other school for several lemmas; all schools have the same sign for *who*, *what*, and *when* except Wittebome. It is not known why this is the case. It is likely that these signs will naturally disappear from the Wittebome SASL variety because the broader deaf community uses different signs and because the SASL subject materials use different signs. VN Naik is also an outlier with a strong presence of ASL.

5.3. Historical Influences

The influence of the lexicons from the potential lexifier languages can clearly be seen in SASL. When viewed according to glottochronological categories, which provide guidance on the divergence of languages from a common source, none are significant and this indicates that SASL is a different language from these languages, not even from the same language family. The rate of cognates or similarity can indicate the relationship between languages as discussed

in section 2.2 (Gudschinsky, 1958; Crowley, 1992): two languages are dialects of the same language if the similarity is above 81%, different languages belonging to the same language family if the similarity is between 36% and 80%, and totally unrelated languages if the similarity is below 36%. From these norms it is clear that SASL is a completely different language compared to the six sign languages. It is prudent at this stage to again state that this study did not investigate cognate rates, but rather lexical similarity based on phonological features.

BSL showed the highest presence in the SASL lexicon. Britain had a strong presence in South Africa in the 19th and early 20th centuries. It is not known exactly how the interactions occurred that allowed for the BSL lexicon to be integrated into SASL. One possibility is the staff at schools that were established by the Dominican orders because the staff were from Ireland. Perhaps there was less of a difference between ISL and BSL in the 19th century than there is today, however there is no evidence for this. The most likely explanation is that Britain's presence in the South African government also extended to the education of deaf children.

VGT showed a strong presence that cannot clearly be explained. The large variation included in the VGT dictionary cannot solely be the reason for the relatively high presence of VGT in SASL. There is only one school for the deaf that was established by a Flemish organisation, Sizwile school for the deaf, which is apparent when looking at the results. The Dutch Reformed Church possibly has some roots in Belgium; this may contribute to the explanation.

ASL has a very strong influence on the SASL variety used at VN Naik school for the deaf. Today, ASL is the most prominent sign language in the world; this is evident when looking at International Sign and the large number of signs from ASL. ASL has vast resources, from texts on grammar and phonology to pedagogical resources. This likely explains to some extent its presence in other schools for the deaf. In recent times there may be an increased influence due to the Deaf South African Member of Parliament using SASL with a clear ASL influence.

The Dutch Reformed Church established the vast majority of schools for the deaf in South Africa and a much higher degree of influence from NGT was therefore expected. The lower than expected numbers leads one to assume that the lack of staff from The Netherlands to run the schools for the deaf and the British presence in South African government explains this result.

The involvement of Irish nuns in the running of several schools for the deaf probably explains the influence seen from ISL. DGS is not very prominent, but this was expected due to

the small number of schools established by the German Dominican Order and the strong oralist tradition in Germany.

There are sign types that did not show an influence from any of the sign languages investigated (see 4.3). There are several possible explanations for this. These may be signs that evolved from natural contact between deaf people; at schools or in communities. It is also a possibility that school faculty and staff invented signs that were adopted by the users. There may also be other sign languages to which SASL users were exposed. A study into possible cognates may yield more insight as a relationship may be discovered if one considers historical signs. Phonological differences do not exclude the possibility of a relationship existing between two lexical items (see Parkhurst and Parkhurst, 2003).

5.4. Conclusion

SASL exhibits clear influence from other sign languages. The extent of this influence, however, is not high enough to warrant discussion on whether SASL is a dialect of BSL or ASL; the influence is not nearly large enough. There is also extensive lexical variation within SASL. However, this does not detract from the status that SASL holds as a language; on the contrary it reinforces SASL as a natural language. Natural languages change when coming into regular contact with other languages. This is a clear sign that SASL is a living language; adapting to the needs of its users.

BSL and VGT have shown the largest influence among the schools for the deaf while ASL has a large influence at four schools for the deaf. The current trend in SASL users appears to be the rejection of other sign language influences; Nokwazi (2017) made specific mention of excluding initialised and so-called English signs. These signs are part and parcel of SASL and exhibit a high degree of use.

The impact of SASL as a school subject is likely to be significant. Learners will be exposed to a specific lexical variant of a lemma through twelve years of school though the materials developed centrally. The effect this will have on variation in SASL should certainly be measured in future research. A future study could compare results with the present study's results on lexical variation in SASL to ascertain if there has been a shift in dominant sign types. It is the author's view that SASL teachers and assistants need to be made aware of the lexical variation of SASL and, critically, that it does not detract from SASL as a language but enriches it.

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APPENDIX 1

Lemma	no. of tokens	No. of types	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6		Type 7		Type 8		Type 9		Type 10		Type 11			
			same	sim	same	sim	same	sim	same	sim	same	sim	same	sim	same	sim	same	sim	same	sim	same	sim	same	sim		
All	12	3	5	0	6	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
Animal	12	5	1	0	7	1	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
Answer	14	7	3	1	3	0	1	1	1	0	1	0	2	0	1	0	-	-	-	-	-	-	-	-	14 MATCH	MATCH
Apple	19	3	6	0	11	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
Ask	19	6	6	0	1	0	6	0	1	0	4	0	1	0	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
Aunt	14	1	7	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
Autumn	8	6	3	0	1	0	1	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	8 MATCH	MATCH
Bad	12	3	7	3	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
Because	12	4	9	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
believe	19	2	15	3	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
bird	19	1	19	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
Black	14	1	5	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
Blood	12	1	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
Blue	19	6	6	3	1	0	2	1	2	2	1	0	1	0	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
Borrow	14	8	2	0	2	0	2	2	1	0	1	1	0	1	0	1	0	-	-	-	-	-	-	-	14 MATCH	MATCH
boss	14	6	6	2	1	0	1	0	1	0	2	0	1	0	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
bread	19	3	11	3	1	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
breakfast	14	7	1	0	8	0	1	0	1	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	14 MATCH	MATCH
bring	14	5	5	1	1	1	1	0	1	1	3	0	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
brother	14	2	11	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
brown	14	4	7	1	1	2	2	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
butter	18	4	2	1	6	7	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18 MATCH	MATCH
buy	14	2	6	5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
cat	14	1	10	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
cheese	19	10	1	0	1	0	3	2	3	1	1	0	3	0	1	0	1	0	1	0	1	0	-	-	19 MATCH	MATCH
chicken	14	4	1	0	2	0	7	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
children	19	2	12	0	7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
count	12	4	7	0	3	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
cow	14	2	12	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
daughter	13	3	3	0	6	3	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13 MATCH	MATCH
day	14	2	1	0	11	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
decide	16	7	2	0	4	0	5	1	1	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	16 MATCH	MATCH
die	11	4	5	1	3	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11 MATCH	MATCH
dinner	13	6	2	1	2	1	2	0	1	0	3	0	1	0	-	-	-	-	-	-	-	-	-	-	13 MATCH	MATCH
dirty	12	4	3	5	1	0	1	0	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
dog	19	8	1	0	1	0	1	0	2	0	5	3	3	0	1	0	2	0	-	-	-	-	-	-	19 MATCH	MATCH
dry	12	3	7	0	2	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
dull (boring)	12	4	5	0	1	0	5	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
dust	11	4	2	1	3	0	3	0	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11 MATCH	MATCH
earth	12	3	7	3	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
egg	12	4	6	3	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
elephant	14	4	2	1	2	0	5	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
father	19	3	7	0	9	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH
feather	10	4	4	1	3	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 MATCH	MATCH
find	13	5	2	2	3	0	1	2	1	0	1	1	-	-	-	-	-	-	-	-	-	-	-	-	13 MATCH	MATCH
finish	14	4	5	5	1	0	2	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14 MATCH	MATCH
fire	12	2	10	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12 MATCH	MATCH
fish	19	3	8	8	2	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19 MATCH	MATCH

parents	18	6	3	2	2	1	1	0	2	4	1	1	1	0	-	-	-	-	-	-	-	-	-	-	18	MATCH	MATCH
person	12	1	12	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
pig	12	2	11	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
pizza	14	4	7	0	4	0	2	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
play	19	7	7	0	2	1	1	0	5	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	19	MATCH	MATCH
porridge	14	10	1	2	1	0	1	0	1	0	1	0	1	2	1	0	1	0	1	0	1	0	1	0	14	MATCH	MATCH
potato	19	7	3	9	1	0	1	0	2	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	19	MATCH	MATCH
promise	18	8	2	6	1	0	1	0	2	0	2	1	1	0	1	0	1	0	-	-	-	-	-	-	18	MATCH	MATCH
purple	14	11	1	1	1	0	1	0	1	0	2	1	1	0	1	0	1	0	1	0	1	0	1	0	14	MATCH	MATCH
rain	19	1	12	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	MATCH	MATCH
red	19	5	1	7	2	1	3	3	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	19	MATCH	MATCH
remember	14	2	1	0	11	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
rice	14	6	1	1	1	1	1	0	4	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
right (correct)	12	2	9	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
river	12	1	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
rope	10	4	2	0	3	0	1	1	3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	MATCH	MATCH
safe	12	4	8	0	2	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
salad	12	3	6	3	1	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
salt	12	7	1	0	3	0	2	0	1	0	1	0	3	0	1	0	-	-	-	-	-	-	-	-	12	MATCH	MATCH
school	12	2	11	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
sea	12	3	2	0	7	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
search (look for)	10	2	4	0	6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	MATCH	MATCH
see	14	2	7	5	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
sell	14	3	4	1	2	4	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
sharp	10	5	3	2	2	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	10	MATCH	MATCH
short	12	3	5	5	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
sing	12	3	1	0	6	1	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
sister	14	3	9	2	2	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
sit	19	4	12	1	1	0	4	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	MATCH	MATCH
smooth	9	2	2	0	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	MATCH	MATCH
snake	19	4	6	0	10	0	2	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	MATCH	MATCH
son	13	4	4	2	3	0	1	0	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	MATCH	MATCH
stand	14	1	13	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
star	12	2	7	4	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
start	19	7	10	3	1	0	1	0	1	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	19	MATCH	MATCH
stone	12	5	4	0	5	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
summer	12	3	4	6	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
Sunday	19	3	8	7	3	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	MATCH	MATCH
tail	11	1	8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	MATCH	MATCH
tell	14	5	1	0	6	0	2	2	1	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
test	12	5	1	0	2	0	4	3	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
thin	11	4	2	3	1	2	1	0	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	MATCH	MATCH
think	14	2	10	2	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
travel	13	2	10	0	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	MATCH	MATCH
tree	12	1	12	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
true	12	2	8	2	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	MATCH	MATCH
try	20	7	7	4	2	0	1	2	1	0	1	0	1	0	1	0	-	-	-	-	-	-	-	-	20	MATCH	MATCH
uncle	14	2	2	0	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
understand	14	2	11	2	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH
use	14	5	1	0	9	1	1	0	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	14	MATCH	MATCH

Follow1		ICONIC						x	x		x	x	x	x			x	x	x	x	x			x	x
Forget1		SIM			SIM	SIM	SIM		x		x	x	x	x			x	x			x			x	x
Forget2																									
Full1		ID							x	x			x	x	x	x			x		x		x	x	x
Good1		ID			ID	ID	ID		x	x			x	x	x	x			x		x		x		x
Good2	ID																							x	
Grandfather1																									
Grandfather2																									
Grandfather3																									
Grandfather4																									
Grandfather5	ID																							x	
Grandmother1																									
Grandmother2																									
Grandmother3																									
Grandmother4																									
Grandmother5	ID																							x	
Grease (oil)1		ID	SIM										x	x											
Grease (oil)2	ID														x										x
Grease (oil)3																									
Grease (oil)4																									
Grease (oil)5																									
Grease (oil)6																									
Green1																									
Green2																									
Green3		ID																							x
Green4																									
Green5																									
Happen1																									
Happen2		ID							x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Happen3																									
Happen4																									
Heavy1	ID	ID		ID	ID	SIM	ID			x			x	x	x				x		x			x	x

