Issues in the analysis of polycomponential verbs in Australian Sign Language (Auslan)

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Abstract

This dissertation examines problems in the current analysis of polycomponential verbs of motion and location in signed languages, with a focus on Australian Sign Language. Prior to the seminal work of Stokoe (1960), the signed languages of deaf communities were often considered by linguists to be gestural, and thus non-linguistic, forms of communication. Since 1960, however, attempts have increasingly been made to describe all aspects of the visual-gestural communication of signed languages as part of a linguistic system. Researchers since the late 1970s have endeavored to show that polycomponential verbs are polysynthetic, multimorphemic classifier constructions. Evidence will be presented in this dissertation that calls this claim into question.

One part of this evidence comes from a detailed critique of the current analysis of polycomponential verbs as multimorphemic constructions. A second part of the evidence for this counterclaim comes from a comparison of classifier systems in signed and spoken languages. Additional support comes from a detailed analysis of data collected from deaf signers of Australian Sign Language and Taiwanese Sign Language using stimulus material originally developed for American Sign Language. This comparison illustrates important cross-linguistic differences in the use of handshape morphemes to represent referents in these signs. Uses of space and some features of movement in these signs appear, however, to be highly similar in these three unrelated signed languages. Moreover, the data from these three signed languages is compared to gesture data collected from a group of hearing adult non-signers using the same stimulus material. This comparison highlights points of similarity in the responses from signers and gesturers, and suggests that many of the spatial and movement features of polycomponential verbs in signed languages appear to be transparently related to their meanings, rendering problematic attempts to analyze them as morphemes in the traditional sense This evidence lends some support for the claim that polycomponential verbs of motion and location in signed languages represent combinations of linguistic and gestural components and are an important area in which signed languages differ from spoken languages.

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This dissertation reproduces a number of illustrations from the following theses and publications (all of which are listed fully in the references): Figures 2.9 WAIT-LONG-TIME, 2.1, and 4.1 are from Baker-Shenk and Cokely (1980); Table 2.3 SISTER, Figures 2.9 HAVE and CHECK, 2.12, 3.9 OBJECT-TO, THANK, ASK and KNOW, and Appendix B are from Brennan, Colville, Lawson and Hughes (1984); the illustration in Table 3.1 is from Brentari (1995); the signs COLLEGE, INTERPRET, COURSE, THEORY, INTERVIEW, ORGANIZATION and CULTURE in Table A.5 are from Costello (1994); Figures 2.7, 2.9 REBEL, Table 2.4, Figures 4.2, 4.4 SIT, Table A.5 and Table A.6 are from Johnston (1998); Figure 2.6 MORNING is from Kennedy, Arnold, Dugdale & Moskovitz (1998); Figure 2.14 is from Liddell and Johnson (1989); Figure 3.26 is from Liddell (1980); Figures 3.9 MOVE, 3.14 and 4.5 are from Liddell (1990); Figures 3.12 and 3.13 are from Liddell (2000b); Figures 2.3, 2.4, 2.9 SIGN, 2.11, 3.1 (b), 3.2, 3.3, 3.12, 3.27 and 4.4 PERSON-PASS-BY are from Moody (1983); Figures 3.1 (a), 3.1 (c), 3.1 (d), 3.4, 3.7, 3.8, 3.9 CHOOSE, 3.10, 3.11, 3.23, 3.25, and 3.28 are from Padden, Humphries & O'Rourke (1980); Figures

2.6 PARENTS and 2.9 BABY are from Smith (1996); Figures 3.24 and 4.3 are from Stewart and Luetke-Stahlman (1998); Figures 3.5 and 3.16 are from Supalla (1982); Figures 3.15, 3.17, 3.18, 3.19, 3.20, 3.21 and 3.22 from Supalla (1986); Figure 3.6 is from Supalla (1990); and lastly, Figures 2.1, 2.2 and 3.14 are reproduced from Valli and Lucas (1995). Handshape illustrations in Chapters 3 and 5 are from Prillwitz et al. (1989).

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Chapter 1
Introduction

1.1 Introduction

This dissertation examines problems in the current analysis of polycomponential verbs of motion and location in signed languages, with a focus on Australian Sign Language (the signed language used in the Australian deaf community, henceforth referred to as *Auslan*). Following Slobin et al. (2000), I prefer to use the term *polycomponential verb* to refer to this category of signs rather than alternatives such as *classifier predicate* or *polymorphemic verb*. This term is used because the claim that these forms include classifier morphemes is open to question, and the analysis of the components in these signs as multimorphemic constructions is also problematic (Cogill, 1999), as will become apparent in this dissertation[1].

Prior to the seminal work of Stokoe (1960), the signed languages of deaf communities were often considered by linguists to be gestural, and thus non-linguistic, forms of communication (see, for example, Bloomfield, 1933). In the last four decades of the twentieth century, however, attempts have increasingly been made to describe all aspects of the visual-gestural communication of signed languages as part of a linguistic system. Initially investigators suggested that the class of polycomponential verbs of motion and location in signed languages had more in common with holistic and analogue uses of gesture than with the words of spoken languages (Klima & Bellugi, 1979). Researchers since the late 1970s have, however, endeavored to show that these signs are polysynthetic, multimorphemic constructions, similar to complex lexical items found in some spoken languages (Engberg-Pedersen, 1993; Supalla, 1982). As a result, it has been claimed by some that the structure of signed languages, despite the differences in modality, does not differ in any significant way from spoken languages (Newport & Supalla, 2000). Evidence will be presented in this dissertation, however, that begins to call this claim into question.

One part of this evidence comes from a detailed critique of the current analysis of polycomponential verbs as multimorphemic constructions. This is presented in the next two chapters. A second part of the evidence for this counterclaim is presented in Chapter 5. This chapter of the dissertation includes an analysis of data collected from adult deaf signers of Auslan and Taiwanese Sign Language (the signed language used in Taiwan) using stimulus material originally developed for American Sign Language (the signed language used in the deaf communities of the United States of America and by the majority of deaf people in English-speaking parts of

Canada, known as *ASL*)[2]. This comparison illustrates important cross-linguistic differences in the use of handshape morphemes to represent referents in these signs. Uses of space and some features of movement in these signs appear, however, to be highly similar in these three unrelated signed languages. Moreover, the data from Auslan and Taiwanese Sign Language is compared to data collected from a group of hearing adult non-signers using the same stimulus material. This comparison highlights points of similarity across the responses from all three groups, and suggests that many of the spatial and movement features of polycomponential verbs in signed languages appear to be transparently related to their meanings, rendering problematic attempts to analyze them as morphemes in the traditional sense (Cogill, 1999).

This evidence lends some support to the claim that polycomponential verbs of motion and location in signed languages may represent combinations of linguistic and gestural components and are an important area in which signed languages differ from spoken languages. Although it has long been recognized that spoken language discourse involves more than lexis and grammar (the physical environment of any exchange, vocal qualities such as pitch and loudness, body posture, facial expression and manual gestures are all significant and meaningful), this analysis suggests that the blending of linguistic and gestural elements in the formation of individual signs is a unique characteristic of signed languages.

In this dissertation, when I use the terms *language* or *linguistic* and differentiate these from *gesture, gestural* or *paralinguistic*, I am drawing on definitions of language and gesture provided in McNeill (1992). Language systems are seen as having all the properties listed in Table 1.1 below, and gesture as having some, but not all of the same properties. Like McNeill (1992, 2000) and his colleagues, however, I see gesture (although it may not have all the same properties defined here as linguistic) not as a mere embellishment to language but as integral to language (in the broader sense) itself.

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[1] For a detailed discussion of terminological issues related to this area, refer to Chapter 3.

[2] Primarily due to work by North American Christian missionaries and American trained educators of deaf children, varieties of signed languages related to ASL have also spread to parts of Africa and Asia.

Table 1.1

segmentation	symbols are broken down into a limited number of meaningless segments
compositionality	symbols are constructed by combining segments
lexicon	symbols or symbol segments recur in the same form in different contexts
morphosyntax	combinations of symbols and symbol segments adhere to standard patterns
paradigmatic oppositions	symbol segments are organised into contrasting sets
distinctiveness	details are added to the form of symbols solely to distinguish them from other symbols
arbitrariness	symbols are used to refer to entities and events in contexts in which their iconicity is ruled out
standards of form	symbols, symbol segments and combination of symbols are held to standards of form
a community of users and a tradition of use	a community exists that understands the symbols and symbol combinations and this community spands several generations

1.2 Aims of this study

Thus, as described above, the primary aim of this dissertation is to re-examine current analyses of polycomponential verbs in signed languages and to provide some evidence for an alternative analysis that recognizes these constructions as partly linguistic and partly gestural in nature.

As well as this primary aim, this dissertation has a number of additional aims. First, this study intends to provide an initial description of the use of polycomponential verbs of motion and location in Auslan. These forms appear to play a central role in the derivational morphology of the language, yet have been the focus of relatively little research until now (Schembri, 1996). In particular, the dissertation will discuss in detail the results from an empirical investigation into the use of polycomponential verbs of motion and location by a group of 25 deaf native signers of Auslan living in two major regions of Australia.

Second, the study hopes to contribute to the study of signed languages in general. As explained above, comparisons between the results of the present research on Auslan and similar studies reported for other signed languages will be made. This is particularly true of comparisons with ASL and Taiwanese Sign Language, as the elicitation materials used in the investigation mentioned above are adapted from identical materials used in ASL research, and have also been used in research on deaf signers of Taiwanese Sign Language. This provides an excellent opportunity for detailed cross-linguistic comparison, and adds to our knowledge of signed languages in general.

Third, as mentioned above, the dissertation aims to re-examine our understanding of classifier morphemes and polycomponential constructions in signed languages. In Chapter 4, the notion that the handshape morpheme in these verb forms acts as a classifier is re-examined. The classifier analysis has gained widespread acceptance in the signed language literature, but recent crosslinguistic work on classifiers in spoken language has provided sign linguists with an opportunity to re-think some of their assumptions about the role of the handshape morpheme in these constructions.

1.3 Background and methodology

The motivation for this thesis comes from my own observations over a number of years of signing and non-signers' gesture in naturalistic contexts, analysis of teaching materials produced for students of Auslan and for trainee signed language interpreters, and discussions with native signer informants.

The main focus of this thesis, however, is on elicited data, collected using the *Verbs of motion production test* (VMP). The VMP test forms part of an Auslan adaptation of the *Test battery for American Sign Language morphology and syntax* (Supalla, Newport, Singleton, Supalla, Metlay, & Coulter, in press) which has been used to elicit data on other key aspects of Auslan grammar (Schembri, Wigglesworth, Johnston, Adam, Leigh & Barker, in press). The VMP consists of a videotape containing 85 filmed sequences in which dolls, toy animals and other objects move around. The video stimuli was shown to 25 deaf native signers, and their signed responses were filmed by a deaf co-researcher. The responses were then coded and analyzed by myself. To ensure reliability, a subset of the responses were re-coded working closely with a deaf assistant who is a native signer of Auslan. A further 12% of all responses were independently coded by a hearing native signer.

This Auslan data was then compared with data collected using the VMP task from four signers of Taiwanese Sign Language, a signed language completely unrelated to the signed language of the Australian deaf community. This made possible some detailed cross-linguistic comparison.

An investigation was also conducted into the representation of moving referents in hearing non-signers' gesture. The VMP task was used with a group of ten hearing people with no knowledge of any signed language who were asked to represent the motion events shown in the videotape in gestural form. This data enabled some comparison between the two unrelated signed languages and gesture.

A complete description of the VMP task, methodology, participants and the results of the study is given in more detail in Chapter 5.

1.4 Signed language research in Australia

In order to contextualize this study, some background about signed language research in Australia is presented in this section. Background information about Auslan and signed language use in the Australian deaf community can be found in Appendix A.

In the 1980s, the Australian federal government recognized the importance of Auslan as the primary or preferred language of the deaf community in numerous national policy documents on language and literacy (Lo Bianco, 1987). Since that time, the use of Auslan in deaf education, the provision of interpreting services, and the teaching of Auslan as a second language has expanded enormously. Auslan courses are now provided in at least two universities (La Trobe University in Victoria and the University of Newcastle in New South Wales) and in colleges of technical and further education in every state, as well as at community colleges and the various state deaf societies. This has resulted in many new employment opportunities for deaf people and given many thousands of hearing people across the country access to the language of the deaf community for the first time. In the last fifteen years, the establishment of bilingual education programs has seen Auslan become the language of instruction in preschools and primary classrooms in several states around the country (Komesaroff, 2000). The last decade has also seen the introduction of Auslan interpreter training programs in many major cities, just as the demand for signed language interpreting services in a range of new environments has grown quite dramatically (Ozolins & Bridge, 1999). A degree course for those wishing to become teachers of Auslan is also available at La Trobe University, with a nationally accredited Certificate in Auslan Teaching currently offered by the Deaf Education Network (a non-government community college) in New South Wales.

Research into Auslan has not, however, kept pace with these developments. As explained in 1.5 below, there remains a dearth of trained linguists, both deaf and hearing, working in signed language research in Australia. A number of national curricula and several packages of course materials have been designed for Auslan teaching, and introductory courses on sign linguistics have begun to be included in Auslan teacher training programs (Schembri, 1997a). The lack of trained sign linguists, however, has meant that relatively little research has been conducted into the language itself. In particular, the grammar of the language has received little research attention (Schembri et al., in press). This partly reflects the fact that, compared to some countries in North

America and Europe, signed language research began relatively late in Australia. It was only in 1987 that the first curriculum for Auslan teaching and a sketch grammar of the language were produced (Johnston, 1987), with the first doctoral dissertation following two years later (Johnston, 1989). Johnston's dissertation provided an overview of the grammatical structure of the language, and showed that it shared many of the same general morphosyntactic characteristics as other signed languages, such as ASL and British Sign Language (*BSL,* the signed language used by deaf people in England, Scotland, Wales and Northern Ireland) (Johnston, 1989). The second volume was the first dictionary of Auslan based on linguistic principles, with over 3,000 entries. The dictionary was published soon after and remained the only available reference book on Auslan in classrooms across the country for almost a decade.

Johnston went on to publish a number of papers on diverse topics in sign linguistics, including a discussion of transcription conventions used in signed language research (Johnston, 1991a), a proposed classification of verb signs in Auslan (Johnston, 1991b), an application of Systemic Functional Grammar to aspects of its structure and use (Johnston, 1996a), and work re-examining the inter-relationship between signed languages and the spoken languages of the surrounding community (Johnston, 1991c; 1997). His research of late has mostly focussed on issues related to signed language lexicography (Johnston & Schembri, 1996, 1999; Johnston, Adam, & Schembri, 1997) and recording the lexicon of Auslan by producing a second edition of the dictionary of Auslan in both book form and on CD-ROM (Johnston, 1998).

Other than Johnston's work, very little descriptive work has occurred in the decade following the publication of his thesis. Drawing on the work of BSL researchers, my own previously published work (Schembri, 1996) has provided an overview of sign formation processes in Auslan. I have also carried out initial research on prosodic constraints (1997b), polycomponential verbs (1995, 1998), and have began the investigation of specific morphological processes in Auslan, such as the derivation of noun-verb pairs (Schembri et al., 2000). A preliminary description of name signs in Auslan has also been produced (McKee, McKee, Schembri & Adam, 1999).

A team of researchers from the National Institute of Deaf Studies (henceforth *NIDS*) at La Trobe University has published work on the history and use of fingerspelling in Auslan (Branson, Toms, Bernal, & Miller, 1995). The main focus of this work was, however, a description of the historical development of manual alphabets, rather than on use of the manual alphabet in the present-day Australian deaf community. Since that time, the two leading NIDS researchers have concentrated their research attention on *kata kolok*, an indigenous signed language in northern Bali (Branson, Miller, Marsaja, & Negara, 1996; Branson & Miller, 1998, Branson, Miller

& Marsaja, 1999), whilst other members of the NIDS team have pursued interests in comparative lexicology (Toms-Bernal, 1997), Auslan teacher training (Pardo, 1998) and signed language teaching (Bernal, 1997). The only other descriptive work produced by NIDS has been a conference poster on role shift in Auslan and its relationship to different discourse forms (Toms & Hutchison, 1998).

My current work has also been greatly influenced by a recent paper on polycomponential verbs by Cogill (1999), part of a dissertation in progress at the University of New England. Other research on the language of the Australian deaf community has, however, concentrated on issues related to its use and acquisition. An ethnolinguistic study of the deaf community suggested that it was comparable to other linguistic minority groups in Australia (Ruthven, 1988). The role of fingerspelling in the Australian deaf community has been sketched by Annabell (1998). Hyde and Power (1991) conducted a demographic study into the use of Auslan in the deaf community (the figures from this study are cited in Appendix A), while Page (1998) has undertaken initial work on signed language contact varieties in the Australian context. The acquisition of Auslan as a first language by deaf and hearing children has been the focus of some research at the Queensland University of Technology (Mohay, Milton, Hindmarsh & Ganley, 1998), Australian National University (Littleton, 2000), and the University of Sydney (de Beuzeville, 1994), whilst research into the factors which influence its acquisition as a second language has begun (Jeavons, 1998). The use of signed communication in the classroom has been investigated (Leigh, 1995); reports on educational services for deaf migrants (Cresdee, 1997) and issues in educational settings for signing deaf students have been produced (Bremner & Housden, 1996); and a number of research projects looking at signed language interpreting in the Australian context have been initiated towards the end of the 1990s (Napier, 2001; Napier & Adam, 1998; Ozolins & Bridge, 1999).

1.4.1 Auslan teaching materials

As section 1.4 demonstrates, research projects of an applied nature have attracted a great deal of attention, perhaps motivated by the rapid growth in the teaching of Auslan as a second language, Auslan interpreter training programs and bilingual education of deaf children. Due to the relative lack of basic descriptive work by trained linguists, however, much of the Auslan teaching and resource material that has been developed has not been based on sufficiently extensive scientific research. As a result, some of the claims made in the available teaching and resource material about the structure and use of Auslan appear open to question. I will discuss one example here: the *Learning Australian Sign Language: Introductory Auslan Level 2* book and video from NIDS at La Trobe University (Branson, Bernal, Toms, Adam & Miller, 1995).

In the student workbook that forms part of the *Learning Australian Sign Language: Introductory Auslan Level 2* package from NIDS, a number of claims about the language are made. In the introduction, for example, the authors suggest that the use of fingerspelling varies according to the gender of the signer. Branson et al. (1995: iii) explained that "...women tend to finish a fingerspelt sign with an upward movement and men with a downward movement". There is no explanation of what exactly is meant by an "upward" as opposed to a "downward" movement. Fingerspelling is usually produced with both the hands held in front of the chest. Branson et al. (1995) thus seemed to be implying that female signers move their hand upwards from the usual location in front of the chest as they fingerspell, whereas men move their hands downwards from this position.

In a later part of the book, there is some discussion about pronominal signs. In this section, a particularly strong claim is made about the appropriate use of the first person singular pronoun sign, glossed as ME[3]: "When a signer refers to themselves...before indicating an action they will be involved in, the ME is always repeated...as in the example above... ME-ME GO DANCE (nod)" (Branson et al., 1995: 21). Here the authors appear to be suggesting that when the pronoun ME represents the agent, effector, or thematic argument of an action verb, then the pronoun must be reduplicated.

Unfortunately, the authors do not present any evidence for either of these assertions, nor any references to other work against which these claims can be tested. Furthermore, none of the informants I have consulted as part of my research have been able to confirm either of the claims made in Branson et al. (1995), including informants that are native signers of the Victorian variety of Auslan (the video and workbook were produced by the team at NIDS, all of whom are based in Melbourne). In addition to this, the signing on the video that accompanies the student workbook actually provides little evidence for either the gender variation in fingerspelling or the obligatory pronominal reduplication which Branson et al. (1995) described. The examples of fingerspelling from both male and female signers found in the videos fails to provide any support for the notion that females fingerspell with an upward movement whilst males fingerspell with a downward one. The signed language used in the video also does not appear to confirm the existence of the obligatory pronominal reduplication they describe. This can be seen clearly in examples 1-1 to 1-8 in Table 1.2 below which illustrates examples of signed clauses in the accompanying video that seem to contradict the rule of obligatory first person singular pronoun reduplication (the examples also appear in the workbook, and the relevant page numbers are

3 The signs here are represented by a gloss (Auslan signs discussed in later sections of this thesis will be represented by a combination of glosses and transcription). For an explanation of the glossing and transcription conventions see Appendix B.

also given below). It is difficult to judge the relevance of these counterexamples, however, as no explanation of these apparent exceptions to this grammatical rule is provided.

Table 1.2

1-1	_______aff_______ ME FINISH GO DOCTOR TODAY MORNING (nod)	p. 23
1-2	___________neg_____________ NO ME BORROW PAY-PAY-PAY ME (nod)	p. 65
1-3	__aff__ ME MOVE NEW HOUSE	p. 111
1-4	_aff__ FINISH ME MOVE ME CL-MOVE THERE (nod)	p. 113
1-5	ME CL-KEY TURN-TURN	p. 137
1-6	_neg_ ME WORK NO	p. 149
1-7	________neg________ ME CAN'T FIND WHERE	p. 165
1-8	______aff______ ME FINISH SHUT SHUT FINISH	p. 213

It is possible that the variation in fingerspelling and the usage of the first person pronoun mentioned here may reflect dialectal features of the signing used by the particular informants who were consulted by the research team at the NIDS. As I have explained, however, the evidence from consultations with native signers of the Victorian variety of Auslan have so far failed to support the suggestion that these descriptions reflect aspects of dialectal usage. It is not at all clear what led the authors to make these claims about the language. They might simply reflect idiolectal or perhaps sociolectal aspects of the signing used by the informants involved in the NIDS study. Alternatively, there may be other factors involved that the authors have not recognized. The use of changes in movement and repetition in fingerspelling and signing, for example, might be due to some as yet undescribed phonological process in Auslan, or simply reflect prosodic factors such as stress or emphasis. On the other hand, these descriptions may actually represent folk beliefs about the structure and use of Auslan that, in the absence of empirical research, have been uncritically accepted as facts about the language and incorporated into the student workbook and video.

In fact, neither signed language teachers or researchers can afford to take any aspect of these languages, even the most fundamental, for granted. Despite enormous progress over the last forty years, Aarons (1994) argued that there is still in reality a great deal of uncertainty surrounding many basic issues in signed language research. She pointed out that there is disagreement, for example, about the number of pronouns in signed languages and if specific forms other than a first person pronoun exist (Meier, 1990; Engberg-Pedersen, 1993). There is debate about exactly what can be considered an adjective and a preposition, and the relationship between these word classes and verbs (Johnston, 1989, 1991b; Engberg-Pedersen, 1993; Bergman, 1983, 1986; Brennan, 1992; MacLaughlin, 1997). In addition, Aarons (1994) noted that there is on-going controversy about the existence of a basic word order (Bouchard, 1996; Bouchard & Dubuisson, 1995; Kegl et al., 1996). In the last decade, debate has reopened about how best to characterize the various uses of space in signed languages (Bos, 1990; Engberg-Pedersen, 1993; Johnston, 1991b; Loncke & Quertinmont, 1995; Liddell, 1998, 2000a), and the relationship between signed languages, gesture, and cognition (Cogill, 1999; Liddell, 2000b; Liddell & Metzger, 1998). Perhaps even more than in the description of other relatively undocumented languages, many basic issues remain matters for debate in signed language research, and require a great deal more investigation.

1.5 Problems facing the signed language researcher

There is no doubt that unsubstantiated claims of the kind made in the NIDS Auslan teaching materials reflect the relative lack of research that has been conducted into the language. This dearth of descriptive work on the language itself partly stems from a number of constraints and problems facing the linguist who chooses to begin work on natural signed languages. Aarons (1994) has provided an excellent overview of the difficulties encountered by those wishing to undertake signed language research. Some of these problems are no different from those encountered by any linguist studying a previously undocumented language, whilst others are peculiar to signed language research. As these constraints have helped shape the current study, I shall summarize and adapt some of her observations here.

As in many other parts of the world, the majority of research related to the deaf community so far undertaken in Australia has been initiated by hearing researchers. With a few notable exceptions, these hearing researchers have been non-native signers. Aarons (1994) suggested that this is because there are very few deaf people who have achieved a level of education that would enable them to pursue a career in signed language research. This is not simply because the signing deaf population is comparatively small (being less than 0.1% of the total population of Australia, see Appendix A). It also reflects the fact that deaf people have been poorly served by educational institutions (Lane, 1992). As a result of educational disadvantage, Aarons (1994) pointed out that most deaf people are limited to working as research assistants or as language informants for hearing researchers. The hearing researcher is often regarded in academic circles as the "expert" and is responsible for publishing and presenting the results of the research. These unequal power relations between hearing and deaf people undoubtedly influence the quality of their research co-operation. As both Aarons (1994) and Zwitserlood (1996) have suggested, the deaf person may feel little ownership of the research and may not consider the data carefully, or may feel obliged (consciously or not) to provide the evidence that the researcher wants. They may not feel inclined or able to dispute the claims that hearing researchers wish to make about the language, even if they feel that these claims are deficient.

Another reason that few deaf people become involved in signed language research is that such research may not always be perceived as a high priority in the deaf community. More pressing issues, such as the education of deaf children, the provision of signed language interpreters, access to captioned programs on television and improved telecommunication services have occupied the attention of deaf community organizations in Australia. Aarons (1994) suggested that the importance of a better understanding of signed languages to these other goals is sometimes not recognized by the community, and little support is provided specifically to encourage and develop the skills of deaf native signers to participate in research.

Partly because of this perception that signed language research is a low priority, the results of the research carried out by hearing linguists are frequently not shared with the deaf community. They are presented at international conferences and published in journals for an academic audience. Such presentation and publication would normally provide the researcher with a useful opportunity for the exchange of ideas, but in many cases, deaf people do not attend such conferences, nor do they commonly have the English literacy skills to access the material published in scholarly journals (Alker, 1992; Bernal, 1997). As a result, as Aarons (1994) explained, the claims made by hearing signed language researchers may go unchallenged and unexamined.

Amongst both deaf and hearing researchers themselves, discussion of the data presented at conferences and in journals has in the past been hampered by the lack of any single universal written or transcription system for signed languages. Data has most often simply been presented by means of English glosses (as mentioned above), with additional symbols to represent spatial and non-manual features. Compared to spoken language research, the primary language data discussed in the literature is simply much less accessible to the signed language researcher. This has made access to the work of colleagues on the same or other signed languages much more difficult, and has limited the exchange of ideas and the progress of research.

Just as access to signed language research publications and conferences presentations is difficult for many deaf people, access to the language itself is often quite problematic for non-signing hearing researchers who wish to learn a signed language and are keen to undertake research. Unlike many communities who use unrecorded spoken languages, users of a particular signed language do not inhabit a geographically defined area in which the signed language researcher can live in order to learn the language and undertake field work. Instead, deaf people in countries such as Australia live scattered throughout the suburbs of major cities and towns, only coming together in deaf clubs, or meeting for community cultural, sports and social events. These clubs and events, however, are very important times for deaf people who often otherwise work and live much of their lives in the company of hearing people. Deaf people thus highly value the time they spend with each other and with other fluent signers (such as hearing family and friends). The presence of unfamiliar hearing people who are learning the language may be viewed with suspicion or resentment and may not be welcomed by all members of the deaf club or association (Lane, Hoffmeister, & Bahan, 1996).

In addition to this, as explained in Appendix A, when deaf people address hearing English speakers with a limited knowledge of a natural signed language, they often use one of the more English-like signed language varieties (Lucas & Valli, 1992). Those deaf people with skills in spoken English may choose not to use sign at all, especially if the hearing person is unknown to them. This is partly to facilitate communication with the hearing person, but it also reflects language attitudes in the deaf community. Natural signed languages may be felt to be inferior to spoken languages and thus the use of English or any kind of English-based signing is considered to be preferable when communicating with those who do not belong to the community (Johnston, 1989). The use of a natural signed language is one of the strongest symbols of a deaf identity and its use is a means of expressing solidarity with other deaf people (Kannapell, 1989). Many deaf people thus do not feel comfortable using the language with hearing people, especially those they do not know well. Thus, initially the hearing second language learner may be able to do no more than observe the more native-like varieties of Auslan when they are used between deaf people themselves. They will have few opportunities to interact in the target language with native or fluent deaf signers. For hearing non-native signers who lack on-going social or workplace contact with deaf people, the acquisition of the signing skills required to do effective research in the area can thus be very difficult.

The existence of English-like varieties of signing can also have an impact on data collection. For many deaf non-native signers, these varieties may represent their preferred form of signed communication, while some native and near-native signers may shift (consciously or otherwise) to more English-like forms of signing in the presence of hearing people, or in the presence of unfamiliar deaf people (Lucas & Valli, 1992). As a result, researchers investigating the grammar of signed languages have most often chosen to focus on the collection of data from deaf native signers, in situations where no hearing people are present.

The focus on native signers also appears to be significant for other reasons. There is a considerable research literature that suggests that of those many deaf people who have acquired signed languages as a second language in adulthood or as delayed first language after early childhood, very few fully master the grammatical complexities of these languages (Mayberry & Eichen, 1991; Mayberry, 1993; Newport, 1990). Because so few deaf people are native signers (see Appendix A), however, researchers carrying out field work in smaller deaf communities may be tempted to rely on non-native signers as informants, or not consider the focus on native signers important. This can introduce greater variation into their data, and make comparison with related or similar work by other researchers problematic.

Ideally, signed language data should be collected from situations in which the language is being used in naturalistic contexts. Observations of naturalistic data are an important source of information, but attempting to record such data on videotape for later analysis is difficult. Finding a way to collect video-recorded data in an unobtrusive fashion presents quite a challenge, perhaps even more so than collecting spoken language data on audio-tape. Firstly, one must find informants who are comfortable being filmed. In addition to this, appropriate lighting is needed, the signers must be facing the video-camera at all times if an accurate recording of their signing is to be made, and reasonable proximity is necessary to record various subtle non-manual features such as changes in facial expression, mouth patterns and eye gaze. For the non-native signing hearing researcher, the problems are particularly great. Their presence may influence the variety of signing used, and thus a deaf research assistant who can operate the video-camera is needed. Without the co-operation of an obliging assistant, or the funds to pay for their services, hearing non-native signers are limited in their ability to collect naturalistic data.

Often, however, the particular grammatical structures which interest the researcher may not appear in data collected naturalistically. Crucial examples needed to test hypotheses about the language may be rarely used (Aarons, 1994). In such cases, data can be elicited. The elicitation of data, however, brings with it other problems.

When eliciting data, researchers may be tempted to use translation tasks from English into Auslan. It is important to minimize the use of English translation tasks, as these may trigger code-switching, or may depend on native or near-native skills of English (which may not be common in the deaf community). Alternative stimuli, such as pictures or filmed sequences are more appropriate, but producing such materials may be costly.

In elicitation tasks, both the stimuli and response should ideally be videotaped. If the stimuli are signed or presented by the elicitor, small variations in the presentation may result in different judgements by the informant. This is especially true where the elicitor is a non-native signer.

Interpretation of the video-taped data can be very complicated. Researchers must watch the videotape, then transcribe what they see. But as Aarons (1994) pointed out, people do not always agree on what they see. For the non-native signer, the subtlety of non-manual signals or the speed of naturalistic connected signing may be a problem. It is best to look at the data with another researcher or research assistant (especially one who is a native signer) or, where appropriate, with the informants themselves. Unless the researcher is successful in obtaining substantial sources of funding, however, the costs involved in hiring research assistants or paying informants for the slow and monotonous work of assisting and checking transcriptions may prove prohibitive.

When working with a research assistant or informant, it is important that both the researcher and assistant/informant understand the nature of the task. This is especially important if the research assistant is also working as an elicitor with the informants. Like the informants, the elicitor will need to be a deaf native or near-native signer, but also needs to have a well-developed metalinguistic awareness. The metalinguistic skills of informants and elicitors may, however, vary significantly. These skills often reflect the degree to which the language in question has been studied and the kinds of metalinguistic knowledge that are prevalent in the community (Aarons, 1994). The latter is especially important for signed language researchers in Australia. With so little research and few opportunities for training, only very few deaf people have the skills for this kind of work. Metalinguistic skills amongst most deaf people, even teachers of Auslan, tend not to be well developed. Folk explanations of the origin of individual signs usually focus, for example, on their perceived iconicity. This awareness of iconicity, however, may lead informants to base judgements about the acceptability of certain constructions in the language on the degree to which they reflect links between the signed form and its meaning. Engberg-Pedersen (1993) suggested that informants may not only interpret and explain examples iconically, but present researchers with signing that is more iconic than what may be observed in their everyday interactions with each other.

In addition, informants and elicitors must understand the difference between prescriptive views about usage and the actual use of the language in the community. Over the last decade, the increasing involvement of deaf people in the teaching of Auslan has led to a greater awareness of and pride in their language. In some cases, this new found pride has led some to see varieties of signed communication influenced by English as a threat to natural signed languages (Corker, 1997; Bridge, 1994) and to reject signs which are perceived as "foreign", especially those borrowed from other signed languages, or from artificial sign systems such as Australasian Signed English (Schembri, 1996). Some deaf people reject signs which are seen to be "hearing inventions", especially signs associated with the style of signing seen amongst hearing teachers of the deaf, social workers, or signed language interpreters (see, for example, Sutton-Spence & Woll, 1999). All the signs included in the recently published Victorian School for Deaf Children's dictionary of Auslan for parents of deaf children, for example, were "vetted" by a small panel of deaf signers who appear to have excluded particular examples of usage they considered socially or linguistically unacceptable (Bernal & Wilson, 1998). Despite the fact that many of those signs not included may be widely used in the deaf community, there are some in the community who would consider them inappropriate for inclusion in a dictionary because of issues related to the history of suppression of natural signed languages and the recent emergence of a strong sense of deaf pride.

Until recently, few Auslan teachers have, however, had the opportunity to study linguistics, and few of them have the literacy skills needed to familiarize themselves with the signed language research literature. In the absence of adequate training and teaching materials based on research, it seems that many folk beliefs about the language have circulated widely and become "mythologized", passed down authoritatively from experienced teachers to their less experienced colleagues. Although some of this received wisdom may be based on well-founded linguistic intuitions, some of it may not be, as the examples from the *Learning Australian Sign Language: Introductory Auslan Level 2* text discussed above demonstrate.

1.6 Summary

In this chapter, I have outlined the four aims of this study: (1) to provide an initial description of polycomponential verbs of motion and location in Auslan; (2) to re-examine the claim that these constructions include classifier morphemes; (3) to undertake some cross-linguistic comparison of polycomponential verbs of motion and location in three unrelated signed languages; and (4) to compare these findings with a study of gesture in non-signers in order to demonstrate that these forms appear to be blends of linguistic and gestural features rather than polymorphemic constructions as previously claimed. I have also provided an outline of the methodology used (this will be expanded in section four), and discussed the social and research context for this dissertation. Before moving onto discuss previous research on polycomponential verbs of motion and location in signed languages in Chapter 3, I will present in the next chapter an overview of current analyses of phonological and morphological structure in signed languages.

Chapter 2
Models of signed language phonology and morphology

2.1 Introduction

In this chapter, I provide an overview of the parameter model of phonological structure in signed languages, introduce the two alternative models of signed language morphology which I refer to as the *homogeneous* and *heterogeneous models* respectively, and sketch some of the implications recent research on language and gesture has for these models of signed language structure. In order to assist readers without prior knowledge of a signed language, this chapter provides the necessary background for the discussion in the next chapter which focuses on the analysis of polycomponential verbs of motion and location in signed languages.

2.2 Models of signed language phonological structure

In this section, I will give a very brief introduction to current models of the formational characteristics of signs and the terminology used by signed language researchers to describe sublexical features of these languages. This introduction is intended to provide an overview of what might be termed the *parameter model* of signed language sublexical structure. Other models of signed language phonology have been proposed, such as the *movement-hold model* (Liddell & Johnson, 1989), the *prosodic model* (Brentari, 1998) and the *semantic phonology model* (Armstrong, Stokoe, & Wilcox, 1995), but the parameter model has perhaps had the most influence on work in signed language description.

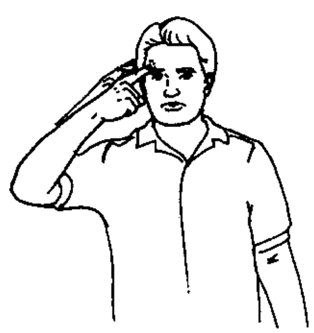
One of the defining features of human languages has traditionally been the notion that they have a duality of patterning, or double articulation (Lyons, 1977; Matthews, 1974). The terms *duality of patterning* and *double articulation* both refer to the fact that the morphemes (understood here as the smallest meaningful units of a language) used in any spoken language may be broken down into smaller, meaningless units. Thus, morphemes in English enter into two patterns of contrast at once. As McNeill (1992) explains, the word *dog* differs from other free morphemes in meaning, contrasting with *cat, wolf, monkey* etc. The word also differs from other words phonemically, contrasting with *cog, doll, dig* etc.

It was only in the second half of the twentieth century that linguists began to propose that double articulation could be found in signed languages as well as spoken languages. This suggested that, despite the differences in modality, the sublexical structure of spoken and signed languages was similar. With the publication of *Sign*

Language Structure in 1960, William Stokoe was the first researcher to demonstrate that the signs used in ASL could be considered to have an internal sublexical structure analogous to that found in the words of spoken languages (Stokoe, 1960). Before Stokoe, signs had been regarded simply as unanalyzable iconic gestures with little or no internal organization (Woll, 1990), rather like those used in the gesticulation that accompanies speech (McNeill, 1992). This meant that signs were thought to be unlike words because they could not be broken down into smaller, meaningless recurring segments.

Stokoe (1960) showed, however, that the lexical signs[1] of ASL appeared to be produced using a limited number of gestural features. He suggested that the action of a sign had three main parts or *aspects*: a *designator* (used to refer to the specific combination of hand configuration and hand orientation, abbreviated to *dez*), a particular *tabulation* (or *tab*, used to refer to the location of the hands), and a specific *signation* (or *sig,* used to refer to the movement of the hands). Dez, tab and sig were examples of what he called *cheremes*, the signed equivalent of phonemes.

Later, these came to be known widely as *handshape, location* and *movement* respectively (see for example, Sutton-Spence & Woll, 1999, or Valli & Lucas, 1995). This basic finding about sign structure has been successfully employed in the analysis of every known signed language to date, including Auslan (see Johnston, 1987; 1989).



THINK

Figure 2.1

The claim that Stokoe's cheremes are meaningless units (and thus equivalent to spoken language phonemes) has, however, been called into question, even by Stokoe himself (Armstrong, Stokoe & Wilcox, 1995; Brennan, 1990; Johnston, 1989). For many signed language researchers, however, the observation that lexical signs within related semantic fields (i.e., the Auslan signs THINK, REMEMBER, FORGET, UNDERSTAND, KNOW) share similar formational aspects (i.e., the forehead is the location component of many Auslan signs that refer to mental processes, as shown in Figure 2.1 above) does not mean that morphological status should be given to these features, but that this aspect of signed languages simply "...falls under the rubric of 'form symbolism', the sign language counterpart of sound symbolism" (van der Hulst, 1993). As I point out in Chapter 3, however, this analysis may be adequate for monomorphemic signs, but does not appear to hold for the polycomponential signs which are the focus of this dissertation. Despite this, I will focus here on how this finding has been applied to the structure of non-polycomponential signs.

2.2.1 Handshape, location and movement

Handshape, as the name suggests, refers to the shape of the hand used in a sign. In the Auslan sign WHO shown in Figure 2.2, for example, most of the fingers of the hand are held in a fist, and the index is extended. In the sign HOW-MUCH, however, all the fingers are held extended, and slightly apart. The human hand is, however, capable of assuming a vast array of other possible shapes. It may be closed completely into a fist, or the fingers may be held together; there may be bending of the hand at the wrist, or the fingers may be bent at the knuckles or joints; the thumb may be extended, held parallel to the fingers or held across the palm or closed fist; the index, middle, ring or little finger may be extended, bent, or in contact with each other. Despite the great number of possible hand configurations that can be produced, each particular signed language tends to only use a limited number of handshapes. In my previous work, I have suggested that 34 distinctive handshapes are necessary for the description of the core lexicon of Auslan (Schembri, 1996)[2].

Location refers to the position of the hand on the body or in the space around the signer. In WHO, the hand is held in the right side of space just in front of the signer's chest, while in HOW-MUCH it is held with the fingers making contact with the chin. As with handshape, there are a potentially enormous number of different loci on the body and in space that may be used. Users of signed languages, however, tend to use only those parts of the body and locations in space that fall into what sign linguists call the *signing space.* The signing space refers to an area which extends vertically from approximately just above the head to the waist, and horizontally from elbow to elbow when the arms are held loosely bent in front of the body. It is in this area that the hands and arms can move and make contact with the body and with each other easily and naturally.

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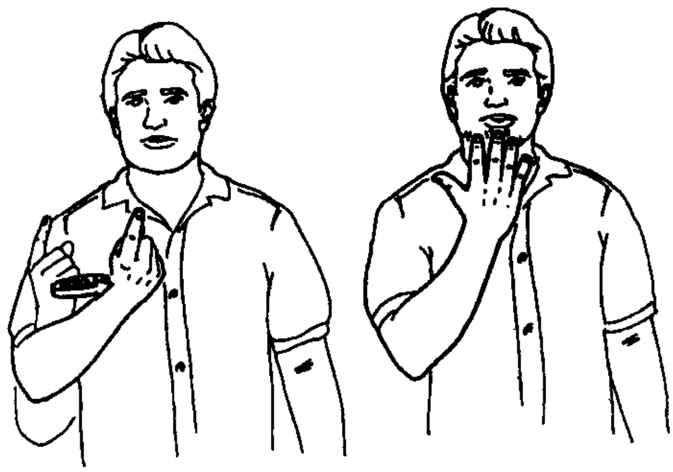
[1] Note that in this dissertation, I will use the term *lexical sign* to refer to signs from the core native lexicon of signed languages (see the discussion in 2.3). By the use of this term, I do not intend to suggest that only such signs are lexical items.

[2] Research since this time, however, will mean that this figure will need to be revised upwards (see Johnston, 1998).



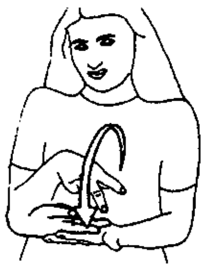
WHO HOW-MUCH

Figure 2.2

The hand(s) typically perform some kind of movement, rather than simply being held completely still at some particular location on the signer's body or in the space around the signer. The movement in the signs WHO and HOW-MUCH are both relatively simple: for WHO, the hand moves in a horizontal circle just in front of the signer, while for HOW-MUCH, the fingers wriggle. In other signs, the hand(s) may move upwards, downwards, to and fro, in an arc, a circle, or spiral. Movements through the signing space, as in the sign WHO, are known as *path* movements. Other types of movement, such as the movement in HOW-MUCH, are known as *local* movements. These do not involve a movement through space but may be realized as a change in handshape, in the orientation of the palm and fingers, or as some other kind of movement while the hand is held at a particular location (Brentari, 1998). Many signs may use a single path or local movement alone, while others may be realized as complex combinations of these two different types of movement. As with handshape and location, the monomorphemic signs of a signed language exploit only a finite number of all those movements of the fingers, hands and arms that are physically possible.

2.2.2 Other aspects of sign formation

Since Stokoe's original work, further research has shown that other features of sign formation need to be taken into account. Battison (1978) suggested that *orientation*, which refers to the direction of the palm and fingers, is also an important component of sign formation. A particular handshape can be oriented in a number of different ways in relation to the signer's body. The palms and fingers may be oriented left, right, up, down, towards or away from the signer. In the sign WHO, for example, the fingers are oriented upwards and the palm is facing the signer.

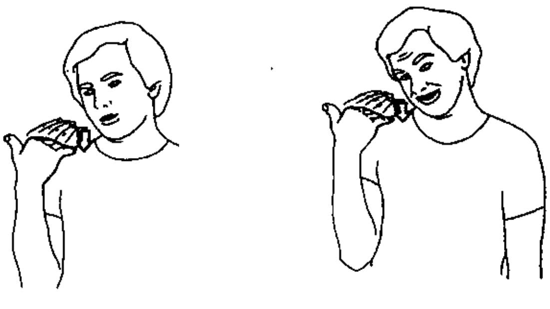


FALL

Figure 2.3

Some signs also make contrastive use of *hand arrangement* and *point of contact*. In signs that involve two hands, such as the sign FALL shown in Figure 2.3, hand arrangement refers to the placement of the hands in space with respect to each other. Note that in this sign, one hand is initially held above the palm of the other hand. In a two-handed sign like FALL, only one hand moves, and ends in contact with the passive hand. In right-handed signers, the active hand is the right hand, while the left is passive. The point of contact describes the part of the active hand that may be used to contact the passive hand (Brennan, 1992). In this sign, it is the back of the active hand that makes contact.

Other features, such as the *stress* (used to refer to the peak velocity of a sign's movement) and *duration* of sign production, and the *rate of repetition of movement* are also employed in the formation and modification of signs (Coulter & Anderson, 1993). Many linguists also recognize that *non-manual features* (such as facial expression, mouth patterns, and movement of the head and body) play an important role in the internal structure of signs (Liddell & Johnson, 1989). In the sign glossed as RECENTLY shown in Figure 2.4, for example, the head makes a slight sideways movement towards the shoulder. In JUST-RECENTLY, the head movement is more pronounced and combined with a particular facial expression. Of these additional features, sign linguists now generally include orientation in their descriptions of signs and most appear to agree that it counts as one of the four most basic parts of sign formation (Woll, 1990). Although originally known as aspects by Stokoe, these four visual-gestural features have come to be called the *parameters* of sign production (Valli & Lucas, 1995), analogous to the parameters of speech production, such as voicing, place and manner of articulation. In all signed languages, each of these four parameters has a finite number of values in monomorphemic signs that have come to be recognized by sign linguists as constituting the set of distinctive features in signed languages (van der Hulst & Mills, 1996). Many linguists also now include non-manual features as the fifth parameter (Sutton-Spence & Woll, 1999). The other features listed above, however, do not appear to be essential to describe the internal structure of all signs in Auslan and other signed languages, and some (such as stress, duration, and rate of repetition) may also form part of the prosodic structure of signed languages.



RECENTLY JUST-RECENTLY

Figure 2.4

2.2.3 Distinctive features

As briefly mentioned above, several researchers have suggested that the parameters of handshape, orientation, location, and movement may be further analyzed into sets of distinctive features (Liddell & Johnson, 1989; Sandler, 1989; Brentari, 1990, 1998; van der Hulst, 1996). Much of this work has focused on the most complicated parameter: handshape (e.g., Boyes-Braem, 1981; van der Hulst, 1996; Sandler, 1996). Despite a great deal of progress, as Corina and Sandler (1993) pointed out, there remains a lack of consensus amongst sign phonologists about the composition of features required, both for specific signed languages and for an understanding of universal signed language phonological distinctions.

As an understanding of distinctive features is important for the description of the handshape component of polycomponential verbs, an example of a distinctive feature analysis of handshape will be presented briefly here. The model discussed here can be found in Brentari (1998), and analyzed articulators in signed languages into a number of subcomponents. An outline of the distinctive feature tree she suggested is shown in Figure 2.5 below.

The features for articulators fall into two main categories: those that fall under the *nonmanual* node and those under the *manual* node, depending on whether the articulator is the hand or some other part of the body. This can be further divided into H_1 and H_2, referring to the dominant and subordinate hands respectively. The H_1 node branches into the node *arm* (for those signs that use the whole arm as an articulator) and *hand*. The hand can be specified for eight orientations. The hand node then branches into *selected fingers* and *nonselected fingers*.

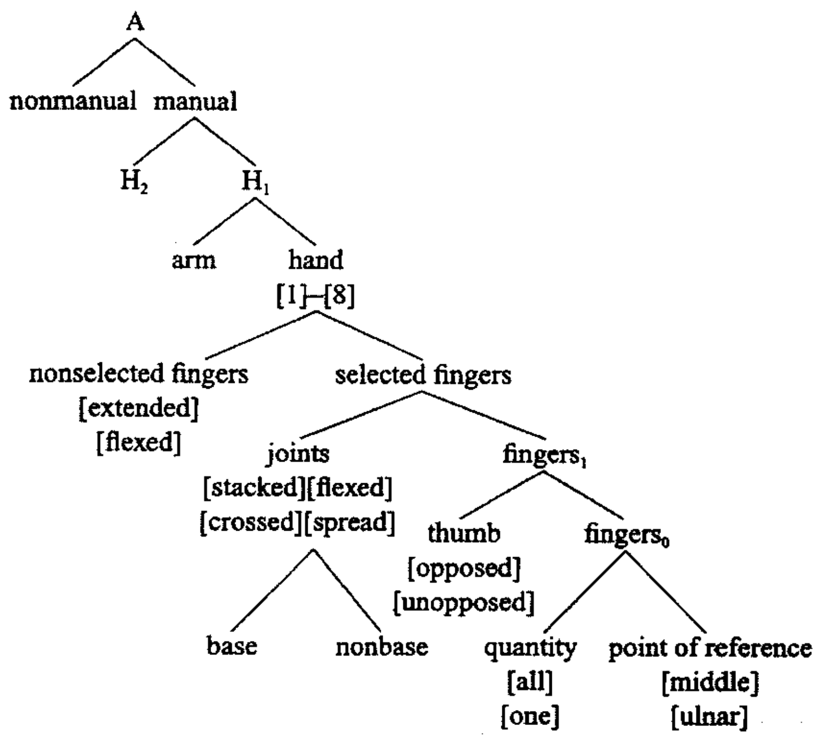


Figure 2.5

As the name suggests, selected fingers refers to the salient configuration of fingers that are used in the handshape (the remaining fingers are the nonselected fingers which may be *flexed* (fingers bent or closed) or *extended*). The fingers selected may be the index finger; the index combined with the middle, the index, middle and ring; or all four fingers. These can be specified by combinations of the features of *all* or *one* under the *quantity* node and *middle* and *ulnar* under the *point of reference* node (see Brentari, 1998, for a full explanation). Brentari, van der Hulst, van der Kooij, & Sandler (1996), drawing on data from ASL, Sign Language of the Netherlands and Israeli Sign Language, claimed that the finger selection feature remains constant throughout the execution of any individual sign. In the sign, RECENTLY shown in Figure 2.4 above, for example, although the hand bends at the knuckles, the selected finger feature remains the same.

The behavior of the thumb also comes under the selected fingers node. The thumb may be *opposed* to the selected fingers (in a plane perpendicular to the palm), or *unopposed* (in the same plane as the palm).

Under the *joints* node, Brentari (1998) suggested four features: *stacked*, *flexed*, *crossed*, and *spread*. Stacked refers to the fingers in a position one above another, as in a 'squash racket grip'. In a flexed configuration, the fingers are bent at specific joints. Fingers may also be crossed one over the other, or spread apart. These can occur at the *base* or *non-base* joints.

With these limited number of articulator features, Brentari (1998) claimed it is possible to describe all possible handshapes in ASL.

2.2.4 Simultaneity and sequentiality in sign structure

In spoken languages, distinctive features are organized into segments which are themselves combined into larger units that are known as syllables. According to Stokoe's (1960) original description of sign structure in ASL, signs appeared to be organized differently. The three aspects of handshape, location and movement were described as being produced simultaneously by the signer. For Stokoe, it seemed that the nature of the formational units of a sign meant that simultaneous production was inevitable. It is, after all, physically impossible to produce a handshape that is not in some location on and near the body, and to produce some kind of movement that does not involve a change in location, handshape or orientation. Thus there is always some degree of simultaneity in sign production.

Sign linguists initially believed that this formational characteristic of signs made signs quite different from the words of spoken languages. Spoken words, in contrast to Stokoe's (1960) simultaneous model of sign structure, generally result from the sequential combination of phonemes. Although each phoneme in English is the product of a simultaneous combination of the parameters of voicing, place and manner of articulation, the vast majority of syllables in spoken languages result from a sequential concatenation of phonemes. Syllables may contain two or more phonemes strung together, and words may result from the combination of many such syllables.

Table 2.2 Example of signs showing simultaneous contrast.

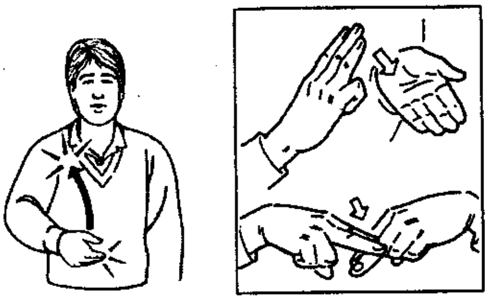
	HOW-MUCH	HOW-OLD
HANDSHAPE	5	5
ORIENTATION	Fingers pointing upwards, palm facing the signer	Fingers pointing upwards, palm facing the signer
LOCATION	On the chin	On the nose
MOVEMENT	Wriggling movement	Wriggling movement

The contrast we find in many minimal pairs in Auslan, however, may be described as simultaneous contrast. Many signs consist of a single handshape, produced in a single location and combined with a single type of movement. These elements are produced simultaneously by the signer, and appear to lack any internal sequential organization. The Auslan sign HOW-MUCH shown in Figure 2.2, for example, is produced by placing the 5 handshape on the cheek and wriggling the fingers. The sign HOW-OLD differs only in location, as shown in Table 2.2 below. This sign is produced by placing the 5 handshape on the nose and wriggling the fingers. The internal structure of many signs in Auslan thus appears to differ fundamentally from the words of a spoken language, where the formational elements are generally organized in a linear fashion.

Stokoe's (1960) analysis did recognize that there are examples of sequential contrast in ASL. He noted that the movement parameter often involved a sequence of movements and that many ASL signs were formed from the sequential combination of two individual signs (Meier, 1993). Work on ASL since the early 1980s, however, has made it clear that Stokoe's simultaneous model is not an adequate account of the phonological structure of the language, and this seems equally true for Auslan. Many signs in both ASL and Auslan show sequential patterning, and changes in sequence are used contrastively. With the Auslan sign GIVE, for example, the contrast between the Auslan signs that mean 'I give to you' and 'you give to me' is a sequential contrast (see Table 2.4). To represent the former, the sign begins at a location near the signer's body and ends at some location away from the signer. For the latter, the sequence of locations is reversed.

There are many other examples where linear ordering of parameters is important in Auslan. The northern dialect sign MORNING (shown in Figure 2.6), like the various forms of GIVE, uses a sequence of locations. The handshape first contacts the ipsilateral side of the stomach and then moves upwards to the ipsilateral side of the chest. Lexicalized compound signs (see 2.3.1 below) are derived from the sequential combination of individual signs. The sign PARENTS (shown in Figure 2.6), for example, is derived from a compound of the signs MOTHER (a sign based on fingerspelled -m-) and FATHER (a sign based on fingerspelled -f-). The correct ordering of these parts is required to produce both these signs. Reversing the sequence of either MORNING (i.e., moving the handshape from chest to stomach) or PARENTS (i.e., combining the signs in reverse order as in FATHER^MOTHER) does not produce acceptable variants of these signs.

Thus signed languages such as Auslan appear to employ both simultaneous and sequential patterns of organization. The realization that signed languages show sequential contrast has important ramifications for an understanding of sign formation processes, and has led many sign linguists to suggest that the formational features of signs, like spoken words, are organized into segments and syllables.



MORNING PARENTS

Figure 2.6

2.2.5 The sign syllable

Since the 1980s, several researchers have developed models to describe the sequential structure of signs (Liddell, 1984; Perlmutter, 1990; Sandler, 1989). Perhaps the most influential account has been the movement-hold model developed by Liddell and Johnson (1989). The details of this approach are complex, and there is insufficient space to cover them all here. The following summary of the movement-hold model by Valli and Lucas (1995: 36) provides a basic definition:

> The basic claim about the structure of signs in the Movement-Hold Model is that signs consist of hold segments and movement segments that are produced sequentially. Information about the handshape, location, orientation, and non-manual signals is represented in bundles of articulatory features...Holds are defined as periods of time during which all aspects of the articulation bundle are in a steady state; movements are defined as periods of time during which some aspect of the articulation is in transition. More than one parameter can change at once. A sign may only have a change of handshape or location, but may have change of both handshape and location, and these changes take place during the movement segment.

The form of the Auslan sign MAN shown in Figure 2.7 would thus be described as beginning with a hold (H) segment (as it is held on the chin). The M segment follows (as the hand then moves slightly down) and ends with a second H (another hold under the chin). In simplified M-H notation, it would be represented as in Figure 2.8 (Note that I have used handshape names from Johnston, 1989. In his terminology, *Cup* and *Fist* are equivalent to the C and S hand configurations respectively).

Some of the claims made by this model have, however, been criticized by a number of linguists (Sandler, 1989; Perlmutter, 1993; Wallin, 1996; Wilbur, 1990, 1993). Although it is widely accepted that H segments occur during the production of individual signs, and that they can be identified and measured (although the identification process is not always easy to make, see Sandler, 1990), the majority of such segments appear to be dropped in signed interactions (Wilbur, 1990). There appear to be very few cases in signed discourse where signs are produced only as an H segment. Signs appear not to be well-formed unless they have some kind of movement, either movement from one location to another, or a change from one handshape or orientation to another. Even those signs that appear to consist only of an H segment, such the signs HOW-MUCH, are most often produced with either some internal local movement (i.e., the fingers wriggle), or a transitional movement. Psycholinguistic studies of sign perception also suggest that movement is the most central formational category. Research has shown that the perception of sign movement appears to be crucially different from that of the static parameters, such as handshape and location (Poizner, Klima & Bellugi, 1987). Thus movement appears to be central to sign production and perception, and to form the core of what has come to be known as the sign syllable.

It appears that Chinchor (1978, cited in Corina & Sandler, 1993) was the first to argue that ASL signs were organized into syllables in which movement corresponds to the core or peak of the syllable, analogous to the vowels of spoken language syllables. Wilbur (1993) has also adopted this description, and she regarded each of the following patterns of movement as constituting a single syllable (I have provided Auslan sign examples for each, and those not elsewhere illustrated appear in Figure 2.9): (a) path movement (change of location, e.g., GIVE); (b) local movement (change of handshape or orientation, e.g., HAVE, REBEL); and (c) combinations of path and local movement (change of location and handshape, e.g., CHECK).

MAN

Figure 2.7

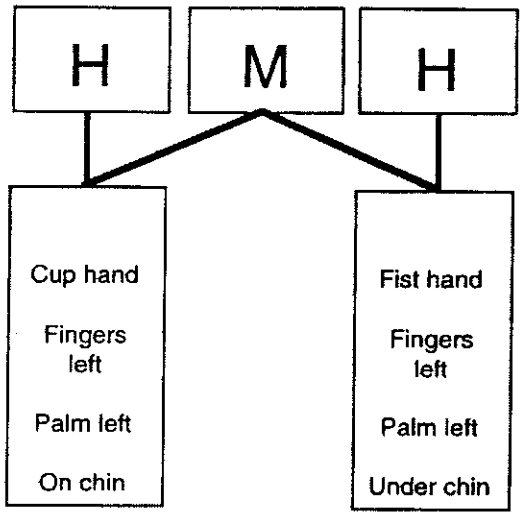


Figure 2.8

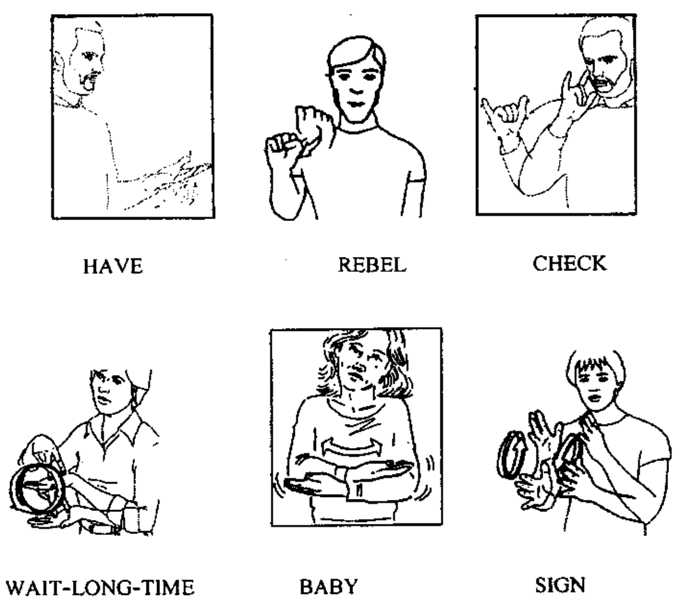


Figure 2.9

According to Wilbur (1993), elliptical movements constitute two syllables (WAIT-FOR-A-LONG-TIME), as do bidirectional (or back-and-forth) movements (e.g., BABY). A single circular movement is considered to be one syllable (e.g., SIGN), and the wriggling, fluttering and trembling movements one finds in many signs (e.g., HOW-MUCH) are also counted as a single syllable, analogous to the rapidly repeated articulation of consonants such as the trilled /r/ (Brentari, 1996). Some lexical items—in particular those derived from fingerspelt English words—

involve a sequence of two or more handshape changes (e.g., -s-o-n-, -c-l-u-b-)[3]. These items would be considered multisyllabic forms.

The concept of a sign syllable, although not uncontroversial amongst sign linguists (see, for example, Uyechi, 1996) is claimed to be significant because it appears that signed languages such as ASL and Auslan favor signs which are monosyllabic (Brentari, 1995b; Corina & Sandler, 1993; Schembri, 1996). The vast majority of monomorphemic Auslan signs appear to have only one change in handshape, orientation, and/or location (Schembri, 1996). In fact, there appear to be no signs that have a citation form that is longer than two syllables, and a number of processes appear to be at work in the language which reduce multisyllabic signs (i.e., signs with more than one change in location, handshape, or orientation) into monosyllabic signs. This is true of lexicalized compound signs, for example (e.g., PARENTS). Although the individual signs in a compound each form a separate syllable, the compounding process often produces a monosyllabic, rather than disyllabic, sign.

A number of differences, however, between the segments and syllables of spoken language and those suggested for signed languages have been identified in work by Uyechi (1996). Uyechi believed that the differences between the phonological organization of signed and spoken languages is sufficient to warrant signed language specific terminology. Thus she referred to the signed equivalent of the segment as a *transition unit* (Uyechi also does not divide it into two types, such as movement and hold), and the signed syllable as a *cell*. The crucial differences between signed and spoken languages here relate to the timing and the properties of the phonological features organized by segment as opposed to transition unit, and syllable versus cell. Although cells (like syllables) follow one another (as in the examples of sequentially ordered compounds, such as PARENTS), the component transition units within a cell (articulatory features of handshape, location, movement, and so on) occur simultaneously. Uyechi argued that this is distinct from segments in a syllable that must be ordered sequentially. Similarly, the values within transition units may relate to morphological properties of signed languages, not simply phonological ones. In spoken languages, she noted, distinctive features such as [*coronal*] and [*labial*] rarely act as morphemes, but, as the analysis of polycomponential verbs suggests, single features acting as meaningful units are extremely common in the morphological patterning of signed languages. This latter point is discussed in 2.3 below.

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[3] The fingerspelled alphabet refers to a set of signs for the letters of the English alphabet that is used to spell out vocabulary from English. In ASL, one-handed fingerspelling uses primarily single handshapes, a few of which are specified for orientation and location. In Auslan, two-handed fingerspelling uses primarily combinations of two handshapes that are specified for orientation, hand arrangement and point of contact (see Appendix B).

2.3 The homogeneous model of signed language morphological structure

In the final section of this chapter, I provide an introduction to the two main descriptive models of signed language morphology, which I will refer to as the *homogeneous* and *heterogeneous* models respectively. Both models of signed language morphosyntax recognize that there are different types of meaningful unit in signed language lexicons (i.e., that such languages include both signs that appear to be composed of a single meaningful component and signs that are made up of many such components), each with their own morphophonological properties. The key difference is that those working in the homogeneous model of signed language structure analyze all these different units as morphemes, whereas those working within the heterogeneous model do not. Instead, researchers in the latter group suggest that some polycomponential verbs are the result of a fusion of linguistic (i.e., morphemic) elements with para- or non-linguistic elements (such as loci in the signing space around the signer and the use of affective facial expressions, eye gaze, and expressive movements of the head and body). In the sections below, I outline the main aspects of the homogeneous model as it applies to signed language lexicons, describing the distinction between native and non-native lexicon, and between the core and non-core native lexicons in signed languages (Brentari & Padden, 2001; Padden, 1998). This will serve to prepare the reader for the discussion of polycomponential verbs in the following chapter. I will also provide an overview of the heterogeneous model. Some context for this alternative analysis of signed language morphological structure is provided by the final section of this chapter in which I sketch recent research on the relationship between language and gesture.

2.3.1 The native and non-native lexicon

Linguists believe that users of a particular language have a mental lexicon that contains the words and morphemes of that language. Together with the mental grammar (which contains the rules for combining the words and morphemes into complex lexical items, phrases and sentences), the mental lexicon enables users of a language to produce and comprehend utterances in that language (Spencer, 1991).

In signed languages such as ASL, it has been suggested that the lexicon may be divided into a subcomponent that contains all the native sign vocabulary (called the *native lexicon*), and a peripheral non-native component (the *non-native lexicon*) mostly derived from contact with English (Brentari & Padden, 2001; Padden, 1998). In the case of Auslan, native forms would include signs such as THINK, HOW-MUCH, MORNING, MAN and CHECK discussed earlier in this chapter. These are signs that have developed within Auslan, and conform to a set of nativization constraints (for examples of such constraints in ASL, see Brentari, 1998; Brentari & Padden, 2001). Non-native forms are lexical items that are fingerspelled representation of English words. Historically, fingerspelled sequences appear to have moved from the non-native lexicon into the native lexicon as they become nativized. An example would be the sign PARENTS that ultimately derives from a fingerspelled -m- and -f- for 'mother' and 'father' respectively, but has now become lexicalized as an Auslan sign. The native subcomponent may thus be subdivided into *core* and *non-core* components. This is illustrated in Figure 2.10 (from Brentari, 1998)[4]. This illustrations shows that the non-core native lexicon has two components: (1) represents signs derived from fingerspelling, and (2) represents polycomponential constructions. The central area (3) is the core native vocabulary. As we see in the next section, signs may also move from the non-core into core native lexicon.

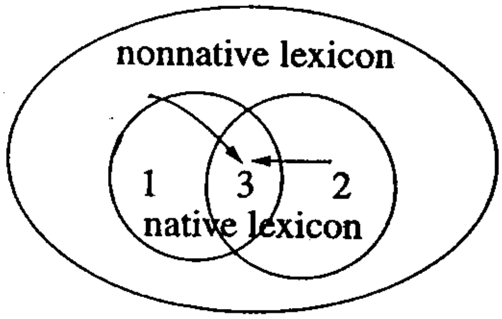


Figure 2.10

2.3.2 The core native lexicon

The native lexicon is a repository of signs, but it could not possibly contain *all* the signs of a particular signed language, as the list is potentially infinite in length. In order to understand the distinction between core and non-core components of the native lexicon, we need to draw a distinction between *potential* signs in Auslan, and *actual* signs. Actual signs are those signs which have occurred, are recorded in dictionaries, and with which most of the signing community is familiar, as opposed to the limitless number of potential signs which are possible to produce according to the derivational rules of the language. Spencer (1991) suggested that the lexicon of a spoken language can be divided into two: a *permanent lexicon* which lists the actual forms used in a language, and a *potential lexicon* which contains the morphemes which may be used to produce the limitless number of potential word forms. Since the 1970s, this understanding of spoken language lexicons has been applied to signed languages. Following Brentari & Padden (2001), I will refer to the permanent lexicon as the *core* native lexicon. It is also widely known as the *frozen* or *established* lexicon (Brennan, 1992, McDonald, 1983, Schembri, 1996) and corresponds to part 3 of the diagram in Figure 2.10. The core native lexicon includes all the

4 Although I have borrowed the model of the lexicon proposed by Brentari (1998), my interpretation of this model differs somewhat from her proposal.

permanent items of Auslan vocabulary, signs that are highly stable and standardised in form and meaning, and which are used frequently in the language. These signs are known as lexicalised signs. We can think of lexicalised signs "...as 'ready-made', 'off the shelf' lexical items. They are already in existence: the signer simply has to pluck them from her/his mental lexicon and place them in the appropriate lexical contexts" (Brennan, 1992: 45-46).

Table 2.3 A specification of the parameters for the Auslan sign SISTER

Parameter	Specification
Handshape	Hook handshape
Orientation	
Fingers	Fingers up (when straightened out)
Palm	Palm left
Location	The bridge of the nose
Movement	Contact twice

Many lexicalized signs in Auslan appear to be synchronically monomorphemic. Borrowing terminology from work by Johnson and Liddell (1984), we can refer to such monomorphemic signs as *completely specified* monomorphemic signs. These are listed in the signer's mental lexicon as single meaningful units and are thus equivalent to free morphemes in a spoken language such as English. Their feature values are completely specified: any significant change in the handshape, orientation, location or movement may alter the meaning of the sign, or result in a completely different sign. In Table 2.3, there is an example of completely specified morpheme (the sign SISTER) as it might be represented in a signer's mental lexicon. Each cell of the table contains specific information about the sign's formational features.

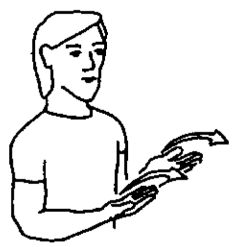
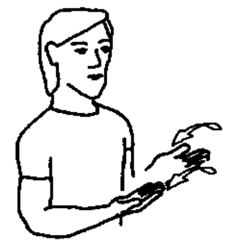
The core native lexicon, however, also consists of signs that are derived from a combination of more than one morpheme. Many lexicalized compound signs in Auslan are clearly derived from two morphemes, such as DEAF^CLUB 'deaf club', WRONG^MIND 'feel guilty' and GIRL^FRIEND 'girlfriend', although such forms might more appropriately be considered synchronically monomorphemic forms. Other monomorphemic forms appear to be blends that have may have evolved from compounds (e.g., CHECK appears to be derived from SEE^MAYBE). Generally, it appears that signs that are a compound of more than two signs are often loan translations from English, such as DEAF^AWARE^TRAINING 'deafness awareness training', SIGN^LANGUAGE^LINGUISTICS 'sign language linguistics' or NATIONAL^DEAF^MEETING 'national deaf conference'. As can be seen from these examples, normally the number of lexical items in these compounds corresponds to the number of signs from which they are composed (Wallin, 1996). This latter type of compounding, a highly productive process in Auslan and ASL, has only comparatively recently begun to be explored in any detail (Perlmutter, 1996).

Another group of signs we can call *incompletely specified* lexicalized signs. Only some of the features of these signs are specified in the mental lexicon, forming what might be considered a root or base morpheme. The rest of the sign's features contain empty specifications that must be filled by other morphemes (similar to bound morphemes) to produce a modified form of the base sign. Many of these morphemes may operate as inflectional morphemes, representing the arguments of a verb and aspectual modifications (for a fuller discussion of inflection in Auslan, see Johnston, 1989, 1991b, 1996a). There are a variety of such incompletely specified signs in the lexicon, ranging from those with only one or two features which are not specified to those that contain many empty cells for numerous kinds of morphemes (the various subcategories of incompletely specified signs are discussed in the next chapter).

Table 2.4, for example, shows three forms of the verb sign GIVE. As mentioned previously, changes in the agent and recipient argument of this verb are realized as changes in the orientation, location and movement specifications of the sign. The base form of GIVE listed in the signer's mental lexicon is unspecified for its agent and recipient arguments, so many of the specifications are empty. The specifications that can be inserted into the empty cells are called *paradigmatic morphs* (or *p-morphs*) by Johnson and Liddell (1984) since they provide modifications to the base form by means of paradigmatic contrasts. P-morphs may be composed of a single distinctive feature (as mentioned above) or group of distinctive features that form part of a single segment. They are analogous to bound morphemes found in spoken languages (Wilbur, 1987; Sutton-Spence & Woll, 1999).

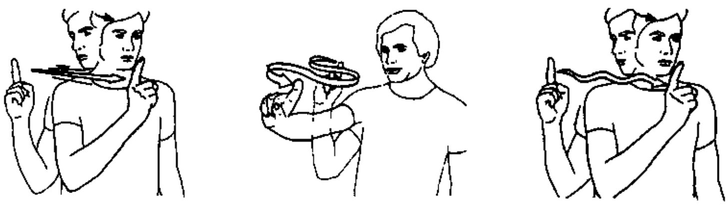
Thus we can see that the signs in the core native lexicon can be grouped into three main types: (1) completely specified lexicalized signs which are generally monomorphemic, (2) compounds of two (or more) completely specified lexicalized signs and (3) incompletely specified lexicalized signs consisting of base morphemes which may be combined with other p-morphs to produce modified or inflected lexicalized signs. Johnson and Liddell (1984) refer to type (1) and type (3) signs as examples of *segmental morphs* (or *s-morphs*), since the representation of these forms consists of a bundle of articulatory features (handshape, location, movement and so on) that constitute a signed segment (Liddell & Johnson, 1989).

Table 2.4 Specifications of the parameters for three modified forms of the Auslan sign GIVE (adapted from Johnston, 1989)

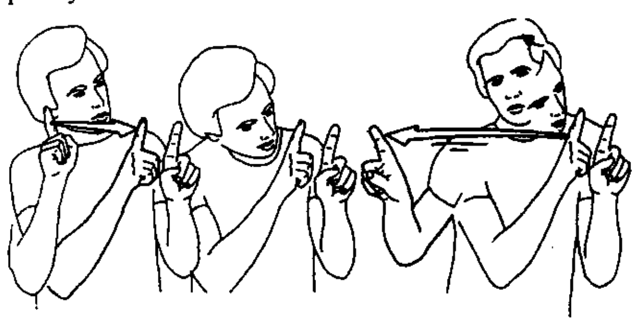
Parameter	Specification		
	 centre-GIVE-forward 'I give you'	 forward-GIVE-centre 'you give me'	 left-GIVE-right 'he/she give him/her'
Handshape	Flat handshape	Flat handshape	Flat handshape
Orientation			
Fingers	Fingers left	Fingers left	Fingers away from signer
Palm	Palm up	Palm up	Palm up
Location	Moves from location near signer to location near addressee	Moves from location near addressee to location near signer	Moves from location on the right to location on the left (or vice versa)
Movement	A slight upward arcing movement between the two loci	A slight upward arcing movement between the two loci	A slight upward arcing movement between the two loci

2.3.3 The non-core native lexicon

The distinction between the core, established or frozen lexicon and the *productive* or *non-core* native lexicon in signed languages has been explored in the work of several sign linguists, including Brentari & Padden (2001), McDonald (1982), Padden (1998), Supalla (1978, 1982), Schembri (1996) and Johnson and Liddell (1984), although the ways in which this distinction have been described differ considerably. For the purposes of this discussion, we will ignore the non-core fingerspelled native lexicon shown as part 1 in Figure 2.10, and focus only on the polycomponential component in part 2. The distinction between core (part 3) and non-core (part 2) native lexicon is particularly emphasized and exemplified in a series of publications on BSL by Brennan (1990, 1992, 1994). The difference between these two aspects of signed language vocabulary is generally understood in the following way: the core native lexicon (part 3) consists of those completely and incompletely specified monomorphemic forms which are frequently used and highly standardized in the language, while the non-core native lexicon (part 2) is made up of p-morphs which either act as bound roots or as a variety of types of affixes. Multimorphemic lexical items (such as the class of polycomponential verbs of motion and location which are the focus of this study) are conceptualized by most researchers as actively created by signers from combinations of these productive morphemes (or p-morphs).



'person pass by quickly' 'person wander off' 'person stroll by'



'person approaches another person, then hesitates, then moves away'

Figure 2.11

In previous work (Schembri, 1996), I suggested that Auslan, like other signed languages, has an enormous range of p-morphs: morphemic uses of handshape, orientation, location, and movement, as well as a variety of non-manual morphemes. As we have seen, these p-morphs can be used by the signer to extend or modify the meaning of lexicalized signs. P-morphs may also be combined in novel ways to produce entirely new polycomponential signs, which have traditionally been analyzed as multimorphemic constructions (Johnson & Liddell, 1984). The skilled signer is able to produce new forms by assembling the different p-morphs in different ways as the need arises. This may result in combinations of meaningful units which have never actually been used before, but which are fully understandable and meaningful in a particular context (Brennan, 1992). In Figure 2.11 above, examples of various polycomponential verbs using the G: *animate* morpheme (a hand configuration used to refer to the motion of a human being) combined with different p-morphs of location and movement are shown.

This productive aspect of the language is very much a part of everyday interactions between signers, such that in any given sample of sign usage, "...there is likely to be a significant percentage of signs which have been created or re-created, on the spot, as required" (Brennan, 1992: 46). Some of these signs may remain nonce or "one-off" lexical items. Others form part of a class of signs that must be re-created anew each time they are needed. Other forms may move into the core lexicon of the language through processes of lexicalization and nativization, coming to be used by the wider community of signers in a standardized way. The lexical sign MEET shown in Figure 2.12, for example, appears to have been derived from polycomponential verbs using the G: *animate* morpheme.

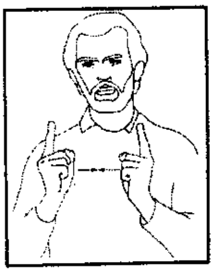


Figure 2.12

Figure 2.12 represents an overview (adapted from Sutton-Spence & Woll, 1999) of the main types of morphemes in the lexicon of a signed language such as Auslan.

2.4 Towards a heterogeneous model of signed language structure

In the model of the lexicon described above, the various meaningful components of signs (such as the use of handshape, movement, and loci in the signing space) are all treated as morphemes. This analysis of signed language structure has had widespread acceptance since it was first proposed in the 1970s, but a number of researchers have begun to question this model in the last decade (Armstrong, Stokoe & Wilcox, 1995; Cogill, 1999; Liddell, 1998, 2000a, 2000b; Liddell & Metzger, 1998; Macken, Perry, & Haas, 1993, 1995). Although these writers have not proposed a unified approach to this issue, it is clear that they share a dissatisfaction with analyses (such as that shown in Figure 2.13) that propose that all meaningful units in signed language morphosyntax are examples of morphemes.

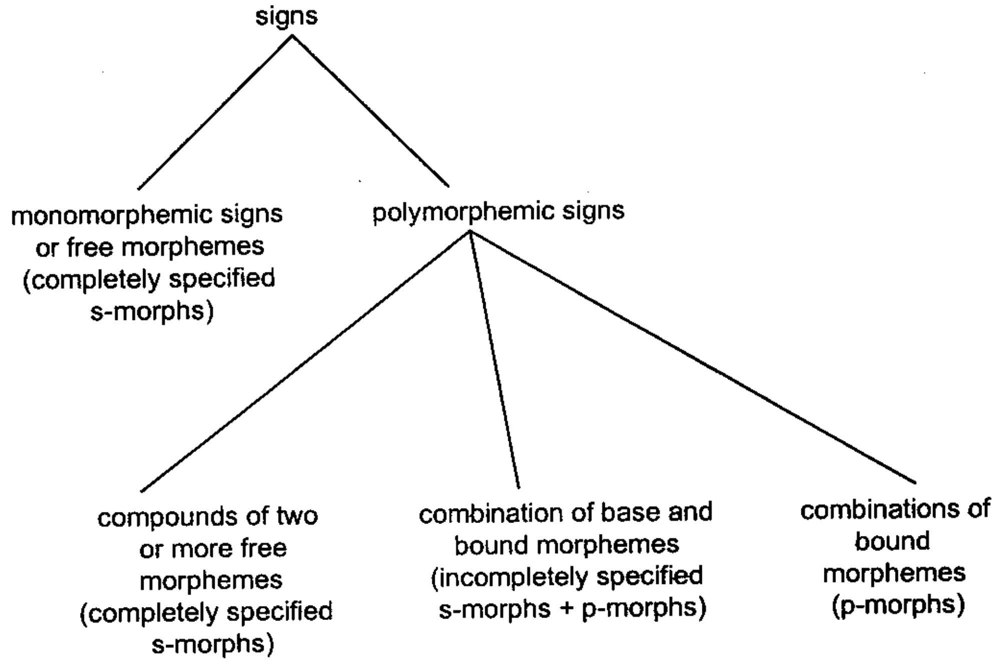


Figure 2.13

Liddell's (1998, 2000a) work represents perhaps the most detailed description of this approach. Unlike his earlier proposals, Liddell appears now to consider examples of incompletely-specified signs, such as the sign GIVE in Auslan, to be part of a category of signs (which he calls *indicating verbs*) which do not combine with spatial p-morphs, but which simply point towards referents present in the environment or towards loci in the space around the signer associated with absent referents. Obviously, referents may occupy any number of potential loci around the signer, and this potential renders problematic any attempt to consider such loci as examples of morphemes. Moreover, if the referent is absent, signers may direct the indicating verb towards any number of locations in space associated with the referent. Attempts to account for this use of space within the homogeneous model have failed, Liddell argued, because proposed phonological representations cannot account for the unlimited directional potential of these verbs.

The most detailed attempt to create a phonological representation of space can be found in the work of Liddell and Johnson (1989). In order to account for the uses of loci possible with indicating verbs, these writers suggested that space could be described by means of a vector radiating away from the signer, distance points away from the signer on that vector, and height features (Liddell, 2000a). This representation uses seven vectors, four distances away from the signer, and several possible height features. A large number of loci can be described as a combination of vector, distance, and height, as shown in Figure 2.14. Their proposal asserted that these phonologically definable spatial loci operated as morphemes, and that signers would pick the specific locus on the spatial grid closest to the referent present in the environment. Such directional signs do not appear to be constrained by such a grid, however, and it does not seem to be possible to posit a limited number of predetermined vectors, distances or heights used by signers in face to face discourse. Signers direct indicating verbs at physically present referents, regardless of where the referent is actually located in space.

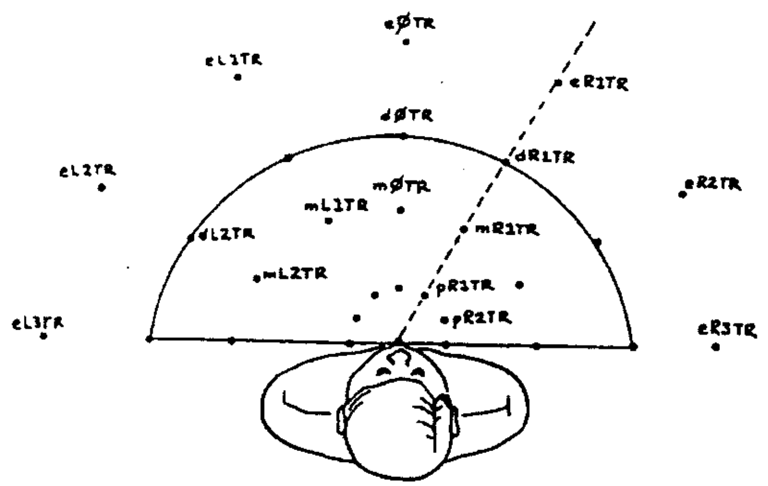


Figure 2.14

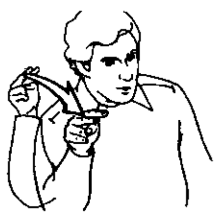
Clearly, if one is to accept duality of patterning as a defining characteristic of language, phonological descriptions of morphemes are necessary (Cogill, 1999). Because of this failure to incorporate spatial loci into a linguistic description, Liddell (2000b) suggested that this use of loci in signing space cannot thus be analyzed as morphological, but is better described as gestural pointing towards elements of mental spaces (see Chapter 3 for a fuller discussion of this). This pointing is fused with the linguistic features of the sign. The result is a construction that is partly linguistically encoded and partly gestural. This does not amount to a claim that signed languages are something other than bona fide natural languages. It suggests instead that some features of signed language structure previously thought to be morphemes may actually be playing a different role, and that our understanding about the relationship between signed language and gesture may need to be revised. Liddell's work on indicating verbs will be taken up in more detail in Chapter 3.

It is important here to explain my reasons for referring to this model of signed language morphology as *heterogeneous*. To understand this, we have to review the earlier sections about the phonological structure of signed languages and compare it with spoken languages. In the monomorphemic lexical signs of a signed language like Auslan (such as the sign SISTER), and the words of a spoken language like English, we can see parallels in phonological structure. In both languages, Liddell (2000a) explained, a mobile articulator has to be placed in a specific place in articulatory space to produce the lexical item. In the Auslan sign CHECK, for example, the fingertips of the index finger initially makes contact with the cheek under the eye. In the sign

SISTER, the hand makes contact with the nose. In the production of any given lexical sign, the hands can either be in contact with a specific location on the body, as in the sign SISTER, or the hand can be near a location on the body, as it is in the sign RECENTLY (the hand is near the side of the head, but does not touch it). Such articulatory uses of space in signed languages may be contrastive, as we have seen. The sign SISTER is produced with a handshape contacting the nose twice. Changing the location to the cheek while keeping constant all other features of the sign produces the Auslan sign STRANGE.

The placement of the articulator in space is also important in the production of spoken words. Just as the hand must be correctly placed in articulatory space to produce signs, Liddell (2000b) pointed out, the tongue must be correctly positioned to produce spoken words. In the English word *tick* (pronounced as /tɪk/) for example, the tip of the tongue must begin by being placed against the alveolar ridge, behind the upper teeth to produce the word initial consonant. It then moves through the mouth as it produces the word medial vowel and ends by contacting the velum to produce the word final consonant.

In contrast to the lexical signs described above, a few classes of signs in the lexicon of signed languages may be produced in an apparently unlimited number of locations. As we have seen, the Auslan signs GIVE or LOOK (illustrate in Figure 2.15 below) may be pointed towards referents present in the signer's physical environment. The sign LOOK may be directed towards any of a large number of people sitting in a room to mean 'look at her/him/them', and the direction would be different each time. The core meaning of the sign remains the same, but the semantic role of patient or undergoer may be signaled by the changes in direction. This is not similar to any feature in the structure of spoken languages. The tongue does not move around the oral cavity during the production of a word, Liddell (2000b) explained, pointing in different directions in its articulatory space to signal different meanings. This makes such signs in the lexicon of Auslan and other signed languages unlike words found in any spoken language.



LOOK

Figure 2.15

Thus Liddell (2000a) argued that signed languages appear to make use of signs that are composed entirely of a linguistically definable number of features, and other signs that are only partly made of such features. This is why I have suggested that such a description of signed language structure may be called a *heterogeneous model*. I have borrowed the term *heterogeneous* from the work of Macken, Perry & Haas (1995) who described ASL as a *heterogeneous communication system*. They used this term to point out that natural signed languages incorporate more than one way of representing meaning, using both arbitrary conventional meaning (such as the arbitrary and conventional link between the form of the Auslan sign SISTER and its meaning) and what they call *richly grounded meaning* (this describes communication that uses a natural robust connection in cognition between the symbol and what is signifies, as in the form of the sign LOOK which may be directed at a present referent). I am using it here, however, to refer to differences in both form and meaning in signed languages. In some cases, richly-grounded meaning may not be expressed by means of a morphophonological structure, but by gestural means.

2.5 Language and gesture

The work of Liddell (1998, 2000a) is a radical departure from traditional analyses of signed languages, but evidence from recent neurological and psycholinguistic studies lends some support to this position (Casey, 1996, 1998, 2000; Casey & Kluender, 1998; Corina, 1999; Emmorey, 1999; Emmorey & Herzig, 2000). His work appears to be influenced by a paradigm shift currently underway in the study of human communication generally. Increasingly, many leading scholars, including psychologists and anthropologists as well as linguists working within functional and cognitive theories of language, are suggesting that gesture may act as not simply an extra-linguistic feature of face to face communication but as an integral part of language itself (Kendon, 1980, 2000; McNeill, 1992, 2000).

In a recent paper on this incipient paradigm shift in linguistic and psycholinguistic research, Duncan (1999) explained that during most of the 20th century, the influential work of scholars such as Ferdinand de Saussure, Leonard Bloomfield and Noam Chomsky has seen the study of human language focus almost exclusively on those structural aspects of spoken communication that are organized as categorical oppositions, such as phonology, morphosyntax, and semantics (Duncan, 1999; Kendon, 2000). As Duncan (1999) pointed out, this focus is perhaps best exemplified by the suggestion from the linguist Charles Hockett in the 1960s that the term *language* be restricted to just those aspects of human communication that are vocal, syntactic, arbitrary, abstractly referential (that is, meaning is determinable independently of the immediate context of utterance), and learned (Hockett, 1960). Other patterned characteristics of human communication, such as prosody (voice pitch and loudness), body posture, facial expression, and gesture were considered paralinguistic or non-linguistic, and thus regarded as outside the proper domain of linguistic inquiry.

Some language researchers, however, have rejected the *language* versus *paralanguage* distinction (McNeill & Duncan, 2000). They point to evidence that speech and co-verbal gesture interact in face to face communication (Kendon, 2000, McNeill, 1992), develop in an interdependent fashion in children (McNeill, 1992), share common neurological substrates (Kimura, 1993), and may breakdown together in language disorders (Mayberry & Jaques, 2000) and aphasia (Goodwin, 2000; McNeill & Pedelty, 1995). McNeill & Duncan (2000) suggested that language is an expression of thought by means of two distinct representational systems: one is categorical, compositional and analytic, while the other is imagistic, synthetic and holistic. Patterning in either system may emerge in speech or gesture production, Duncan (1999) suggested, although it has often convenient to think of speech as the embodiment of the categorical, and gesture as the realization of the non-categorical. According to this view, accounts which attempt to isolate the categorical aspects of language from the use of features such as prosody and gesture are reductionist and will simply fail to adequately explain the way language production and comprehension are possible in real-time, on-line face to face communication.

Following Duncan (1999), I will argue in the next three chapters that attempts to account for the use of polycomponential verbs of motion and location that ignore the interdependence and interpenetration of language and gesture have indeed failed, and that our understanding of these forms in signed languages can only more forward once we recognize that signed languages frequently simultaneously exploit the categorical and non-categorical aspects of human communication, often in the very same lexical item.

2.6 Summary

In this chapter, I have provided some background information on models of signed language phonology and morphology that is necessary for the reader who is not familiar with signed languages, and I have introduced the notion that these models may be either homogeneous or heterogeneous in descriptive orientation.

In the following chapter, I shall outline in greater detail the various attempts to analyze polycomponential verbs in signed languages as homogeneous, multimorphemic constructions, focussing particularly on the work of Supalla (1978, 1982, 1986). Chapter 3 will also include some discussion of the criticisms of this analysis, and argue that polycomponential verbs are, like Liddell's (2000a) class of indicating verbs, best analyzed as heterogeneous blends of linguistic and gestural features.

Chapter 3
Polycomponential verbs in signed languages

3.1 Introduction

Auslan has a category of polycomponential verbs of motion, location, handling and visual-geometric description (Schembri, 1996). Similar constructions have been identified in over thirty other signed languages. Many of these signed languages appear to come from unrelated families of signed languages, suggesting that polycomponential verbs may be a candidate for inclusion amongst those grammatical features which appear to be universal characteristics of signed language structure.

Figure 3.1 provides examples of each of the four major subtypes of polycomponential verb in Auslan. Each of these is shown in a clausal context in 3-1 below.

3-1 (a)

TWO POLICE V: two-animate-entities + (forward + move-line + center)

"Two police officers approached me from my right"

3-1 (b)

(lh) B: vehicle + (hold + left)

HAVE MANY CAR (rh) B: vehicle + (loc + right + distribution: in-a-queue)

"There are many cars lined up in a queue"

3-1 (c)

PRO.1 CUP C: handle-cylindrical-entity + (side-left + move-arc + forward)

"I passed you the cup on my left"

3-1 (d)

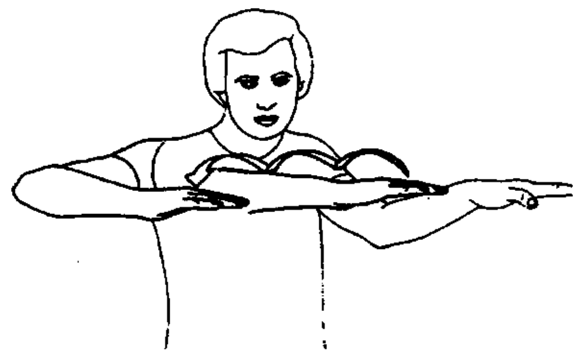
(lh) G: two-dimensional-outline + (hold + left)

COFFEE TABLE (rh) G: two-dimensional-outline + (trace: kidney-shape)

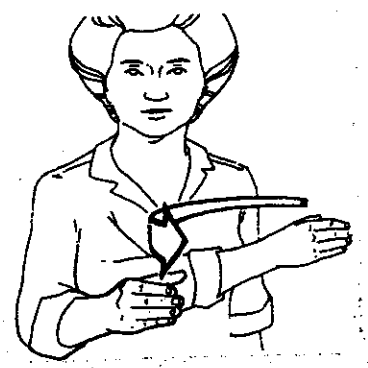
"The coffee table is kidney-shaped"

Verb of motion in example 3-1 (a):

Verb of location in example 3-1 (b):



Verb of handling in example 3-1 (c):

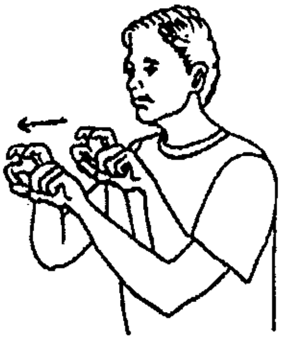


Verb of visual-geometric description in example 3-1 (d):

Figure 3.1: Auslan examples of polycomponential verbs of motion, location, handling, and visual-geometric description

In each of these examples, the polycomponential verb follows at least one lexical nominal or pronominal sign, which specifies the referent(s). The nominal signs are all monomorphemic, completely specified s-morphs. The verb signs, however, have generally been understood as polymorphemic constructions because the handshape, orientation, movement, and location features are each meaningful. Example 3-1 (a) is a example of such a verb, one used to indicate the motion of a referent. In this sign, the handshape and orientation represents two upright animates, the movement is generally understood to mean that the referents walked from one place to another, and location changes describe the motion towards the signer from the right. In 3-1 (b), we see a related example of a verb of location. The handshapes and their orientation represent flat wide horizontal objects (in this case, understood as vehicles), the stamping movement signals to the addressee that the location of the referents is salient, and the placement of the hands one behind the other represents the spatial arrangement of the referents. A verb of handling is given in example 3-1 (c). In this sign, the hand configuration suggests the hand holding something cylindrical, and the change in location show that someone moved this object from a location on the left to the addressee. Example 3-1 (d) is a verb of visual-geometrical description. The use of the index finger draws attention to the edges of the object and suggests that it is shallow in depth, while the pattern of movement traces out its specific shape.

Table 3.1.



Distinctive features	Morphological identity
Movement class node	
[tracing: straight]	'more forward'
Handshape/orientation node	
[H1 selected fingers: 1]	'upright being'
[H2: selected fingers: 1]	'upright being'
[nonselected fingers: flexed]	'side by side'
[H2: radial plane of finger]	'stooped'
[joints: flexed]	'facing forward'
[hand orientation: prone]	
Location class node	
[HPOA: proximal]	'from a'
[HPOA: distal]	'to b'
Nonmanual class node	
[pursed lips]	'carefully'

This class of signs has thrown up a number of problems of description and analysis in signed language research. In Chapter 2, I outlined the traditional parameter model of the sublexical structure of monomorphemic signs, first suggested in the work of Stokoe (1960) and later developed by other researchers (Battison, 1978; Brentari, 1998; Liddell & Johnson, 1989). In this work, the sign was originally analyzed as the smallest meaningful component in signed languages, with the formational components of handshape, orientation, location, movement and non-manual features seen as roughly equivalent to phonemes, and the characteristics of these parameters (such as the number of fingers selected or the position of the thumb) as analogous to distinctive features in spoken languages (van der Hulst, 1996). As more data on the structure and use of signed languages began to be gathered by an increasing number of researchers in the 1970s and 1980s, it appeared that large numbers of lexical items in the data did not fit this model (see, for example, Johnston, 1989). In these forms, the phonological features of handshape, hand arrangement, orientation, location, movement and so forth (which do not form a "pronounceable" form on their own) appeared to individually act as morphemes (Supalla, 1978). An example of a particularly complex construction from ASL is shown in Table 3.1 above along with proposed morphological analysis of each of its features (Brentari, 1995a). According to Brentari (1995a), this single ASL sign means 'two hunched humans, facing forward, move ahead carefully side-by-side from point a to b point b'.

Note that only one of the formational features listed here (i.e., [nonselected fingers: flexed] under the handshape/orientation node) is not associated with a meaningful component.

These signs thus appeared to be different from completely specified monomorphemic forms, such as the Auslan signs SISTER, WHO, and MAN (where the individual phonological features may be considered meaningless), or incompletely specified s-morphs such as Auslan GIVE or LOOK, where a monomorphemic base form may combine with a number of additional meaningful components in a particular sentential or discourse context.

Analysis of these verbs as synthetic, multimorphemic constructions also suggested that these were quite different from what was seen in spoken languages. Brentari (1995a) suggested that the sign in Table 3.1 includes up to nine morphemes in a single syllable, and thus claimed that signed languages were the only human languages where polymorphemic, monosyllabic lexical units were possible. Morphemes in most spoken languages are realized as a single segment made from a bundle of distinctive features, or from a sequence of segments. Morphemes realized as a single distinctive feature are, however, not unknown. Examples of such morphemic units can be found in English (where differences in final consonant voicing may reflect word class distinctions), Japanese (where palatalization is used to indicate "uncontrolledness"), and the Bantu language Chichewa (where the distinction between simple and recent past tense is signaled by changes in tone) (Brentari, 1990; Spencer, 1991).

(3.2) English

(a) /haus/	noun
(b) /hauz/	verb

(3.3) Japanese

(a) /poko-poko /	"up and down movement"
(b) /p^{y}oko-p^{y}oko/	"jumping around imprudently"

(3.4) Chichewa

(a) ndi-ná-fótokoza	"I explained"
(b) ndi-ná-fótókoza	"I just explained"

Nevertheless, the class of proposed multimorphemic verbs in signed languages posed problems for a model that claimed the formational features of signs were meaningless units analogous to the phoneme, and raised doubts about the applicability of the submorphemic analysis of monomorphemic forms to these constructions (McDonald, 1983).

Furthermore, these so called polymorphemic forms appear to be generally more iconic than monomorphemic signs (Padden, 1998; Schembri, 1994), with strong links between the form of their constituent single feature morphemes and their meanings. In the ASL example from Brentari (1995a) shown above, for example, the forward linear movement of the two hands represents forward linear motion of the referents, while the bending of the finger on each hand represents the referents' stooped posture. As a result, these constructions seemed to pose problems for the central role traditionally given to the notion of arbitrariness in language, for the distinction between phoneme and morpheme, and for the existence of double articulation in signed languages that had been demonstrated by Stokoe (1960). Due to the widespread acceptance of the model of sign formation described in Chapter 2, initially many researchers simply considered these iconic, polycomponential constructions as somehow falling outside of signed language proper (McDonald, 1983). Their apparent high degree of iconicity and perceived variability meant they were considered paralinguistic phenomena (Hoemann, 1975), and that they were unlike anything found in spoken language since they appeared to vary in a non-discrete and analogue fashion (DeMatteo, 1977).

Many sign linguists, however, considered these explanations based on visual form-meaning relationships to be "linguistically insufficient" (Wilbur, 1987: 169). Supalla (1978) was among the first to seriously investigate polycomponential verbs and to counter the claim that their iconic character meant that they could not be analyzed into discrete units of meaning. He argued instead that polycomponential verbs were complex morphological constructions, similar to those found in polysynthetic spoken languages such as Navajo. Although the handshape morphemes in these signs did appear to reflect visual characteristics of the referent (particularly its shape), Supalla (1978: 29) drew on the work of Allan (1977) to argue that these handshapes in ASL functioned "...similarly to certain types of morphemes in spoken language which linguists have called classifiers". This proved to be a turning point in the understanding of these forms, with Supalla's (1978) seminal analysis of these signs in ASL leading to a number of further studies, including a number which investigated the acquisition of polycomponential constructions (Kantor, 1980; Schick, 1987; Supalla, 1982). In the acquisition of ASL as a first language, it appeared that mastery of these forms appeared relatively late in the child language development. Supalla's (1982) research indicated that signing children as old as 8 years of age had still not completely acquired the subtleties of this morphological system. This was interpreted as providing evidence for Supalla's analysis of these forms as multimorphemic constructions, because morphological complexity had been found to affect stages of acquisition of spoken languages (Slobin, 1982).

Since the late 1970s, the use of the term *classifier* to refer to the handshape morpheme in these constructions has gained widespread acceptance in the sign linguistics literature. I will discuss the notion of classifier handshapes in Chapter 4 in a detailed comparison between spoken language classifiers and the handshape component in polycomponential verbs. In this chapter, I will provide an introduction to these constructions in Auslan, discuss their relationship with other verbal forms, review several of the major studies of polycomponential verbs in other signed languages and previous work on Auslan, and propose a classification and preliminary description of the sources of meaning involved in these forms. Although the work by Supalla (1978, 1982, 1986, 1990), McDonald (1982, 1983), Schick (1987, 1990) and Brennan (1990, 1992) on polycomponential verbs in ASL and BSL has deepened our understanding of these forms and challenged many previously-held assumptions, I will show that providing a detailed inventory of the proposed morphemes involved in these complex constructions remains a descriptive and analytical problem as yet unresolved by any signed language researcher. I conclude that this difficulty poses problems for the widely accepted homogeneous model of signed language grammar.

3.2 An example text from Auslan

Like Engberg-Pedersen (1993), I will demonstrate the characteristics of polycomponential verb signs in Auslan by using examples of these signs taken from a narrative. The signed narrative I discuss below is from the video *Signs of Language* (Center for Deafness Studies and Research, 1992). In this monologue, the signer is remembering an event from his school days in which he and his classmates were in a carpentry class, and the teacher was attempting to ensure the school children focus on their work rather than daydream. The signer recounts how the teacher threw chalk at him in order to wake him from his daydream, and eventually walked up to him, grabbed him around the neck, and ordered him to concentrate on his work while signing over his shoulder, causing his head to be shaken around uncomfortably. I have chosen this data not because I wish to discuss the educational experiences of deaf children, but because it is from a well-known video, widely used in the teaching of Auslan as a second language and deafness awareness training, and because a number of the polycomponential verbs used in the narrative are explicitly described as "classifier signs" in later parts of the video. In the remainder of this section, I will first provide an English translation for the monologue (based on the translation provided by the voice-over and captions), then follow this with a transcription using English-glosses based on my adaptation of the transcription conventions outlined in Engberg-Pedersen (1993) which is described in Appendix 3, and lastly, I will discuss the examples of polycomponential verb signs in ordinary prose.

> I'll never forget this. When I was young and still at school, we had to learn carpentry. All the boys had to go to carpentry class. Some of us used to daydream in class as we worked, and one day I was idly looking around the room when something hit me on the head. I was shocked. The teacher had thrown something small at me to make me get on with my work. My classmates and I looked at each other—what a nerve he had! We got back to work, but I became curious, winked at my classmates and took a peek at the teacher. I was surprised to see him glaring straight at me over the rim of his glasses. Our eyes met, and I looked away, feeling guilty that he had caught me, and got back to work. I looked up again, and suddenly saw that he had started striding towards us with a stern expression on his face. He was not pleased. He ordered us to get back to work, and took hold of our necks and thrust his arms around behind us, signing "Watch! Watch! Watch!" over our shoulders. My head was jerked backwards and forwards uncomfortably as he did this, but I simply had to put up with it until he stopped and walked off. We watched him go, exchanged disgusted looks, and resigned ourselves to work.

1

gaze	*forward*———
face	*shake-head*——— *brows-up*———
hands	PRO-1 NEVER FORGET LONG-AGO WHEN PRO-1 STILL -a-t- SCHOOL PRO-1+pl. HAVE LEARN

2

gaze	*forward*———
face	*nod*
hands	CARPENTRY ALL BOY (2H) 5: many-animates+(near-left-shoulder+move-line+forward-left)

3

gaze	*forward*———
face	*nod*
hands	CARPENTRY LEARN USE-HAMMER USE-PLANE+ V: look +(upwards+move-circle)+

4

gaze	*forward*——— *up-and-around*———
mouth	*tongue-protrudes*———
hands	SOME PRO-1+pl. YOUNG BOY SAME DREAM (2H) V: look +(upwards+move-circle)+

5

gaze	*up-and-around*——— *right*———
face	*shocked-expression*———
hands	X: small-entity +(forward-right+move-line+forehead) center+LOOK+right WHAT SURPRISE

6

gaze	*forward*———
face	———*nod*
hands	TEACHER center+THROW+left X: small-entity +(forward-right+move-line+forehead)

7

gaze	*forward*——— *right*——— *left*———
face	*frown*——— *angry-expression*———
hands	ORDER+left WORK center+LOOK+right ANNOYED LOOK-reciprocal+left WHAT-A-

8

gaze	——*down*——
face	——
hands	NERVE PRON+right center+LOOK+down WORK++ center+LOOK+down WORK++

9

gaze	*left*——*right*——*left*——
face	*wink*——*startled-expression* *stern-expression*——
body	*shoulders-jerk-upwards*
hands	HAVE-A-PEEK center+LOOK+right gC: thin-round-entity+(under-eyes+change-orientation)

10

gaze	——*right*——*down*——
face	—— *startled-expression*
right hand	center+LOOK+left right+LOOK+center WRONG^MIND PRO-1 WORK++
left hand	center+LOOK+right-then-down

11

gaze	*right*——
face	*shocked-expression*
hands	center+LOOK+right G: animate+(forward-right+walk-in-a-line+center)

12

gaze	*left*——
face	*stern-expression*——
hands	(2H) S+: arm+(analogue:walk-in-quick-and-angry-manner) center+LOOK+right

13

gaze	*left*——*forward*——
face	*stern-expression*——*shakes-head-and-frowns*
hands	S+: arm+(analogue:walk-in-quick-and-angry-manner) NOT HAPPY

14

gaze	*left*——
face	*stern-expression*——
hands	S+: arm+(analogue:walk-in-quick-and-angry-manner) ORDER-left WORK ORDER-left

15

gaze	*forward*——
hands	(2H) C: handle-cylindrical-entity+(center+move-arc+forward+abrupt-offset) POSS-1+pl. NECK

16

gaze	*left*——*squint-and-down*——
head	*shakes-backwards-and-forwards*——
face	*frown*——*grimace*——
hands	AND forward-far-right+LOOK+left++ S+: head-and-torso+(near-right+analogue:shakes-

17

gaze	——*right*——
head	——
face	——*disgusted-expression*——
hands	backwards-and-forwards)++ HOW-DARE-YOU+right PUT-UP-WITH-IT

18

gaze	——*left*——
face	——*shakes-head*——
hands	G: animate+(center+walk+forward-right) GO LOOK-reciprocal+left-and-down

19

gaze	*down*——————————*forward*—————————
face	*shakes-head*—————————
hands	GRIN-AND-BEAR-IT WORK++ NEVER FORGET PRO-1 PRON-forward

This narrative clearly illustrates the morphological diversity of signs in the Auslan lexicon. Throughout the text, many examples of monomorphemic lexical items are used, represented by English glosses. These include nouns (such as SCHOOL, BOY and TEACHER), verbs (such as FORGET and DREAM) and various functors (such as NOT and AND). Such signs are completely specified morphemes from the core native lexicon, and are limited in their ability to combine with additional units of meaning. Nominal signs like SCHOOL, BOY, and TEACHER, for example, cannot usually be morphologically modified to signal plurality (the reduplication which is possible with some nominals is not possible with these forms, perhaps because they are already specified for a repeated movement feature). In contrast, the patterns of movement in verbs such as FORGET and DREAM can be modified to signal aspectual meanings. A slow reduplication of the circular movement in DREAM, for example, might be used to express continuative aspect (Brennan, 1992). The handshape and location specifications in these signs, however, are fixed, and cannot be replaced with other p-morphs to derive modified forms.

A number of polycomponential constructions are also used in this monologue. Unlike monomorphemic lexical items, we have seen that these constructions have traditionally been analyzed as the result of a combination of a large number of highly productive p-morphs. In line 11, for example, the signer uses a G: *animate* handshape morpheme on his right hand (as shown in Figure 3.2). As mentioned in Chapter 2, this morpheme can be combined with location, movement and manner of movement components to characterize the motion and location of animate entities, particularly human beings. Here it is used to represent the motion of the teacher. From a location on his right (represented as *right*), the signer moves his hand in a line inwards towards himself (*center*) in the center of the signing space. The movement from one locus to another is linear (not circular, for example, or in an arc), and as the hand moves, it bounces slightly, which I have transcribed as an example of a manner of motion component *walk*, here combining with the path component *in-a-line* to represent the walking motion of the human being. Because the signer could simply have moved the hand in a linear fashion from *right* to *center* without the bouncing movement, I have treated this manner of motion as a separate meaningful component[1]. This is shown in Figure 3.2 below. Although it is not explicitly transcribed, the handshape is oriented with the finger held vertically and with the palm towards the signer. The unmarked orientation for the G: *animate* morpheme is vertical and the palm facing forward with respect to the movement path, so I have not indicated this in the glossing[2]. In line 18, the same construction is used to represent the teacher walking away from the signer, but here the orientation has the palm away from the signer. This reflects the fact that palm side of the finger is understood as representing the front of the referent's body.

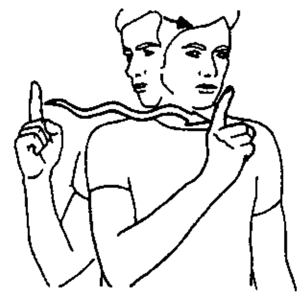


Figure 3.2

In line 2, a related plural form of the G: *animate* handshape morpheme is used, transcribed here as (2h) 5: *many-animates*. The index finger in G: *animate* may be modified to signal the number of animates being referred to: the index and middle finger signal two animates, the index, middle and ring for three animates, and all four fingers for four animates (the first illustration in Figure 3.1 shows an example of this modification to represent two animates). If the number is greater than five, than the whole hand with fingers spread apart may be used, and the orientation of the hand changes so that the palm is directed downwards, with the fingers in a horizontal position. Here the signer represents the movement of the boys going to carpentry class by the use of a two-handed, symmetrical hand arrangement. The hands move in a linear path (*move-line*) from near the signer's left shoulder (*side-left*) to a locus on the forward left side (*forward-left*) of the signing space. A form of this sign is shown in Figure 3.3 below.

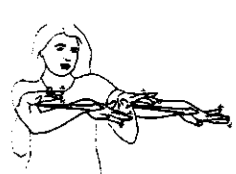


Figure 3.3

[1] See Liddell (2000c) for arguments for an alternative analysis.
[2] Engberg-Pedersen (1993) discussed the notion of *unmarked orientations* for handshape components in polycomponential verbs. By this she meant to suggest that some handshape components have a default orientation that denotes the canonical orientation of the entity in question, such as a car with the wheels downward, a person standing on his or her feet, etc. The evidence for describing these components as unmarked comes from the fact that when describing an entity in a non-canonical orientation, signers may start by holding their hand with the unmarked orientation and then change the orientation with a rotating action of the lower arm and wrist.

In lines 3 to 5, there is an example of the V: *look* morpheme. Here the handshape represents the direction of the signer's eye gaze, the lines of sight metaphorically represented as two fingers. The same hand configuration occurs in the lexicalized sign LOOK (illustrated in Figure 2.15 in the previous chapter). There are a number of examples of this sign scattered through the narrative. In lines 7, 9, 11, and 12, the handshape is directed at a location on right to represent several instances in which the signer looks at the teacher. For the sake of brevity, however, I have elsewhere represented this form simply as a modified form of the incompletely specified sign LOOK. The form in line 3, however, might alternatively be analyzed as part of a polycomponential construction. Here the signer is describing how he and his schoolmates daydreamed, idly looking around the room, rather than getting on with their school work. Two hands are used, perhaps to indicate that more than one person is looking, as is shown by the transcription (2h) V: *look*. The orientation of the fingers is modified so that they point upwards (*up*), and their movement is represented as circular (*move-circle*). The signer adopts a blank facial expression, directs his gaze upwards, rolls his head around a little, and produces a non-manual adverbial transcribed as *th*. This last non-manual signal (slight tongue protrusion, as if to produce the English interdental fricative /θ/ represented by *th*) is commonly used to show that something is done carelessly, or in an inappropriate manner.

Figure 3.4

There are several other polycomponential verbs of motion and location in the narrative. In line 9, the signer represents the teacher's glasses with a two-handed, symmetrical gC: *medium-size-thin-round-entity* morpheme. This hand configuration is shown in the sign in Figure 3.4. Unlike the illustration, however, the hands in this example are held near the signer's eyes, and they are moved in a slightly upward twist from a horizontal to an almost vertical orientation, perhaps to represent the teacher adjusting his glasses in order to see the student more clearly. In line 16, the signer uses the S+: *head-and-torso* handshape morpheme to represent the movement of his own head as the teacher signed aggressively over his shoulder. A form of this morpheme is used in the related sign shown in Figure 3.5 to mean 'nod one's head'. In this form, as the name suggests, the fist represents a person's head, whilst the forearm down to the elbow substitutes for the torso. This morpheme is often used in verbs of motion, which indicate a person bowing, leaning, slouching or stooping. As with the G: *animate* handshape morpheme, the palm side of the fist and forearm represents the front of the body. The movement here is transcribed as *analogue: jerked-backwards-and-forwards* and this indicates the motion of the head and body. The signer's facial expression, head movements and body posture also reflect aspects of the motion and the emotions he experienced.

Figure 3.5

In these examples, we can see that the handshapes indicating the motion of the teacher and those describing the location of the teacher's glasses all iconically represent a whole entity. The hand and forearm in the S+: *head-and-torso* morpheme, however, indicate the motion of a human being with particular reference to the head and torso. Only these parts of the body are represented by the articulators. It is not clear from the use of this form if other parts of the body were shaken about by the teacher's aggressive signing. In another example in the narrative, the signer's hands are used to denote the motion of the teacher indicated by the motion of his limbs. This can be seen in lines 12 to 14. Here the signer forms his hands into a fist handshape and moves his arms in a fashion reminiscent of a person who is walking in a very determined and angry manner. This describes the appearance of the teacher as he approached the students. Following Engberg-Pedersen (1993), I have called this morpheme S+: *arm*, since the hands and arms of the signer are used to represent themselves, but it remains an open question whether this ought to be considered a morpheme, or simply analyzed as an example of mime. The arms are also moved in a way, which is analogous to a stylized version of the motion described (*analogue: walk-quickly-and-angrily*). This is shown in Figure 3.6. This highly mimetic form is produced in a type of serial verb construction in combination with the verb based on the use of G: *animate* handshape morpheme. Here, the construction with S+: *arm* is intended to describe the manner of motion (walking quickly and angrily), whilst the construction with G: *animate* indicates the path (from the right to the center of the signing space).

Figure 3.6

The combination of a double-handed S+: *arm*, positioned in neutral space, produced with this imitative type of movement also co-occurs with a shift in the signer's eye gaze and an altered orientation of the head, as well as the use of particular facial expressions. This use of gaze direction, head movement and facial expression is part of a complex of mimetic behaviors variously known as *role shifting* (Lentz, 1986), *referential shifting* (Reilly, 2000), or *constructed action* (Liddell & Metzger, 1998). The change in eye gaze and head orientation signal that the signer's head and body no longer represents the signer himself, but the teacher. Engberg-Pedersen (1993) refers to this as *shifted locus*: in this example, the locus occupied by the signer's body actually represents a person other than the signer. The facial expressions represent the signer's interpretation of the teacher's emotions as he angrily strode across the room towards the students. We can see a clear contrast in the use of these signals in line 13, as the signer's gaze and head momentarily turn back towards the addressees whilst he signs NOT HAPPY, and then return to the role-shifted position as he continue to describe the teacher's motion. This use of non-manual features has been referred to as *shifted attribution of expressive elements* (Engberg-Pedersen, 1993), and it quite commonly co-occurs with the use of these types of polycomponential verbs.

In lines 15, there is another example of what might be considered a type of polycomponential construction. Here the signer's hands imitate the actions of the hands of the teacher as he recounts how the teacher reached out and grabbed the neck of the students and forced them to watch their work. The signer uses a double-handed form I have labeled as (2h) C: *handle-medium-sized-cylindrical-entity*. This hand configuration is illustrated in Figure 3.7. This hand configuration is combined with a slightly arcing movement out into neutral space (*move-arc*), the motion ending with an abrupt offset to signal the hands making contact with the body of the student. This final movement is analyzed by Engberg-Pedersen (1993) as a movement morpheme (represented as *loc*), since it often occurs in verbs of handling which are used to indicate someone's putting an object in a location or someone's hands making contact with an object.

Figure 3.7

This narrative demonstrates quite clearly the enormous variety of resources available to a signer of Auslan. We can see that the signer uses a range of different polycomponential constructions to describe the actions of the characters in the narrative, but there is also a degree of combination and recombination of the same elements (in the use of the G: *animate* handshape morpheme and *move-line*, for example, to represent both the teacher approaching and later moving away). The signer represents aspects of the same event in different ways (such as the sequential use of polycomponential verbs using the G: *animate* and S+: *arm* handshape morpheme to describe the teacher's path and manner of motion), sometimes using the same components several times in different combinations (as in the various forms of the signs using V: *look*).

Despite the high degree of iconicity found in these forms, many researchers have suggested that it is possible to analyze the activities of the manual and non-manual articulators as various morphemes as I have done here. In the rest of this chapter, I will attempt to answer some of the following questions raised by the analysis of these forms as polycomponential verbs of motion, location, handling and visual-geometric description: How do these constructions relate to other verbs in Auslan? What is the inventory of meaningful handshape components that can be used in these constructions in Auslan and what are the differences between these handshape components? What is the inventory of movement components? How is space used in these constructions? How should we analyze the various sources of meaning in these apparently complex verbs of motion and location?

3.3 Terminological issues

As mentioned earlier, there is a widespread tendency in the sign linguistics literature to refer to the meaningful unit expressed by handshape (such as G: *animate*, and C: *handle-medium-sized-cylindrical-entity* described above) as examples of classifier morphemes. In the 1970s, however, a number of American researchers referred to these hand configurations as *markers* (Mandel, 1977; DeMatteo, 1977), while in the European tradition, they have sometimes been called *proforms* (Engberg-Pedersen & Pedersen, 1985; Sutton-Spence & Woll, 1999).

The term *marker* was not widely adopted by researchers outside the University of California at Berkeley group who introduced it (although Supalla, 1982, did use it to a limited extent), perhaps because it is too general, or possibly due to its apparent links with the controversial theories of the generative semantics school. The term *proform* has also not been widely accepted, although it is still used by some researchers to refer to a subset of classifier morphemes. In Sutton-Spence and Woll (1999) and in Miles (1988), for example, it seems to be used specifically for a limited number of a set of very general hand configurations, often one that is unrelated to the handshape used in an accompanying lexical sign. Thus in the following examples, it appears to be the case that the handshape used in 3-5 would be considered a proform by these writers (because the configuration is very general in meaning and different from the configuration in the nominal sign man), whereas it is not clear if this is true for the example in 3-6 (because the hand configuration is more specific in terms of its shape, and is same in both the nominal and polycomponential verb).

3-5.

MAN G : animate + (forward-right + move-line + forward-left)

"The man walked past me"

3-6.

-t-o-y- PLANE Y: entity-with-two-extensions + (forward-right +move-line + forward-left)

"The toy plane flew past me"

The use of the term *proform* seems, however, to have been abandoned by some other writers. Engberg-Pedersen (1993) used it in earlier publications on Danish Sign Language (Engberg-Pedersen & Pedersen, 1985), but most recently appeared to use this terminology to refer to a subset of pointing signs. I will not use the term here due to these differing usages in the literature, and because it is perhaps best retained in its traditional linguistic sense as a collective term to refer to all those items in a sentence which may substitute for other items, such as pronouns, pro-verbs (e.g., *do* in *I like films and John does too*), pro-locatives (*there* as in *Mary is going to the park and I want to go there too*) etc.

There has been far less agreement on the terminology that ought to be used to refer to the complex constructions in which the meaningful handshape component occurs. Descriptions of these verb complexes in many signed languages have used a wide variety of terms to refer to what appear to be very similar constructions. In the Auslan literature, they are generally referred to as *classifier signs* or simply *classifiers* (Bernal, 1997; Branson et al., 1995), whilst elsewhere they have been variously referred to as *verbs of motion and location* (Supalla, 1986, 1990), *classifier forms*(Brentari, 1998), *classifier predicates* (Corazza, 1990; Liddell, 1977; Schick, 1987, 1990; Smith, 1990; Sutton-Spence & Woll, 1999; Valli & Lucas, 1995), *spatial-locative predicates* (Liddell & Johnson, 1987), *polymorphemic predicates* (Collins-Ahlgren, 1990; Wallin, 1990), *polysynthetic signs* (Takkinen, 1996; Wallin, 1996), *productive signs* (Brennan, 1992; Wallin, 1998), *polymorphemic verbs* (Engberg-Pedersen, 1993) and *polycomponential signs* (Slobin et al., 2000).

The discussion that follows later in the chapter draws heavily on the work of the American researcher Scott Liddell (2000a, 2000b) and the Danish Sign Language researcher Elisabeth Engberg-Pedersen (1993, 1996).

Unlike these authors and my own previous work (Schembri, 1996; 1998; Schembri & Adam, 2000), however, I have chosen to use the term *polycomponential verb* rather than Liddell's *classifier predicate* or Engberg-Pedersen's *polymorphemic verb* for the purposes of this description. Although a subset of polycomponential constructions are clearly verbal in character, such as those forms used to represent the movement of a human being in the narrative discussed above, these constructions also include forms, which have also been described by other researchers as having an adjectival role (Schick, 1990a, 1990b). This appears to be the reason the term *predicate*, rather than *verb*, has been adopted by some researchers. I will not follow this practice, however, for two reasons. Firstly, the term *predicate* has traditionally been used to refer to a constituent of sentence structure, rather than a lexical category (Crystal, 1991). Secondly, it is possible that the adjectival type of polycomponential verbs is best considered a kind of stative verb. Engberg-Pedersen (1993) has suggested that we need more evidence before we can claim that this subclass of complex constructions actually act as adjectives (Engberg-Pedersen, personal communication, April, 2000). This is in keeping with the debate in the literature as to whether or not there is any evidence for the lexical category of adjective in signed languages (Bergman, 1983, 1986; Johnston, 1989). There does appear to be some support for a class of non-polycomponential adjectives in Auslan, but this claim does require more investigation. Some non-polycomponential signs that express adjectival meanings have most of the grammatical properties of verbs (especially stative verbs), but some appear to have some distinctive properties not shared by verbs. Signs such as RED or BIG, for example, may be modified by combining with premodifiers such as VERY and MORE, and may also be used attributively (i.e., they may appear before a nominal). It is not clear if the polycomponential signs of visual-geometric description that appear to have adjectival meanings, however, share these adjective-like properties. In any case, it is also not entirely evident that these properties are sufficient to suggest that such usages of non-polycomponential signs qualify as adjectival. As a result, the inclusion of these forms in the category of verbs appears to be the most appropriate analysis, subject to later revision. I am thus provisionally using *verb* as a superordinate term that includes both verbs of motion, location and handling, and adjectival-type constructions of visual-geometric description.

BED OLD HAVE B: flat-wide-surface + trace: dip + center

'The old bed has a dip in the middle'

Figure 3.8

There are in fact a number of difficulties with other aspects of the current terminology used to refer to polycomponential constructions. Like other researchers, I will focus here on the verbal role of polycomponential signs in Auslan, despite the fact that these constructions, especially verbs of visual-geometric description, appear also to play a nominal role (Brennan, 1992; Engberg-Pedersen, 1993; Johnston & Schembri, 1999; Slobin et al., 2000). The example from ASL shown in Figure 3.8 demonstrates the apparently nominal use of these forms. In this example, the first three signs BED, OLD and HAVE are monomorphemic signs in ASL, while the last sign might be analyzed as a polycomponential sign of visual-geometric description. It is used here to describe the shape and location of the dip in the middle of a mattress. Its position in a sentence, as the complement of HAVE, suggests that it is playing a nominal role in this context. Although the lexicalization of polycomponential verbs has been described for a number of signed languages (Brennan, 1990; 1992; McDonald, 1982; Valli & Lucas, 1995; Woll, 1990), the productive nominal use of these constructions have not been discussed in detail for many signed languages, and needs further investigation.

Another difficulty, as I will demonstrate in Chapter 4, rests with the use of the term *classifier*. Comparisons of polycomponential verbs in signed languages with classifier forms in spoken languages have found that any comparison between the two is highly problematic (Engberg-Pedersen, 1993, 1996; Schembri, 2000). As a result, I have chosen to avoid all those terms that make reference to the concept of classifiers, such as *classifier sign*, *classifier form* and *classifier predicate*.

Alternative terminology, however, brings with it additional difficulties. Supalla's term *verb of motion and location* is too imprecise. In Auslan, for example, there are many other verbs which denote kinds of motion (such as SWIM, RUN, TRAVEL, ARRIVE, and LEAVE) that are best not considered polycomponential constructions, and many signs generally grouped with polycomponential verbs do not refer to a referent's motion or its location.

Labels such as *spatial-locative predicates* appear to suggest that this class of signs exhibit a distinctive use of space, but the use of the signing space is a fundamental feature of many aspects of the morphosyntax and discourse structure of signed languages, and some writers have argued that it is not unique to these constructions (Engberg-Pedersen, 1993).

Referring to these signs as *productive signs* is also not appropriate, as the term *productive* is usually used with reference to a specific grammatical feature or process, rather than a class of lexical items (Bauer, 1988). It is the morphological processes found in signed languages that are used to produce these signs which might be described as productive, rather than the signs themselves. Furthermore, recent work by Liddell (2000c) has begun to question traditional assumptions about the degree of productivity found in these signs (this is discussed in 3 below).

Similarly, the term *polysynthetic*, as Engberg-Pedersen (1993) pointed out, is one most commonly used by some typologists to refer to a class of languages , rather than a specific lexical category, and these languages have morphological characteristics which differ from those found in the complex verbs under discussion. Engberg-Pedersen's alternative term *polymorphemic* is also not completely satisfactory, since it is often used simply to identify any lexical item composed of more than one morpheme (i.e., monomorphemic), and not necessarily in contrast to other more specific terms, such as bimorphemic (Crystal, 1991). Although Engberg-Pedersen (1993) appeared to overlook this ambiguity, it is clear that she did not intend to suggest that all other verbs in Danish Sign Language are composed of a single morpheme:

> My main point here, however, is to distinguish two major groups of verbs in Danish Sign Language, and the primary difference between them is that verbs belonging to one group have base forms with from one to three morphemes, while the others are characterised by a stem that can combine with a large number of morphemes denoting motion and location, orientation, direction, relative position, manner, aspect, and distribution.

Moreover, the use of the term *polymorphemic* is also questionable because it is not clear which of the sublexical components in these forms can actually be analyzed as morphemic (Cogill, 1999). This point is discussed in more detail in 3.8 below.

3.4 Predicates in signed languages

Signs that may function as predicates in signed languages can be organized into types according to morphosyntactic and semantic criteria. Many descriptions of signed languages suggest that verbal, nominal, and adjectival signs may all function as predicates (Padden, 1988). The examples shown in 3-7 come from ASL (Valli & Lucas, 1995), but all would be equally possible constructions in Auslan.

3-7

(a) INDEX-right PLAY
'He/she/it is playing'

(b) ______________t
BOY INDEX-right HOME
'The boy is at home'

(c) ______________t

INDEX-left HOUSE YELLOW

'The house is yellow'

Much of the research literature has concentrated on the description of verb classes in signed languages, and this is the most relevant for our discussion here.

3.5 Verbs in signed languages

As mentioned previously, the polycomponential constructions that are the focus of my research have generally been considered a subclass of verb (Engberg-Pedersen, 1993; Liddell, 2000c; Padden, 1988). I will now outline some of the main verb typologies that have been suggested by researchers working on Auslan and other signed languages. In 3.5.1, I provide an overview of two verb typologies from the homogeneous model, and in 3.5.2, two analyses using a heterogeneous model of signed language structure.

3.5.1 Homogeneous models of verb systems in ASL and Danish Sign Language

In signed languages, verbs can be classified according to a range of criteria. We can recognize syntactic differences in verb signs, based on whether they are transitive, such as the Auslan sign SHOOT, or intransitive verbs, such as COME. We may also use semantic distinctions, dividing verbs into those that indicate states of affairs, such as STAND, and those that indicate actions, as in WALK (Engberg-Pedersen, 1986).

Most descriptions of verbs in signed languages have, however, attempted to group verbs into separate classes solely based on morphological criteria. Initial descriptions of ASL recognized two broad categories of verbs: *directional* or *multidirectional* verbs (i.e., those that used spatial modifications) and those that were *non-directional* or *body-anchored* (Baker-Shenk & Cokely, 1980; Fischer & Gough, 1978).

Perhaps the most influential classification of verbs in signed languages has come from the work of Padden (1988, 1990) on ASL, but alternative approaches taken in descriptions of Danish Sign Language by Engberg-Pedersen (1993), of Auslan by Johnston (1989, 1991b) and of ASL by Liddell (2000a, 2000b) also will be presented. Padden (1988, 1990) and Engberg-Pedersen (1993) appear to attempt to treat all aspects of the meaning of signed language verbs as morphemes, and thus might be considered to be working within the homogeneous model of signed language structure.

3.5.1.1 Padden (1988)

Padden (1988) identified three major classes, based on their morphosyntactic use of space: *inflecting verbs*, *spatial verbs*, and *plain verbs*. She claimed that each of these verbs differ with respect to which morphemes may be added to them:

> Inflecting verbs, unlike the other two classes, mark for person and number. Spatial verbs mark for location and position, and a sub-class marks for path and manner of movement. In contrast, plain verbs do not mark for these categories (Padden, 1988: 25)

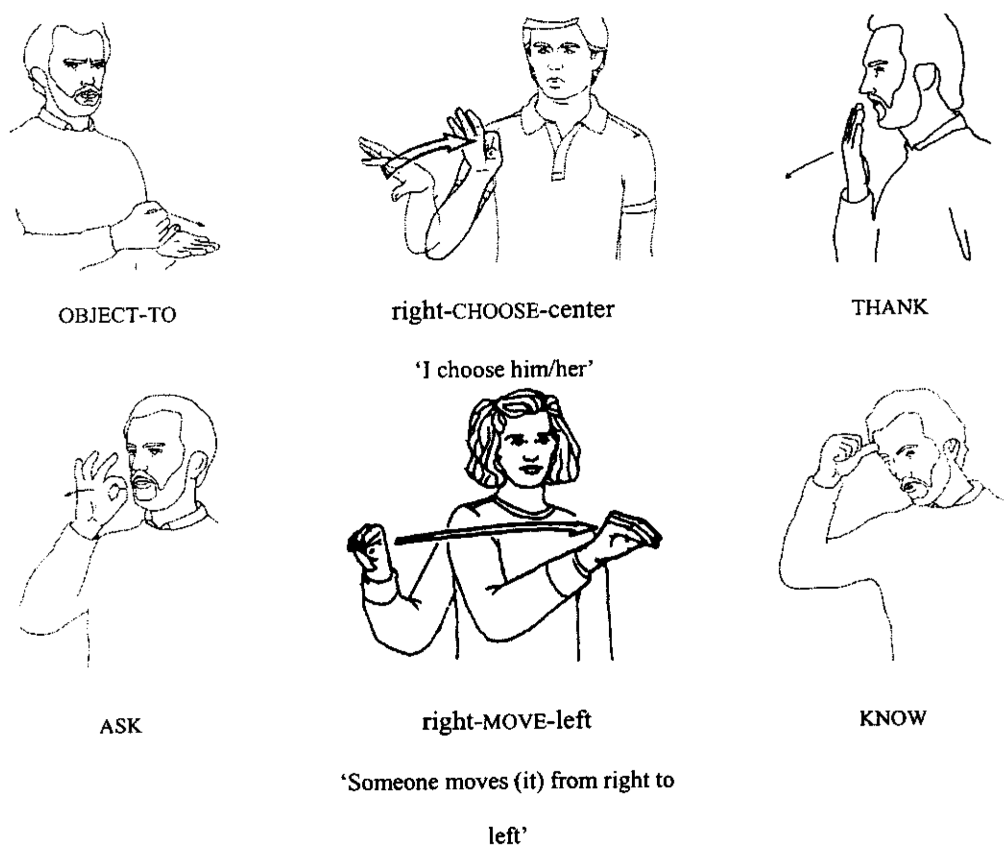
A modified version of Padden's (1988) classification is shown in Table 3.2 (it includes examples from Auslan rather than ASL). Since the initial publication of her typology (Padden, 1988), the term *inflecting verb* has been replaced by *agreement verb*, in recognition of the fact that some of the verbs previously not classified as "inflecting" may in fact be modified for aspect (Padden, 1990). The notion that plain verbs cannot be modified for agreement has, however, come into question, with Bahan (1996) arguing that the non-manual features which co-occur with this class of sign may be modified to signal agreement. Although Bahan (1996) appeared to have recognized a hitherto undescribed means of signaling person roles, not all researchers have accepted that this use of eye gaze is a grammatical device (Liddell & Metzger, 1998). Nevertheless, Padden's classification has been widely adopted by other ASL researchers (Aarons, Bahan, Kegl & Neidle, 1994; Bahan, 1996; Cormier, 1998; Kegl, 1990; Liddell, 1990; Valli & Lucas, 1995), as well as by researchers working on other signed languages, such as Brazilian Sign Language (Lillo-Martin, Mueller de Quadros & Mathur, 1998), BSL (Sutton-Spence & Woll, 1999), Israeli Sign Language (Meir, 1998), Italian Sign Language (Pizzuto, 1986), New Zealand Sign Language (Collins-Ahlgren, 1989) and Taiwanese Sign Language (Smith, 1990).

Table 3.2

Plain verbs	*Spatial verbs*	*Agreement verbs*
LIKE KNOW TASTE	-Classifier verbs V: two-animate-entities + (forward + move-line + center) -Locative verbs MOVE PUT DRIVE-TO	-Double agreement verbs GIVE -Single agreement verbs REMIND -Backwards agreement verbs CHOOSE

I will illustrate Padden's classification scheme using examples of verb signs from Auslan (some of which are illustrated in Figure 3.9). The class of agreement verbs includes the signs GIVE, OBJECT-TO, and PAY. In their citation form, each of these signs is produced with a movement away from the signer. The direction of the movement, and often also the orientation of the hand(s), in these signs is analyzed as an inflection used to signal person and number agreement. In the case of the Auslan examples provided here, the initial position of the hands may be described as signaling the subject argument and the final position may express the object argument of the verb. This, however, is not always the case. *Backward agreement verbs*, such as CHOOSE, work in the opposite fashion (i.e., the initial position stands for the object and the final for the subject argument).

These various loci in space were analyzed as agreement affixes by Padden (1988, 1990). As can be seen in the example GIVE shown in Table 2.4 in the previous chapter, first person agreement affixes are loci near the signer's body, and second person are loci near to or in the direction of the addressee. If the referent is physically present, third person agreement may be signaled by directing the sign towards its real-world location. If it is absent, agreement for third person may use any other location away from both the signer and the addressee (Padden, 1988).



OBJECT-TO | right-CHOOSE-center 'I choose him/her' | THANK

ASK | right-MOVE-left 'Someone moves (it) from right to left' | KNOW

Figure 3.9

The Auslan examples provided here actually represent a subset of agreement verbs which Padden (1990) called *double agreement verbs*. These can be contrasted with verbs that show *single agreement* which are modified only for their object argument, such as SHOW, THANK and REMIND. Many single agreement verbs have a citation form involving some contact on the head or body (thus they are sometimes known as *body-anchored* verb signs), but this formational characteristic is not sufficient to predict whether an individual verb will show single or double agreement. A number of such verbs which may appear body-anchored in citation form, such as ASK or VISIT, appear to be modified by some signers to show double agreement, while others only accept them as single agreement verbs.

Padden (1988) contrasted agreement verbs with spatial verbs and plain verbs. Spatial verbs may undergo modifications of orientation and movement similar to agreement verbs, but in this case the different loci do not signal person agreement. Instead, they act as locative morphemes. Thus, in the polycomponential verb of motion meaning "two people approach me" presented in Figure 3.1, the initial and final position of the hand express not the subject and object of the verb, but the locative relations between the signer and the people represented by the handshape of the sign (i.e., the two people being referred to moved towards the signer from some distance away on the right). Padden's class of spatial verbs is, however, larger than the class of morphologically complex verbs of motion and location. She also included non-polycomponential verbs, such as MOVE, DRIVE-TO, or PUT, where the final position(s) of the hand can be used to signal a location, not the object argument of the verb.

For Padden (1988), both agreement and spatial verbs contrasted with the class of plain verbs. These signs, such as LIKE, KNOW, and TASTE do not inflect for person or number agreement, nor do they take locative affixes. The arguments of the verb must appear as separate lexical items.

Padden's (1988, 1990) typology of verb classes has generated considerable debate amongst signed language researchers (Bos, 1990; Engberg-Pedersen, 1993; Johnston, 1991b; Liddell, 1998). Many of the criticisms center around Padden's claim that the functions of spatial loci found in agreement versus spatial verbs are distinct. As can be seen from the Auslan examples above, Padden (1988) claimed that identical modifications to agreement and spatial verb signs (i.e., such as the movement from a locus on the right side of the signer to one on the left side, as in the examples GIVE and MOVE illustrated in Figure 3.9) are best analyzed as reflecting different grammatical constructions, despite the lack of any formal difference between the two uses of space. Her argument is based primarily on the differences in meaning. In a sense, this makes Padden's system of classification somewhat inconsistent. The difference between plain verbs on one hand, and agreement and spatial verbs on the other, does indeed reflect formal differences between the two in respect to their morphological use of space. But this distinction between agreement and spatial verbs is not based on morphological differences in spatial patterning, only semantic ones (Engberg-Pedersen, 1986). Due to the lack of any difference in form, researchers working on several signed languages have found it difficult to distinguish consistently between the use of space to signal person agreement and to express locative relations (Bos, 1990; Engberg-Pedersen, 1986, Johnston, 1989, 1991b). It is not clear, for example, how the various modifications of the Auslan sign LOOK in the narrative described in section 3.2 ought to be analyzed. When the signer alters the orientation of the hand in this sign so that the fingers are pointing to his right (the locus established in this context to represent the teacher), does the signer intend to mean "I looked to my right" or "I looked at the teacher"? There do not appear to be any formal differences in the modifications to this sign that can express the person agreement and locative meanings.

The debate surrounding these issues has become the focus of more attention in the literature recently. As these claims also have relevance for our understanding of the use of space in polycomponential verbs, I will discuss this question in more detail below in 3.5.2.

3.5.1.2 Engberg-Pedersen (1993)

Engberg-Pedersen (1993) suggested verb classification scheme differs in a number of important ways from those described in Padden (1988, 1990). She categorizes many of the verbs discussed above on the basis of a distinction between modifications signaling *semantic agreement* versus what she calls *pragmatic agreement*, and sets up a contrast between these modifications found in non-polymorphemic verbs with the spatial and movement modifications found in polymorphemic forms.

Table 3.3

Non-polymorphemic verbs<-->Polymorphemic verbs	
Semantic/pragmatic agreement verbs	V: two-animate-entities + (forward + move-line + center)
GIVE	
CHOOSE	
MOVE	
Pragmatic agreement verbs	
TALK	
WRITE	
ANALYZE	
Plain verbs	
LIKE	
KNOW	
TASTE	

As shown in Table 3.3, the main distinction suggested by Engberg-Pedersen (1993) in predicate types is between polymorphemic and non-polymorphemic verbs as prototypes at each end of a continuum, and not between those forms which show subject and object agreement and those which signal locative relationships (Padden, 1988). Other writers have suggested a similar dichotomy (see, for example, Schick, 1991). This typology of predicates represents a useful alternative to the division between agreement and spatial verbs that has been the source of some debate in the literature. The usefulness of Engberg-Pedersen's classification also stems from her claim that it reflects clear morphological and semantic differences, not simply semantic ones. In her analysis, polymorphemic verbs of motion, location, handling and extent do not have a base form, but are assembled around a handshape stem to which movement, location, orientation and non-manual morphemes are added. Polymorphemic verbs differ from non-polymorphemic forms in that only signs closer to the polymorphemic end of the continuum are characterized by the highly productive combination of a range of morphemes denoting figure, ground, motion, location, orientation, direction, manner, aspect, extent, shape, and distribution. In contrast, the non-polymorphemic verbs tend to have monomorphemic base forms, which in some cases can combine with one or two additional morphemes, such as those used to express distribution "of a state, a process, or an event over points or periods in time or over entities or locations" (1993: 20) and aspect, for marking of point of view (such as the examples of shifted locus and shifted attribution of expressive elements described in 3.3 above), and for semantic or pragmatic agreement.

The notion of semantic agreement refers to the type of agreement already described for Padden's (1988) class of agreement verbs. The defining criterion is that "...a form of the verb shows the semantic relations of the arguments to the verb unambiguously" (Engberg-Pedersen, 1993: 154). Engberg-Pedersen used the term *semantic agreement* here in recognition of the fact that this type of verb modification in signed languages does not appear to be obligatory in any context, unlike grammatical agreement where the form of one word requires a corresponding form in another (Crystal, 1991). As in the classification system outlined by Padden (1988), the class of verbs which show semantic agreement have two lexically determined subcategories: double agreement and single agreement verbs.

In contrast, verbs which show pragmatic agreement are able to indicate that there is "...a relation of some kind between static or dynamic situations and the entities and locations which are part of them, but the semantic nature of the relation is not clear from the form of the agreeing constituent" (Engberg-Pedersen, 1993: 214). In pragmatic agreement, the location of the verb such as ANALYZE (see Figure 3.10) may be modified, but this modification is identical regardless of whether the argument of the verb is the agent, patient, source or goal. This is exemplified in the following example from Danish Sign Language (a signed clause complex with equivalent glosses would be identical in Auslan):

3-8.

_______________________________________t

SECOND + fsl CLASS + fsl ANALYZE + fsl FINISH + fsl /FOURTH + fsr ANALYZE + fsr

"When second class had finished analyzing, fourth class analyzed"

OR

"When second class had been analyzed, fourth class was analyzed"

ANALYZE

Figure 3.10

All of the signs in the first clause are produced in a location to the front and left of the signer's body (*fsl* = forward side left), whilst all those in the second clause are articulated on the right (*fsr* = forward side right). As Bergman (1995) pointed out in her review of Engberg-Pedersen (1993), this type of spatial modification has not been the focus of much attention in earlier descriptions of signed languages, and the term pragmatic agreement is actually introduced in Engberg-Pedersen's work. As we will see below, Johnston (1991b) did recognize this aspect of verbal morphology, however, in his class of freely-locating verb signs in Auslan, but this type of modification is absent from the classification scheme suggested by Padden (1988).

As we have seen, the analysis of verbs by Engberg-Pedersen (1993) did not separate verbs into three classes of plain, agreement and spatial verbs. Instead spatial modifications may be used to signal both person and locative relations, and non-polymorphemic and polymorphemic verbs are not distinct categories, but are described as extremes on a continuum.

3.5.2 Heterogeneous models of verb systems in Auslan and ASL

In this section, I will focus on two examples of heterogeneous models of verb systems. I have included Johnston (1991b) here because he appeared to avoid an analysis in which spatial loci are treated as morphemic, although he does not do so explicitly. The Liddell (1998, 2000a, 2000b) analysis mentioned in Chapter 2 is also outlined.

3.5.2.1 Johnston (1989, 1991b)

In response to the many criticisms of Padden's (1988) classification for ASL, Johnston's (1991b) typology of verb signs in Auslan makes a two way distinction between *non-spatially inflecting signs* and *spatially inflecting signs*. The former class of signs appears to be similar to Padden's (1988) class of plain verbs, whilst the latter category groups together agreement and locative verbs, but excludes polycomponential verbs. These are not included in the classification scheme because Johnston (1991b:27) argued that these forms "...form a transitional class of signs that mediate between the sign lexicon proper...and certain kinds of pantomimic behavior, specifically those involving movement through space, which are pseudo-linguistic or even extra-linguistic".

Johnston's class of spatially inflecting verbs is divided into two major morphological subcategories: those which are modified in relation to one locus in the signing space, and those which are modified for two loci. He did not explicitly refer to these spatial loci as morphemes, and seems to reject such an analysis, suggesting that "the signing space is an analog or continuous space in which it is difficult, if not impossible, to isolate discrete units" (Johnston, 1989: 347).

Verb signs which are modified with reference to a single locus include what Johnston (1991b) called *freely locating signs* and *body-locating signs*. The class of free-locating signs are those have their citation form articulated in neutral space, rather than on the body, and are thus able to be relocated in the signing space. Examples would include ANALYZE, WRITE and QUARREL.

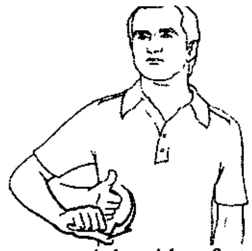
Although Johnston does not state this explicitly, this class of signs actually includes the type of modification referred to as pragmatic agreement by Engberg-Pedersen (1993) which is not discussed by Padden in her earlier work (1988). Johnston (1991b) pointed out that the locus used in the modified form may signal either a locative meaning, or signal an ambiguous type of person agreement (since the signs cannot be directed from an agent locus to a patient locus, but may simply be produced in either the locus assigned to the agent or patient). In the latter case, Johnston suggested that if the verb is intransitive, the locus may represent the agent, whilst if it is transitive, the locus may signal the patient argument.

Body-locating signs, as the name suggests, are made with reference to a single locus on the signer's body. In citation form, these signs are generally produced on or near a specific part of the body that is understood to be neutral in meaning. Thus, in the citation form of the sign OPERATE, the A handshape on the dominant hand moves across the palm of the subordinate hand. But this is not usually read as meaning 'operate on the palm'. When articulated in relation to a part of the body other than the palm, the modification signals the location of the process or the patient argument of the verb, as the following example demonstrates (see the illustration of the modified form of the verb in Figure 3.11 below):

3-9

DOCTOR OPERATE + right-side-of-stomach

'The doctor operated on the stomach'



OPERATE + right-side-of-stomach

Figure 3.11

Verb signs that are modified in relation to two loci are organized by Johnston (1991b) into three classes: *fully directional signs*, *partially directional signs* and *orientating signs*. Note that Johnston's analysis retained the usage of terms such as *directional* (used in earlier work on ASL, see Fischer & Gough, 1978), rejecting the notion that these verbs signal agreement. Fully directional signs refer to those signs in which the direction of the movement found in the citation form may be modified to indicate locative relations or person agreement. As such, these include Padden's double agreement verbs, which I have exemplified above, as well as a subset of those forms classified as spatial verbs, such as MOVE or PUT (i.e., Padden's locative verbs without classifiers).

Partially directional verbs correspond to Padden's class of single agreement verbs, although Johnston (1991b) subdivided this category according to whether they are *beginning directional* (backwards verbs) or *end directional* (regular single agreement verbs).

Orientating verbs are a small group of verbs in which orientation alone may be modified to signal locative and/or participant relations. The sign LOOK may act as an orientating verb sign, as in the following example from Johnston (1991b). The sign LOOK here does not move, but is held on right side of the signing space, with the fingertips oriented towards the signer, as shown in Figure 3.12.

3-10

sr + LOOK + c AGAIN

'He's staring at me again'

sr + LOOK + c

Figure 3.12

Johnston's (1991b) classification scheme is outlined in Table 3.4 below.

Table 3.4

Non-spatially inflecting signs	*Spatially-inflecting signs: one locus*	*Spatial-inflecting signs: two loci*
LIKE	Body locating	Directional
KNOW	OPERATE	Fully directional
TASTE	Freely-locating	GIVE
	TALK	Partially directional
	WRITE	End directional
	ANALYZE	REMIND
		Beginning directional
		COPY
		Orientating
		LOOK

3.5.2.2 Liddell (1998, 2000a, 2000b)

In a number of publications, Liddell (1995, 1998, 2000a, 2000b) has critiqued the work of Padden (1988) and a number of other researchers who have proposed that directional verbs are morphemically complex constructions which encode person agreement. In more recent work, he has also proposed a reanalysis of polycomponential verbs (Liddell, 2000b). Although he has not yet proposed an alternative verb typology for ASL, he does appear to accept a version of the tripartite classification system into plain verbs, indicating verbs (Padden's *agreement verbs*) and spatial verbs (Liddell, 1999). His reasons for accepting this typology appear, however, to be based on different assumptions about the structural differences between each verb type than those found in the original proposal by Padden (1988). As he appears to accept current analyses of plain verbs described above, I shall discuss his class of indicating verbs here.

In Chapter 2, I introduced some of the key issues in Liddell's critique, but I will describe them in more detail here. The most significant aspect of Liddell's (1998, 2000a, 2000b) proposal is his suggestion that the meaningful use of loci in agreement or directional verb signs is based on gesture and involves some fusion of linguistic and extralinguistic elements. In this view, changes in directionality in such signs are not, in a strictly linguistic sense, "inflections" and cannot be said to mark for subject and object agreement. This is the reason he rejects the term *agreement verb* for this class of signs, and has suggested *indicating verb* instead.

In a recent paper, Liddell (2000a) claimed that there is a need to rethink a number of key assumptions about the class of agreement verbs proposed by Padden (1988), Engberg-Pedersen (1993) and other researchers. He pointed out that there seems to be some confusion about three of the key concepts involved: (1) agreement, (2) the phonological structure of the agreement morpheme, and (3) the grammatical process in which the agreement morpheme is attached to the verb.

First, the agreement verb analysis has to draw on widely-accepted definitions of agreement. Lehmann (1988, cited in Liddell, 2000a), for example, proposed the following definition of agreement: constituent B agrees with constituent A (in category C) if and only if the following three conditions hold true: (1) there is a syntactic and anaphoric relationship between A and B; (2) A belongs to a subcategory c of a grammatical category C, and A's belonging to C is independent of the presence of the nature of B; and (3) C is expressed on B and forms a constituent with it.

Liddell (2000a) provided the following example: in 3-11 below (translated as 'I told mother'), a signer is talking to an addressee about their mother. The mother is not involved in the conversation, but is present in the environment. In this example, the sign TELL begins its movement at the chin and then moves out towards the actual physical location of the mother on the right in front of the signer.

3-11

PRO-1 TELL-fr MOTHER

'I told mother'

The agreement analysis would suggest that the spatial modification of the verb sign TELL signals agreement with its object argument. But if we apply Lehmann's criteria for agreement, this analysis becomes difficult to sustain. There is no problem with the first criterion, as Liddell (2000a) pointed out, because there is a syntactic relationship between the verb TELL and its object, the sign MOTHER. The second criterion, however, requires that some grammatical property of the sign MOTHER is encoded onto the verb (i.e., as some type of modification to its form). But there is no evidence that grammatical categories, such as gender, number, and case, are controlling the directionality of the verb. Nor is the category of person relevant here, Liddell asserted. Spatial loci do not reflect person, as there is an open-ended number of loci towards which a signer may direct an indicating verb. This is not consistent with any person agreement system, as such systems are usually closed (generally only reflecting differences in first, second, and third person arguments, and no more). An agreement analysis of these verbs, Liddell (2000a) argued, has thus far failed to identify the grammatical property of the object argument being encoded onto the verb.

The third criterion requires that agreement must be realized as a constituent of the sentence. The sign TELL, however, is directed towards the physical location of the referent. It is not clear how the physical location of the referent in space can be considered a constituent of the sentence. It makes no grammatical sense to suggest that the verb "agrees" with the actual mother. She is the referent associated with the sign MOTHER. This sign is the object argument of the verb, but the referent is not a property of this object argument.

Second, as previously mentioned in Chapter 2, there has so far not been any successful attempt to phonologically represent the spatial locus towards which the sign TELL is directed. Spatial loci need to have some phonological substance in order for a grammatical analysis of space to be possible. Padden (1988) suggested that such a spatial locus acts as an affix, but neglected to specify what phonological features are involved in this proposed morpheme.

We have already mentioned that the most detailed attempt at a phonological representation of space can be found in Liddell and Johnson's (1989) suggestion that over 100 loci in the signing space could be described by means of a complex interplay of vector, distance, and height features. This number of loci was, however, not sufficient to accurately describe how space is used in signed discourse. Moreover, signers also sometimes produce signs that are directed to things outside the signing space, as in the case of the example 3-11 (where the mother is actually located at some distance from the signer). Without phonological features for the proposed agreement morpheme, Liddell (2000a) claimed, there can be no agreement analysis.

Third, some writers have suggested that the proposed agreement morpheme is attached to the verb sign by means of some process of affixation or cliticization (Fischer, 1975; Klima & Bellugi, 1979; Padden, 1988). Without any phonological substance, Liddell (2000a) argued, the grammatical mechanism involved cannot be determined, and such suggestions remain mere speculation.

Liddell's (1999) alternative analysis of indicating verbs, as previously mentioned, is that they represent a blend of a linguistic sign with a deictic gesture. In producing an indicating verb, the hand as articulator produces a sign like TELL and simultaneously points toward conceptualized entities that correspond to subjects or object arguments of the verb. The development of this directional modification in signed languages is both natural and expected, Liddell (1999) suggested, because it emerges from ordinary discourse needs. In spoken communication, speakers may gesture towards present referents as they are being talked about in order to assist the addressee's identification of the referent under discussion. Typically, a speaker will produce some kind of deictic gesture. When saying 'I prefer *this* wine', the speaker may point at a specific bottle of wine, for example, with the index finger or the whole hand. Alternatively, the speaker may use a head tilt, or glance at the bottle in question, or even touch it or lift it if it is within reach. According to mental space theory (Fauconnier, 1985, 1994, cited in Liddell, 2000b), linguistic utterances in themselves do not unambiguously identify a specific referent. Addressees make the connection between an utterance and a referent by using their knowledge of the previous discourse context and the conceptual information available to them. Deictic gestures may assist in the identification of an entity. The combination of spoken utterance and deictic gesture both describes and identifies the relevant wine bottle.

Indicating verbs, according to Liddell (2000b), work in a similar way, but the linguistic and gestural elements are combined in the same form. In spoken languages, these two are distinct, but in signed languages, they blend together because both use the visual-gestural channel. In a sign such as GIVE, LOOK, or TELL, the handshape, orientation, and movement are describable by discrete linguistic features, but the direction and goal of the movement constitutes a gestural component of the sign.

This conceptual information available to a speaker or signer that enables them to interpret such deictic gestures is known as a *mental space* (Liddell, 2000b). Included among the types of mental spaces that are used in signed language discourse is *real space*. This refers to an individual's conception of his or her immediate physical surroundings. For Liddell (2000b), directing an indicating verb like TELL towards referents present in the environment around the signer can be described as gesturing towards elements of real space. Another type of mental space is a *real space blend*. A blend with real space involves one or more elements of real space being combined with elements from another mental space. This may occur when an indicating verb is directed towards a locus in the signing space associated with an absent referent. We can see this in the illustration in Figure 3.12. These signed examples come from data collected by Liddell in which a signer of ASL is recounting a story based on the comic strip "Garfield". The signer is describing a scene in which the cat character, Garfield, is seated, and his owner is standing to Garfield's right. In this particular scene, Garfield turns to his right and looks upwards at the owner. The signer is describing this part of the scene with the sign shown as *real space* in Figure 3.12.

Liddell (2000b) described how the signer uses a number of lexical signs to describe this scene, including the phrase CAT LOOK. He directs the sign LOOK upward and to the right. He also turns his body and gazes upwards and to the right, imitating the posture and gaze of the main character in the comic strip. In reality, there is no-one standing to the right of the signer, but the signer has conceptualized a mental comic strip space in which the owner is imagined to be standing there. This is no different (in terms of the sign produced) from directing the indicating verb towards a physically present referent.

Liddell (2000b) called this resulting combination of the comic strip mental space and real space a *grounded* blend. It is a grounded mental space because the signer behaves as if the entities in the mental space were physically present. The resulting sign is also a blend of linguistic and gestural elements, as can be seen in Figure 3.13. The linguistic elements include the handshape, orientation, and movement features of the incompletely specified form look. The gestural elements are the directionality of the sign LOOK, and the shifted expressive elements (the turning of the signer's body and head, and the change in eye gaze).

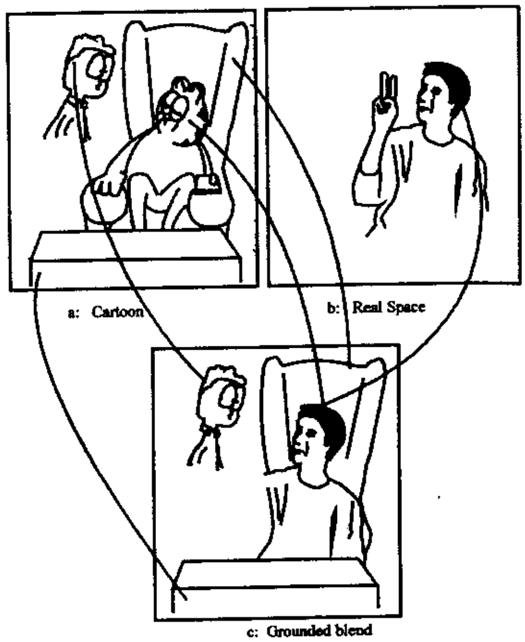


Figure 3.12

In the next section, I will move onto discussing polycomponential verbs in signed languages. Liddell's (1998, 2000b) application of the concept of mental spaces is also relevant to our discussion of polycomponential verbs, but I shall discuss the details of this proposal after I have introduced the homogeneous model and its analysis of these forms in signed languages.

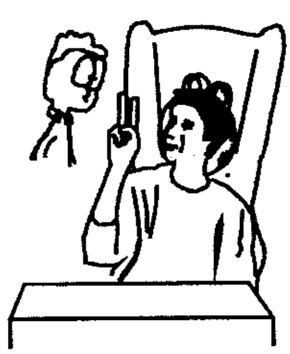


Figure 3.13: A blend of cartoon space and real space

3.6 Descriptions of polycomponential verbs in other signed languages

I will summarize several of the major studies of polycomponential verbs in signed languages, but will limit this account to the work by Engberg-Pedersen (1993), McDonald (1982), Supalla (1978, 1982, 1986, 1990) and Schick (1987, 1990). The work by researchers other than Supalla will, however, be described in brief. Many of these descriptions have served as the basis for work on a number of other signed languages, such as my own earlier work for Auslan (Schembri, 1996), Brennan (1990, 1992) on BSL, Collins-Ahlgren (1990a, 1990b) on both New Zealand Sign Language and Thai Sign Language, Corazza (1990) on Italian Sign Language, Matthews (1996) on Irish Sign Language, Wallin (1990, 1994, 1996) on Swedish Sign Language, and Zwisterlood (1996) on Sign Language of the Netherlands.

3.6.1 Supalla

The work of Supalla on ASL (1978, 1982, 1986, 1990) remains among the most influential descriptions of polycomponential verb signs in any signed language, so it will be discussed in some detail here. This work also provides the theoretical background for the elicitation material used as part of an investigation of polycomponential verbs of motion and location in Auslan described in Chapter 5.

Supalla's (1978, 1982) work appeared to have been amongst the first which rejected previous descriptions of ASL polycomponential constructions as "ad hoc gestures" (see, for example, Mandel, 1977). For Supalla (1978: 28), this category of signs had:

> ...been long excluded from ASL research because they were considered a kind of non-linguistic extension of the visual-manual mode (analogous to "vroom-vroom" for the sound of a motorcycle in the auditory mode). These signs have been called "sign mime", "visual vernacular" or "mimetic depiction", as they seem to reflect aspects of the real world in form. Handshapes often refer to shapes of objects, and movement is used either to represent motion or shape of objects...Recently, DeMatteo (1977) has investigated some of these signs and proposed that signers rely on visual imagery to produce these signs. He believes that such signs vary continuously in form and meaning, in an analogue way, to match the visual images they represent. He thus has argued that ASL is organised radically differently from spoken languages, which have discrete units of meaning.

Supalla (1978, 1982, 1986) claimed instead that, despite their high degree of iconicity, these signs were more appropriately considered multimorphemic verbs of motion and location, organized like the multimorphemic verbal constructions found in polysynthetic languages such as Navajo. He claimed that the system was not an analogue one at all, but was instead organized like the morphological systems of spoken languages. He was among the first to contend that each polycomponential verb is constructed from a limited number of discrete morphemes with particular meanings which are combined in specific ways.

In particular, Supalla (1986: 182) claimed that research had revealed that these ASL verbs of motion and location included classifier morphemes, defining classifiers as:

> ...morphemes that vary in form as a function of certain categorical properties of the associated noun. For example, the handshapes in ASL verbs may

> vary as a function of whether the associated noun is a two- vs. four-legged object, or they may vary as a function of whether the associated noun is long and thin vs. broad and flat.

Supalla (1982) outlined detailed arguments for his view that these forms should indeed be considered multimorphemic classifier verbs of motion and location rather than simply examples of the mimetic depiction of objects. His claim that these constructions were composed of discrete morphemes appeared to gain most support from his study of the acquisition of verbs of motion and location in three deaf children from deaf families. Using a combination of elicitation and observation, he showed that, like morphologically complex forms in spoken languages (Slobin, 1982), the acquisition of these verbs in ASL seemed to be a relatively prolonged process, with the development of their use proceeding in identifiable stages. These first language learners appeared to treat the morphology of verbs of motion and location as componential, with younger children producing fewer morphemes and more incorrect combinations, and older children gradually making fewer errors as more and more meaningful units and the rules for their correct combination are acquired over time.

Supalla (1978) explicitly compared the ASL classifier verbs of motion and location with classifier predicates in Athabaskan languages such as Navajo (I will explore this aspect of Navajo in more detail in Chapter 4). This set of complex predicate forms in Navajo varied systematically according to aspects of their referent in a way that seemed remarkably similar to what Supalla (1978) described for ASL. Drawing on the work of Allan (1977), who described classifiers across a range of spoken languages, Supalla (1986) also showed the particular categories of classifier used in ASL resembled those found in spoken languages. This further supported his claims about the nature of these signs, since despite their iconicity and the fact that they could potentially represent an infinite variety of distinct real-world objects, ASL appear to have developed "only those types of classification that are found in spoken languages of the world" (Supalla, 1986: 182).

For Supalla (1986: 183), verbs of motion and location are primarily composed of a movement root plus a classifier handshape affix:

> The root of the ASL verb of motion or location consists of one of a small number of possible movements, referring to the underlying predicate type (existence, location, or motion) of the noun and, for verbs of motion, one of a small number of movement paths (e.g., linear, arc, or circle). Obligatorily affixed to the movement stem is a set of articulator morphemes, consisting of a hand or other body part, formed into a particular shape and located in a particular place and orientation along the movement path. The handshape is typically the classifier morpheme of the verb of motion or location (i.e., it marks the classification of the noun as, for example, legged vs. non-legged). The relative locations of the hand and body articulators mark the locative relationships among the central noun (the moving object) and any secondary nouns (the ground objects).

3.6.1.1 Movement morphemes

Supalla (1978, 1982) divided the movement morphemes into three main categories:

(1) *stative* roots: these involve no movement in space, and are used in predicates of existence, meaning 'X exists' (e.g., 3: *vehicle* + *exist* as shown in Figure 3.14 as part of a two-handed construction)

(2) *contact* roots: these involve a very small movement in space, and occur in predicates of location, meaning 'X exists in some location' (e.g., 3: *vehicle* + *loc* as shown in Figure 3.14)

(3) *active* roots: these involve movement through space, and are used in predicates of motion, meaning 'X does Y' (e.g., 3: *vehicle* + *move-line* as shown in Figure 3.14)

For each of these three types, there is an *anchored* and a *displaced* form. Anchored roots are those that undergo no change in location in space, while displaced forms are those which move from one location to another.

For the stative root, an anchored form would involve a simple *hold*, with no movement at all. An ASL example, might be a 3: *vehicle* handshape simply held in the signing space (e.g., as shown in Figure 3.14). This might be used to represent a stationary vehicle, such as a vehicle that is parked while another vehicle passes it. A displaced form of a stative root would be an example of a *tracing* movement. An example might be the *B: flat-wide-object*, palm down and fingers away, moving in an arc from left to right, to represent, for **example**, the shape of a hill (e.g., *B: flat-wide-object +analogue: trace-hill-shape* + *exist* as shown in Figure 3.15). It is important to note here that the movement of the hand does not represent the movement of the referent, but

(lh) 3: *vehicle* + *move-line* + *rept* (rh) 3: *vehicle* + *exist* | 3: *vehicle* + *loc* | 3: *vehicle* + *move-line*

Figure 3.14

aspects of its appearance. Supalla (1982) recognized three major kinds of stative displaced roots: a *linear* root (used to represent a straight line or an object with a flat surface), an *arc* root (used to represent an arcing line or object with a semi-circular appearance), and a *circular* root (used to represent a circular line or object with a circular appearance).

Figure 3.15

An anchored contact root involves a *contact* movement. This is an extremely brief movement before the hand stops in some specific location (as if it were coming into contact with something). This movement combined with the ASL 3: *vehicle* handshape described above would be used to signal that a vehicle is located in some specific place (e.g., 3: *vehicle + loc* as shown in Figure 3.14). A displaced contact root is realized as a *stamping* movement. Here the small downward movement with an abrupt offset is repeated in a number of different locations, with each location being produced along a linear, arcing or circular path, as with the tracing movement roots mentioned above (e.g., *B: flat-wide-object + loc+ distribution: in-a-queue* as shown in Figure 3.1). This movement combined with the B handshape might be used to describe a series of relatively flat objects, such as books, or a line of vehicles in some particular spatial arrangement.

An anchored active may involve a change in *orientation* or *form*. An *end-pivot* movement is a change in orientation involving bending at the wrist (e.g., *S: head + analogue: nod* as shown in Figure 3.5), while *mid-pivot* is a rotation of the hand (e.g, 3: *vehicle + turn* as shown in Figure 3.16). A change in form refers to changes in handshape, such as the spreading of the fingers, the bending or folding of the hand, the hooking of the fingers, or a change in diameter. A displaced active root involves a change in location that, like the other stative and contact active roots, may have three different values in shape: linear, arc and circular movement. In the linear movement root, the hand moves along a straight path (e.g., *G: animate + move-line*), while the arc root involves movement along an arc-shaped path, and the circular root involves movement along a circular path.

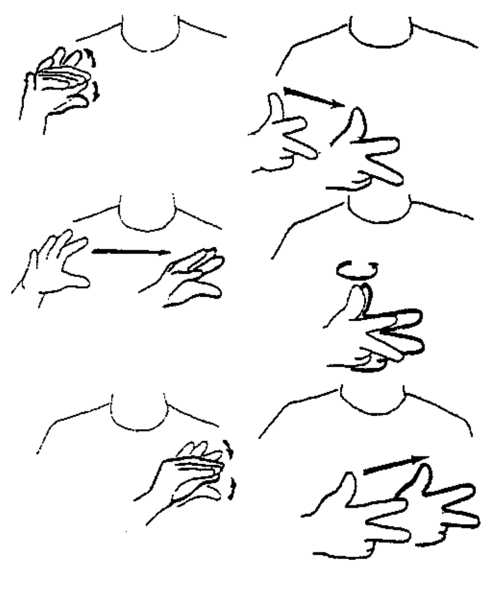


Figure 3.16

Table 3.5 below illustrates Supalla's basic movement roots. These movement roots, however, do not account for the all the movement types possible in a polycomponential sign. The basic movement roots may combine to create complex movement combinations. Supalla (1982) analyzed the movement in the following constructions as a sequential combination of basic movement roots. The first form shown on the left side of Figure 3.16, which Supalla glossed as *flashlight-beam + goes-on + moves + then-goes-off*, is analyzed as a combination of an anchored root, followed by a displaced root, followed by another anchored root. In the second form shown in Figure 3.16, 3: *vehicle + turn*, a linear root is combined sequentially with a mid-pivot root and then another linear root.

Additional types of movement are analyzed as a combination of a basic movement root with secondary movement affixes. These affixes are themselves the result of a combination of features. Firstly, affixes may involve relatively *maximal* changes in location, orientation or handshape, or relatively *minimal* changes in these features. Secondly, the changes of movement may be *unidirectional* (i.e., movement in only direction), *bidirectional* (i.e., movement back and forth from the middle of its path), or *contra-directional* (i.e., movement back and forth from one end of its path). Lastly, the movement may be *single* or *repeated*. The movement in a sign like *V: animate + moves-line + with-small-jumps*, would be analyzed as a combination of the linear root with the repeated, minimal, contra-directional affix nested within it, while *V: animate + moves-line + randomly* would be the result of the same root combining with a repeated, minimal, bidirectional affix.

Table 3.5 Supalla's basic movement roots

ROOT	DISPLACEMENT	PARAMETER	SHAPE
Stative	displaced	location	linear tracing
			arc tracing
			circular tracing
	anchored		hold
Contact	displaced	location	linear stamping
			arc stamping
			circular stamping
	anchored		contact
Active	displaced	location	linear path
			arc path
			circular path
	anchored	orientation	end pivot
			midpivot
		handshape form	spread fingers
			bend hand flat
			bend hand round
			change diameter

Supalla (1982: 23) summarized his analysis in the following way:

> In sum, a given verb of motion or location may consist of a set of basic roots organised in a series of constrained ways, with a limited number of affixes attached to certain of these roots. Although this organization permits a large number of possible movement forms, both simple and complex, it is much more constrained than is in principle possible for the representation of movement through space...All the movement forms which can be produced by the human articulators but which cannot be generated in this movement system are either ungrammatical or are not distinguished semantically or phonologically from the forms herein described.

3.6.1.2 Articulator morphemes

Affixed to the movement root is an articulator morpheme. These morphemes are used to represent three types of referents potentially involved in a verb of motion and location: a central object (the moving or located object), a secondary object (an object with respect to which the central object is located or moves) and a ground (a background surface on which the motion occurs). As previously mentioned, Supalla (1982, 1986, 1990) refers to this articulator morpheme as a classifier morpheme. In his work, both the hands and other parts of the body can function as classifier morphemes. Supalla (1986) described five main categories of classifier morphemes: *size and shape specifiers*, *semantic classifiers*, *body classifiers*, *bodypart classifiers* and *instrument classifiers*.

The first category, size and shape specifiers (SASSes), refers to those handshape morphemes in polycomponential verbs which represent the referent object according to its size and shape. Supalla (1982, 1986) analyzed each of these SASS handshapes not as a single articulator morpheme, but as a combination of several hand-part morphemes where "each finger as well as the thumb and forearm is a possible morpheme which can combine in specifiable ways to form a handshape" (Supalla, 1982: 36). According to Supalla, however, not all of the fingers operate as separate morphemes. The SASS handshapes for straight objects, shown in Figure 3.17, illustrate the use of the index finger alone in a form meaning 'thin straight object', the index finger plus the middle finger produce a form 'narrow straight object', and the four fingers combined result in a form meaning 'wide straight object'. A form with only the index, middle and ring finger is not distinctive because not all of the fingers act as independent morphemes in these combinations. Supalla (1986) considered the middle finger a kind of bound morpheme, for example, since it could only be added to the hand already marked with another finger morpheme.

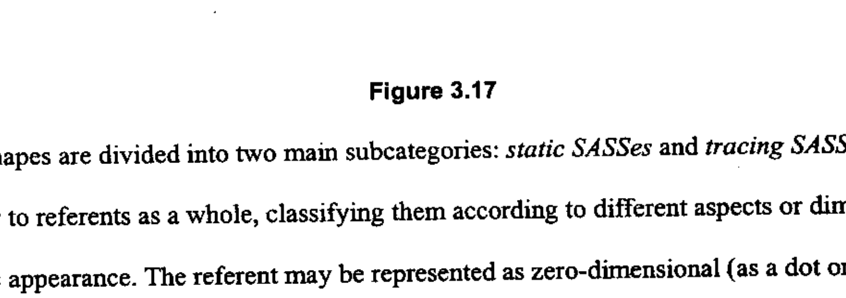


Figure 3.17

SASS handshapes are divided into two main subcategories: *static SASSes* and *tracing SASSes*. Static SASS handshapes refer to referents as a whole, classifying them according to different aspects or dimensions of their visual-geometric appearance. The referent may be represented as zero-dimensional (as a dot or speck), or as having one or more dimensions (such as a straight, round, or angular object). As the chart reproduced in Figure 3.18 illustrates, Supalla (1982, 1986) organized the different SASS handshapes into a hierarchy of forms, with the handshapes at the higher levels being "semantically and phonologically more complex than earlier derived forms" (1986: 187).

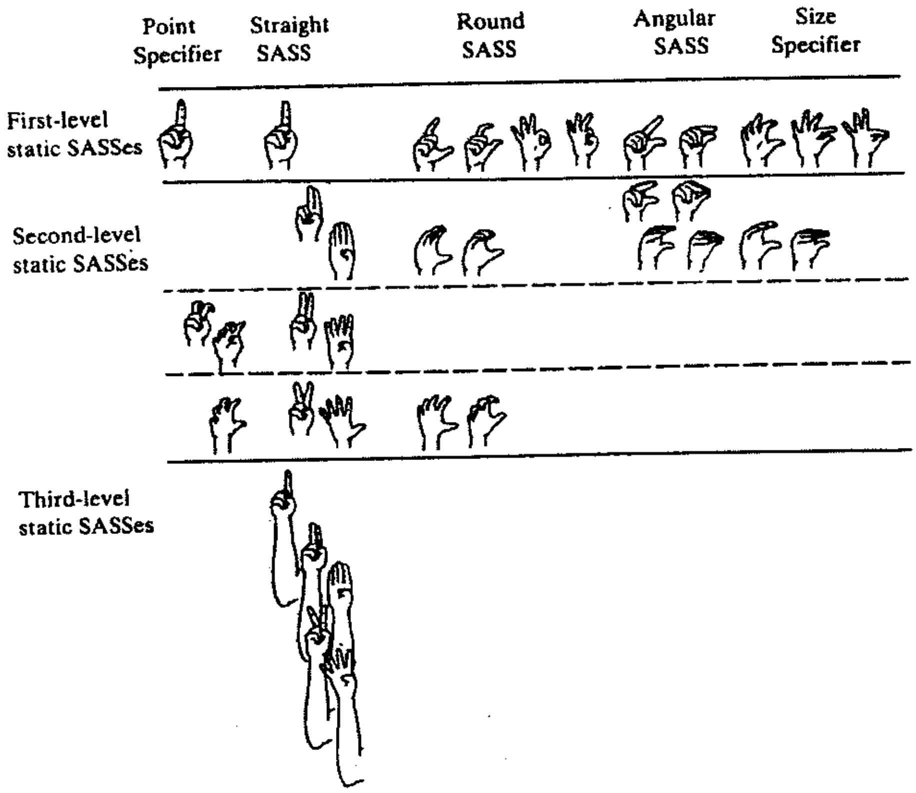


Figure 3.18

The first level static SASSes involve the use of the index finger alone, or the index finger interacting with the thumb. These are used to represent objects which are relatively thin, and the use of the index finger and thumb indicate whether the narrow object is straight, round, or angular. In a predicate representing the location of a pencil, for example, a form such as G: *thin-straight-entity* + *loc* might be used, whereas a different predicate might be used to refer to the location of a coin F: *thin-circular-entity* + *loc*.

The second level static SASSes all involve the incorporation of the other fingers (middle, ring, and little finger). These are used to represent objects which are straight, round, and angular, but relatively wider than the first level SASSes. In a predicate representing the location of a book, a form such as B: *flat-wide-entity* + *loc* might be used, which differs from the form typically used to refer to the location of a cup: C: *medium-sized-cylindrical-entity* + *loc*.

The third level static SASSes refer to those that involve the addition of either the forearm, or of a second hand. These are used to describe very wide or long objects, as in the form which might be used to represent the movement of a telegraph pole G+: *large-thin-entity* + *fall*.

The tracing SASS handshapes refer to the use of the first, second, and third level SASS handshapes in combination with a tracing movement which is used to sketch an outline of the referent object, such as the use of the following form which might be used to represent a cable or pipe: *C: wide-cylindrical-entity+ analogue: trace-pipe-shape*. For Supalla (1986: 189), these tracing SASSes are derived "by having the static SASS handshapes undergo higher-level derivational processes, in which a tracing movement is added to represent those dimensional characteristics of the object not marked by handshape alone".

The second category of articulator morphemes discussed by Supalla (1982, 1986) are the semantic classifier handshapes. Compared to the SASS handshapes, semantic classifiers are a smaller class of handshape morphemes which are more abstract in their representation of their referent objects. They are not analyzable into component morphemes, and are considered by Supalla (1986) to be monomorphemic forms. Some examples of ASL semantic classifiers are shown in Figure 3.19.

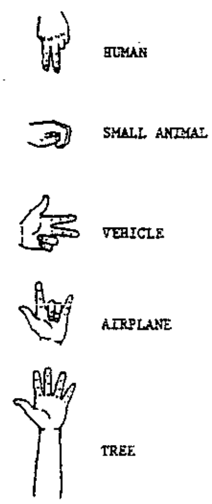


Figure 3.19

Although semantic classifiers may have originated as size and shape specifiers, Supalla (1982) treated them differently, because he claimed that they refer abstractly to classes of referents (e.g., humans, vehicles, trees, small animals etc), as in *G: animate + move-line*, and not specifically to the visual-geometric features of the referent. One example of a semantic classifier, the handshape used in ASL to refer to the motion and location of vehicles shown in Figure 3.19, does not in fact resemble the referent object at all. There is evidence that the vehicle classifier actually originated as a SASS form representing the mast and spars of a sailing vessel (Supalla, 1986), and that the meaning has shifted over time to include all vehicles, including cars, trucks and motorcycles.

Semantic classifiers are divided into four main groups: *legged object classifiers* (such as the V: *animate* handshape with the index and middle finger extended downward from the hand to represent humans), *maneuverable horizontal object classifiers* (such as the B: *vehicle* handshape with all fingers extended and flat, used to represent vehicles in Auslan), *maneuverable vertical object classifiers* (such as the 3: *vehicle* handshape with the thumb, index and middle fingers extended and spread, used to represent vehicles in ASL) and *columnar object classifiers* (such as the use of the upright forearm and hand to represent a tree).

The third category of articulator morphemes described by Supalla (1982, 1986), the body classifiers, are different from both the SASS and semantic classifiers. The latter types of classifier involve only the use of the hands moving in space, while the body classifier involves the whole body of the signer, used to represent the body of the referent. The sign shown in Figure 3.20 (S+: *arm + in-the-eye)* makes contact with a particular location on the body of the signer, but this can be used to refer to the same location on the body of the referent. There are a number of restrictions on the use of the body classifier, including the fact that only single nominal referents that are animate may be represented in this way, and the signer's body cannot be combined with a movement path across space to refer to the movement of the referent through space (a semantic classifier would be used).

Figure 3.20

The fourth category, the bodypart classifiers, involve the use of a location on the signer's body and/or the signer's hands to represent a particular body part of a referent. The two main subcategories of bodypart classifiers which Supalla (1986) described are *bodypart SASSes* and *limb classifiers*.

Bodypart SASSes may involve the use of either a static or tracing SASS produced at a particular location on the signer's body. An example of a static bodypart SASS might be 4: *many-thin-narrow-entities + protruding-from-mouth*, where the handshape is placed at the signer's mouth in order to represent the protruding teeth of a referent. If a tracing bodypart SASS were used, such as 4: *many-thin-narrow-lines + analogue: trace-lines + on-body*, the combination of the handshape moved over the signer's body would represent the stripes on the body or clothing of a referent.

Limb classifiers involve the use of the signer's hands and arms to represent the limbs of the referent Two examples of this (the G: *legs* and B: *feet* handshape components) are shown in Figure 3.21. For Supalla (1986), limb classifiers fall into two groups: in one group, the signer's hands and arms are mimetically used to represent the hands and arms of a human referent, or may be modified to represent the forelimbs of some non-human animate referent; in the second group, the hands and arms symbolically represent the legs and feet of both humans and non-human animates.

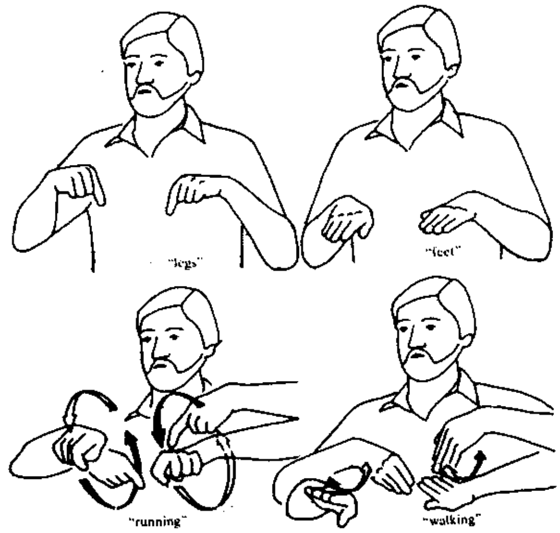


Figure 3.21

In contrast to these examples, where the hands and arms represent the hands, arms or forelimbs of an animate, the legs and feet of a signer cannot be employed mimetically to refer to the legs, rear legs or feet of an animate. The actual parts of the signer's body fall outside the signing space and are not phonologically significant in signed languages such as Auslan or ASL. Thus Figure 3.21 show examples of how SASS classifiers may be employed to represent the motion of these bodyparts.

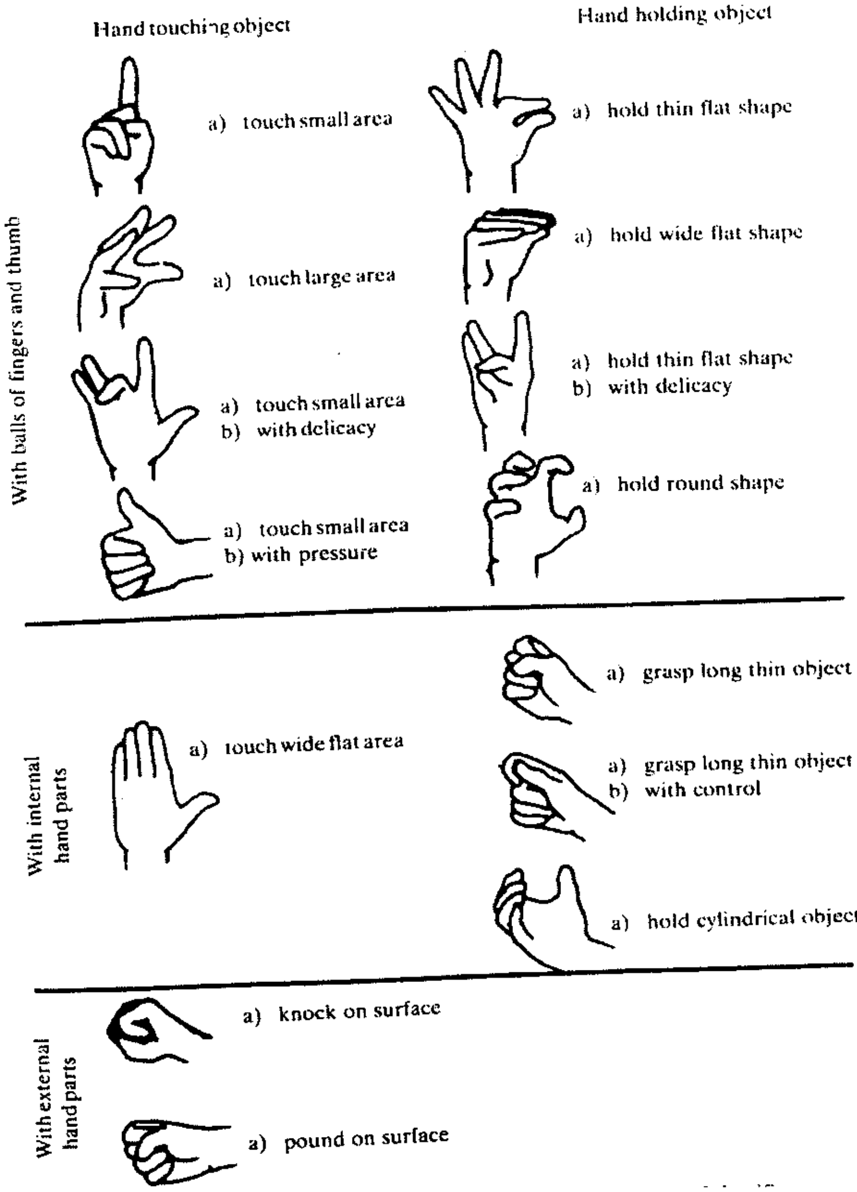


Figure 3.22

The fifth category are the instrumental classifiers. These involve the use of the signer's hands to represent the action of manipulating an object. The instrumental classifiers can be divided into two main groups. When a human agent is involved, an *instrumental hand classifier* may be used to mimetically show the action of the agent handling an object. The different choices of instrumental hand classifier are used contrastively to represent the function of the agent's hand(s), the part of the hand(s) contacting the object, the manner in which the action takes place as well as the size and shape of the object being manipulated, as shown in Figure 3.22. A *tool classifier* is used when the signer is representing the agent manipulating an object with a tool of some kind. The tool classifiers are used to show the manner of the manipulation, and a subset also indicates the shape of the tool being held. Due to the specific size and shape of some tools, many of these tool classifiers have become lexicalized, as in the sign SCISSORS shown in Figure 3.23 below.

Figure 3.23

3.6.1.3 Spatial morphemes

Supalla (1982) proposes a morphemic system that controls the placement and movement of articulators through the signing space. He calls this the *reference frame*, and describes it as a collection of reference points available to the signer in which the articulator may be placed. Each of these reference points functions as a morpheme representing the location of an object or objects. I will only describe this system briefly here.

The reference frame is organized into two separate systems: the *real reference system* and the *abstract reference system* (these have come to be known as *topographic* and *syntactic* space respectively, Sutton-Spence & Woll, 1999). These two systems differ in their use of space. Every reference point in the real reference system is analogue to locations and spatial relationships in the world, while every point in the abstract reference system is arbitrary. In the real reference system, the signer may make use of reference points on the body, in the inner space within reach, and the outer space outside of reach. Reference may be made to all possible locations and to all the actual objects in those locations.

In contrast, the abstract reference system uses only the neutral space in front of the signer. In this case, the loci in space available for use in verbs of motion and location are organized into a limited number of possible loci that Supalla calls the *base grid system*. These involve the use of *base plane* morphemes for the location of surfaces in relation to which an event occurs, and *base point* morphemes to refer to the location of some central or secondary object.

Base plane morphemes may combine with other spatial morphemes, such as orientation affixes which can make the base plane *horizontal*, *vertical*, or *diagonal* in relation to the reference frame. Base point morphemes may be combined with locative morphemes to indicate the relationship between a central and secondary object, indicating whether, for example, the relationship between the two objects is *at*, *in*, *at-top*, *at-side*, *at-bottom*, *above*, *beside*, *below*, *outside*, *inside*, or whether the distance between the objects is *unmarked*, *minimum* or *maximum*.

3.6.1.4 Other morphemes

Supalla (1982) discusses other morphemes that may be affixed to the classifier in a verb of motion and location. One affix is the *broken* morpheme, which results in the handshape being bent (and signifies that the referent is bent or broken). If, for example, the thin-and-straight SASS handshape changed from a straight index finger to a slightly curved or bent index finger, this might be used to refer to a broken pencil. A related affix is the *wrecked* morpheme, which involves the fingers of a particular handshape being bent to various degrees to refer to a warped, deformed or damaged referent. This is shown in Figure 3.24. In this ASL example, the signer represents a vehicle crashing into a tree.

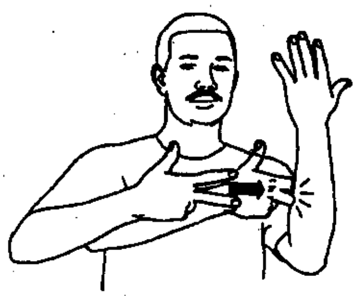


Figure 3.24

Another set of morphemes involves the orientations of the articulator to represent the bearings of the referent objects. Articulator morphemes usually have some unmarked orientation that indicates that the referent is upright. For the semantic classifier used to represent animates, for example, the *upright* orientation affix would see the handshape oriented with the fingers pointing downwards; the *front side down* affix would see the handshape oriented with the palm upwards and fingers pointing horizontally away; and the *side down* affix would see the fingers away, but the palm pointing left (for a right-handed signer). The *opposite* affix may be attached to any of these orientation morphemes to produce the reverse orientation.

3.6.2 Problems with Supalla's account

Supalla (1978, 1982, 1986, 1990) has produced perhaps the most ambitious and detailed study of the morphosyntax of polycomponential verbs of motion and location, handling and visual-geometric description in any signed language, but this work has been the focus of considerable criticism and a number of researchers have proposed alternative accounts of these forms in ASL and other signed languages. In the following sections, I will summarize some of the most important criticisms of Supalla's work, along with some the alternative descriptions proposed.

3.6.2.1 How many morphemes?

In a recent critique of Supalla's framework, both Schick (1990) and Liddell (2000c) have demonstrated that his analysis of polycomponential forms as highly synthetic, multimorphemic constructions produces overly complex descriptions of relatively simple signs.

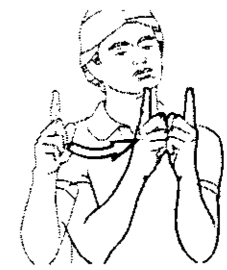


Figure 3.25

If we take the sign Liddell glosses as PERSON$_1$-WALK-TO-PERSON$_2$, for example (shown in Figure 3.25) and attempt a homogeneous analysis of all the possible sources of meaning in the form, he suggested that we have to posit four root morphemes and up to twenty-five affixes to fully account for all the meaningful units in this form, as shown in Table 3.6 below (based on Supalla's account, Liddell suggested that it is not clear if all these morphemes are needed, so those that may not be necessary appear inside parentheses in the table). Among these proposed affixes are some that Supalla (1982) himself failed to discuss in this description, such as a "facing one another" affix that would be necessary to account for the meaning derived from the relative orientation of the two hands in relation to each other. Liddell's description of the full morphemic breakdown of this sign is shown in Table 3.6 below. Note that the minimal number of morphemes appears underlined. If each root requires their own additional affixes (this is not clear from Supalla's analysis), then the additional morphemes are shown in italics.

Table 3.6 Analysis of PERSON$_1$-WALK-TO-PERSON$_2$

	Passive hand	Active hand		
movement root	hold root	hold root	linear movement root	hold root
classifier handshape	freely moving vertical entity	freely moving vertical entity	*freely moving vertical entity*	*freely moving vertical entity*
orientation of entity	upright	upright	*upright*	*upright*
facing	rightward	leftward	*leftward*	*leftward*
orientation of base plane	horizontal	*horizontal*	*horizontal*	*horizontal*
placement (two such affixes establish a 'base plane')	(placement$_a$)	(placement$_b$)	*(placement$_c$)*	(placement$_{a\text{-}c}$)
distance		(unmarked distance)		(minimum distance)
directionality			unidirectional	
repetition			single instance	
maximum number of morphemes = 4 roots + 24	root + 5	root + 6	root + 7	root + 6
minimum number of morphemes = 4 roots + 14	root + 5	root + 5	root + 2	root + 2

According to Liddell's (2000c) interpretation of the Supalla analysis, all sources of meaning must be considered fully morphemic, leaving no room for the visual imagery made possible by the mental spaces analysis. As a result, a relatively large number of roots and affixes have to be suggested, but this does not solve all the problems associated with the analysis of these forms. In the case of the "facing one another" affix, for example, one might posit that this morpheme is realized as the orientation of the two palms facing each other. This works well with these particular handshapes, but if one of the handshapes was changed into the ASL 3: *vehicle* handshape, the orientation of the palms is no longer salient. One would need to posit an additional morpheme here, or perhaps some kind of (phonologically-conditioned?) allomorph of the "facing one another" affix. The possibility that these uses of handshape represent some kind of blend of linguistic and gestural elements (i.e., that an addressee need only understand that the two hands represent entities with fronts and backs, and assume that the palm or front of the hand represents the front of the entities) is simply not considered. Liddell (2000c: 9) summarizes the shortcomings of this approach in the following way:

> Supalla's morphemic proposal depends on the existence of a finite number of morphemes which can be selected and combined in myriads of ways to produce all possible classifier predicates. This search for listable morphemes proceeds in a satisfactory way when we restrict our attention to meaningful handshapes. Beyond this, however, we run into what appear to be insurmountable problems, particularly in dealing with spatial loci, loci on the body, and some orientation features. Supalla's analysis depends on the existence of such finite lists of morphemes but no one has yet proposed any such lists.

Moreover, not all child language acquisition data supports the multimorphemic analysis of polycomponential verbs. Lillo-Martin (1988), for example, reported that two and three year old signing children produced polycomponential constructions in response to stimuli showing invented objects for which no lexical sign existed in ASL. Schick (1990) pointed out that research by Kantor (1982) and Launer (1982) on early lexicons and two-sign combinations in young native signers showed that deaf children produce a large number of such signs, using forms not unlike Supalla's (1982) instrumental classifiers to represent putting on hair clips, or SASS verbs of motion to show a bug crawling up an arm or to represent the act of vomiting. Recent work by Slobin et al. (2000) has found additional evidence that two-year old deaf children use some types of polycomponential verb in productive and meaningful ways. As Schick (1990: 19) explained, "given an analysis such as that proposed by Supalla (1982), these forms would have to be considered morphologically complex and their appearance at such an early age would not be predicted".

Psycholinguistic studies also do not provide clear support for the multimorphemic analysis. In work by Poizner, Klima & Bellugi (1987), the ability of signers with brain damage to produce spatial descriptions was evaluated. The right hemisphere is typically thought to be dominant in the processing of nonlinguistic sounds and visual-spatial skills, while the left hemisphere is widely believed to be dominant for language processing and logic. Signers with right hemisphere lesions were shown by Poizner, Klima and Bellugi to have an impaired ability to produce spatial descriptions using polycomponential verbs of location in ASL. This strongly suggests that the use of spatial loci in such signs is a spatial processing issue, and not a morphemic one. Furthermore, a recent study by Emmorey and Herzig (2000) with deaf native signers and hearing non-signers tested the comprehension and production of similar verbs of location and demonstrated that loci in the signing space seemed to be treated by both groups as gestural representations. Knowledge of a signed language seemed to have minimal impact on the comprehension of analogue use of space.

3.6.2.2 The movement root and handshape affix?

Despite the clear problems with the analysis demonstrated by Liddell (2000c), Supalla's claim that the meaningful unit expressed by movement constitutes the root of a multimorphemic construction has gained widespread acceptance. Similar analyses of the movement component can be found in Brentari (1998), Shepard-Kegl (1985), Liddell & Johnson (1987), Schick (1987, 1990), and Valli & Lucas (1995) for ASL; Collins-Ahlgren (1990a, 1990b) for both New Zealand Sign Language and Thai Sign Language; Corazza (1990) on Italian Sign Language; Matthews (1996) on Irish Sign Language; Wallin (1990, 1994, 1996) on Swedish Sign Language; and Zwisterlood (1996) on Sign Language of the Netherlands.

Engberg-Pedersen (1993) noted that Supalla (1982) did not present any evidence in support of his analysis of the movement component as roots and the handshape components as affixes. She suggested that his reasons for this claim appear to be primarily semantic: it is the meaningful movement components which represent the motion and location meaning in verbs of motion and location. This is certainly the argument put forward by Wallin (1996: 11) who adopted Supalla's (1982) analysis for his description of polycomponential constructions in Swedish Sign Language (which he refers to as *polysynthetic signs*):

> The reason for describing the various movement types as root morphemes...is that the movement types are of verbal character. They decide the character of the polysynthetic sign, specifying whether it denotes motion or location. The handshapes denote whether the motion is performed by the entity on its own or is initiated by an agent.

Thus, in an ASL form such as 3: *vehicle + move-line*, the movement morpheme represents the predicative meaning (motion, not existence or location) and is analyzed as the root of the construction, whilst the articulator is analyzed as a classificatory affix.

Supalla's (1982) claim that the handshape component is an affix also appears to be partly motivated by his desire to build on previous descriptions of ASL (Baker & Cokely, 1980; Kegl & Wilbur, 1976; Klima & Bellugi, 1979) which described the handshape component as a pronominal affix. But, as McDonald (1982) explained, this earlier work dealt almost exclusively with verbs of motion and location, whilst other types of complex verbs were ignored. Based on the limited amounts of data available at the time, these researchers claimed that the movement component appeared to control the verbal meaning of these constructions, whilst the handshape component seemed to have a comparatively peripheral role, representing the type of object involved.

McDonald (1982) claimed that the analyses of the meaningful handshape component as a pronominal or classificatory affix, however, rests on two assumptions:

> First, they assume that there exists other "linguistic" material which can be characterised structurally as a "verb" (the movement in Supalla's analysis) or which unambiguously communicates a single verbal meaning across these "pronominal" forms. Second, they assume that the "pronouns" "add" information to the verb and do not somehow govern or control its meaning. Neither of these assumptions holds for ASL.

As a result of these shortcomings in the analysis of the handshape component as an affix, McDonald (1982) attempted to build a case for her suggestion that the morphemes expressed by the handshape component are the core or stem of the multimorphemic construction because they appear to control the meaning of these forms. She pointed out that verbs with the same movement component, such as *loc* (described as "a slight arcing forward movement with an abrupt held end", McDonald, 1982: 163), but with different meaningful handshape components, such as a C>: *handle-medium-sized-flat-entity* versus V'': *animate*, may have quite distinct meanings. A combination of *loc* movement component with the C>: *handle-medium-sized-flat-entity* articulator morpheme may be interpreted as '(someone) put a book (somewhere)'. The identical movement component combined with V'': *animate*, however, may mean 'a bird perched (somewhere)'. For McDonald (1982), the fact that the meaningful handshape component realizes a distinction between an agent initiating the movement of an object and self-initiated movement suggests the handshape cannot be simply analyzed as an affix, since it controls the resulting interpretation of identical movement components. Engberg-Pedersen (1993: 245) draws a similar conclusion:

> If the movement unit constituted the verb root, the two verb forms should denote the same type of motion, but they do not; the former expresses caused motion, the latter an entity's own motion. The "verbal" meaning not only depends on the movement units, but on the interaction of the classificatory morpheme (expressed by the handshape) and the morphemes expressed by movement.

As is also reported for Danish Sign Language (Engberg-Pedersen, 1993), the combination of the same meaningful movement component with different articulators in different contexts can have quite unrelated meanings in Auslan. A linear movement, like that found in Engberg-Pedersen's movement morpheme *move-line*, can be used to represent an entity's own motion (if combined with V : *two-animate-entities*), motion caused by an agent (if combined with C>: *handle-medium-sized-flat-entity*), or the visual-geometric characteristics of an entity (if combined with G: *two-dimensional-outline*).

McDonald (1982) thus rejected an analysis of the movement component as the root of these constructions and claimed instead that the handshape component is the "stem" of the multimorphemic verb, but her argument (like the analysis she rejected) is based on semantics. In the morphology literature, however, the distinction between *root*, *stem* and *affix* is rarely based on semantic properties alone (Bauer, 1988; Crystal, 1991; Mugdan, 1994; Spencer, 1991). All of these terms are used to refer to aspects of the morphological structure of a word. Although the root is the form which generally carries the main component of meaning in a word (Crystal, 1991), this is not sufficient for deciding if a given morpheme is a root. In fact, it has been suggested that the distinction between notions such as root, stem and affix becomes meaningless if these terms are not used to describe crucial differences in how each of these morphemes combine with other morphemes (Mugdan, 1994). Thus, most definitions of a root or stem morpheme need to specify some morphological criteria. A stem is generally understood to mean a unit which consists of a single root morpheme, two root morphemes, or of a root morpheme plus an affix of some kind. It is the stem to which inflectional affixes are attached. Crystal (1991: 303) explains that a root "...is that part of a word left when all the affixes are removed". For Bauer (1988), a root refers to the basic part of a lexeme which is always realized, and which cannot be further analyzed into smaller morphs.

Yet neither Supalla (1982) nor McDonald (1982) provided this kind of morphological evidence for their respective claims regarding the root or stem morpheme in polycomponential constructions, and their analyses seem misleading given the fact that neither the handshape nor the movement can act as a base morpheme, semantically or morphologically. Both elements appear to contribute equally to the meaning of the construction, and neither constituent realizes a lexeme in itself. In fact, neither the handshape nor movement component in these constructions can stand alone. Supalla (1982) himself recognized this, claiming that the verb form is constructed from handshape, movement and other morphemes combined simultaneously. Strictly speaking, however, this is not the case. The movement component is realized over time, whilst the features of handshape, orientation and so forth are realized simultaneously (Brentari, 1998). Nevertheless, movement and these other features are more or less "unpronounceable" on their own, as mentioned earlier. In Auslan and other signed languages, the movement component requires a morpheme expressed by the handshape component, and vice versa. If we wish to analyze the various components of polycomponential constructions into separate morphemes, we are not left with a root morpheme which cannot be further analyzed or which is always realized. The handshape and movement are, both phonologically and morphologically, mutually interdependent, a point which Engberg-Pedersen (1993) discussed at length, and which I mention below.

If we are to analyze the handshape and movement components as morphemes, then we must either conclude that both the handshape and movement components are roots (in which case the resulting verb is a kind of bound root compound), or that these constructions involve the combination of bound affixes without a root morpheme. Examples of root compounds in English generally only involve free morphemes, such as *text-book*, *computer* *graphics* and *town hall,* but they may also involve combinations of bound roots in other languages (known as *bipartite stems*), such as in the North American languages Washo and Klamath (DeLancey, 1996). Neither of these analyses are entirely satisfactory, however, because it is not clear exactly what is referred to by the terms *handshape root* and *movement root*. Supalla (1982) divides the movement into a root and manner affixes, and the handshape into an articulator morpheme plus other affixes, but this is not the only possible analysis. If we are to posit a movement root, should it constitute everything involved in the physical movement of the hand and arm? Or is it only the path? Or the manner? What about the speed? In 3.6.2.1 above, we have already seen the lack of clarity surrounding the precise number of morphemes Supalla (1982) suggested to account for polycomponential verbs. Dilemmas such as these prompted Engberg-Pedersen (1996: 89) to suggest that "the discrepancies of the analyses we have seen up to now are due to an attempt at forcing traditional morphological classification onto languages that resist such classification". The diverse attempts to overcome some of these analytical problems are discussed in the next two sections on movement and handshape respectively.

3.6.2.3 Movement morphemes?

Despite the widespread acceptance of the movement as constituting a root morpheme, there is extensive disagreement in the literature about what subclasses of meaningful movement components should be analyzed as separate morphemes in polycomponential verbs. Several different classification schemes have been proposed, varying both in the number of movement categories as well as in the nature of these categories (Engberg-Pedersen, 1993; Shepard-Kegl, 1985; Liddell & Johnson, 1987; Schick, 1990). These are summarized in Table 3.7. This table is intended to provide the reader with an overview of the various kinds of analysis that have been proposed, but there is insufficient space to discuss them all here. Some of the impetus for these various classification schemes has come from criticisms of Supalla's account of movement in polycomponential verbs. This criticism has focussed on three major problems. First, many writers, such as Liddell and Johnson (1987), have pointed out that Supalla's notion of stative roots denoting "existence" and separate from contact roots is problematic. Second, Engberg-Pedersen (1993) has argued that Supalla's division of movement roots and manner affixes appears to be based on formal features, and not motivated by linguistic distinctions. Third, Schick (1990) has suggested that his categorization of movement roots appears to leave no room for visual imagery.

In Supalla's (1982) account, he was perhaps the first to recognize a specific type of movement he refers to as a *contact* movement, in which the signer's hand(s) make a short movement in space followed by an abrupt offset. This can co-occur with a classifier handshape to mean that the referent in question is located in a particular location. He distinguished this from *stative* movements, such as a *hold* movement in which the signer simply holds their hand(s) in space or a *tracing* movement in which the hands sketch out the size and shape of a referent.

Supalla (1982) claimed these stative forms were used to represent existence. Engberg-Pedersen (1993) suggested that in her analysis of Danish Sign Language, *hold* may signal some locative information about a referent in certain contexts, and thus appeared to assume its existence, but is never used to make a statement about the existence of a referent. For such a statement, the non-polycomponential verbs EXIST would be used in Danish Sign Language, she claimed. This is also true of Auslan where the sign most often glossed as HAVE would be used to assert the existence of a referent. A similar claim has been made for ASL, according to work by Liddell and Johnson (1987). They described *hold* as used with the non-dominant hand in two-handed polycomponential constructions in which the interaction or respective spatial arrangements of two entities is described. This is very similar to the use of *hold* in the Auslan example 3-1 (b) above, and is quite different from an expression of existence. Furthermore, Schick (1990) argued the difference between what Supalla (1982) called existence and contact roots is simply one of emphasis. The downward movement with an abrupt offset in a contact root is simply adding focus to it and "appears to be a discourse-based notion rather than a distinction in predicate roots" (Schick, 1990: 19).

Table 3.7 Other analyses of movement in polycomponential verbs

Supalla (1982)	McDonald (1982)	Shepard-Kegl (1985)	Liddell & Johnson (1987)	Schick (1990)
1. stative (hold and tracing movements) 2. contact (contact and stamping movements) 3. active (path movements)	1. contact 2. linear 3. random path	1. AT/ON/IN/(WARD) 2. FROM 3. TO 4. LOC	1. stative & descriptive 2. contact 3. process	1. DOT 2. MOV 3. IMIT

Engberg-Pedersen (1993)				
Location	Motion	Manner	Distribution	Extension
1. *Loc* 2. *Hold* 3. *Orientation-change*	1. *Move* 2. *Move-line* 3. *Move-arc* 4. *Move-circles* 5. *Move-(specific-shape)* 6. *Move-random-path* 7. *Jump-path* 8. *Move-back-and-forth* 9. *Analogue-(type)*	1. *Random* 2. *Big* 3. *Small* 4. *Resolutely* 5. *At-a-loss* 6. *Speed*	1. *Distribution-(specific-shape)* 2. *Distribution-(random)*	1. *Analogue-(type)*

Engberg-Pedersen's criticism (1993) is also true of *tracing* movements. These are used in stative verbs which are used to describe the physical characteristics or configuration of a referent, as in 3-1 (d) above, and not to make statements about existence.

Furthermore, Supalla (1982) suggested a distinction in the *contact* category between *contact* and *stamping* movements. Engberg-Pedersen (1993) rejected this claim, suggesting that stamping is simply a form of the same morpheme, but modified to show spatial arrangement of a referent.

If one is to accept Supalla's account of the movement morphemes in polycomponential verbs resulting from a combination of root morphemes and affixes, then one still has to face the problem of deciding which aspects of the movement are to be categorized as roots and which as affixes. For example, Engberg-Pedersen (1993: 262) identified a number of movement morphemes in Danish Sign Language she calls *move-line*, *move-arc*, *move-circles* and so forth. One other morpheme she suggested is *move-random-path* that means something like "move randomly in one general direction". In this movement, the hand moves in short side to side movement while following a path through the signing space that is not in a line, arc, or circle, and its exact path from one location to another is irrelevant. But she also posited a manner affix called *random* to account for cases in which a similar type of movement is produced in a line, arc, or circle. She claims that the difference between *move-random-path* and *move-line + random* stems from the fact that the base morpheme *move-line* means "move somewhere regardless of the exact path" or "move straight", and neither meaning is include in *move-random-path* because it does not involve the representation of an entity moving to a specific point. She contrasted this with Supalla's (1982) analysis of an identical movement pattern in ASL as a combination of the *linear* root with affixes *repeated*, *mini*, and *bidirectional*. This is nothing more than a formal analysis, Engberg-Pedersen (1993) suggested, rather than a morphemic one. How can the meaning "move randomly in one general direction" be derived from each of these affixes?

Although Engberg-Pedersen's (1993) analysis might be considered to be more internally consistent than Supalla's (1982) work (she proposes separate morphemes of location, motion, manner, distribution and extension on morphological and semantic, and not simply formal grounds), her description reached a point in which she abandoned attempts to segment particular instances of movement in polycomponential verbs into a combination of roots and affixes. Like Schick (1990), she proposed that some verbs included movements that are most appropriately described as analogues of specific motion types. She referred to this meaningful use of imitation as a *move-analogue* morpheme, while Schick called it an *IMIT* (short for 'imitative') movement root. An example provided by Engberg-Pedersen (1993: 261) uses the V: *animate* hand configuration which can, for instance, "be used to describe an acrobat jumping on a trampoline turning and twisting his body: the signer's hand moves up, twists in loops, and moves down again. The number of loops and their size can change as a sort of embellishment". This type of analogue motion is also seen in Auslan.

The problem with Engberg-Pedersen's (1993) account, and other descriptions working within the homogeneous model, is that it is not clear where to draw the line between movement types that could be considered analogue and imitative, and those that appear to act as arbitrary symbolic representations. Of all the proposed morphemes of motion and location she listed, for example, only *loc* (equivalent to Supalla's contact movement root) seems to be a clear candidate for morphemic status. Liddell (2000c) suggested that *loc* ought to be considered a morpheme for two reasons. First, the type of movement appears to be definable linguistically (a downward movement followed by an abrupt offset), and second, it has a meaning that is not derived directly from its form (i.e., it does not mean that the referent moved downward and bounced slightly). It is used instead to signal the salience of the location of the referent, often so that the specific locus can serve as reference point for the referent anaphorically in discourse. For many of the other proposed motion morphemes Engberg-Pedersen (1993) described, there does not appear to be much evidence of the double articulation necessary for morphemic status. Motion morphemes such as *move-line, move-circle, move-arc, jump-path* refer to movements in a line, in a circle, in an arc, and so forth. Thus, the relationship of these forms to their meaning is quite transparent.

3.6.2.4 The body as an articulator morpheme?

In the Garfield comic example discussed in 3.5.2.2 above, Liddell (2000c) described how the signer imitates the actions of the main character when retelling the story in sign. The signer directed the sign LOOK upwards and to the right, in the direction where he had conceptualized Garfield's owner to be standing. As he did this, the signer also turned his body and his gaze towards the same location, just as Garfield does in the comic strip. This is an example of role shifting, a feature of signed language discourse we also saw in the Auslan text discussed in 3.2. As we have seen, Supalla (1982, 1986) proposed that the use of the body in this way represents the use of a *body classifier*. Schick (1991: 38), however, rejected this claim:

> Classifiers are morphemes that categorise referents in a symbolic and discrete manner based on salient properties. When the body is used in these...forms, body parts contribute to the meaning of the construction by contextual, deictic, and pragmatic means. Although this information is morphemic, they are not symbolic categorisations; their meaning can only be that body part and cannot represent another object.

Most other researchers do not appear to consider the use of the signer's body to act as a type of classifier morpheme. Although rejecting this claim, many researchers working within the homogeneous model of sign language structure have nonetheless argued, as Schick (1991) has done, that role shift itself is a grammatical device, and not a mimetic, gestural phenomenon. Such researchers have analyzed role shift as subject-object agreement, projected body pronouns, or role prominence markers (Liddell & Metzger, 1998). Schick (1991) has, however, unwittingly pointed out the contradiction inherent in this approach. The use of the body to represent itself means that the relationship between form and meaning is transparent, and double articulation is lacking. In such uses of the body, there are no linguistically definable meaningless phonological features. The relationship is not symbolic, and thus difficult to treat as morphemic. Therefore, without morphemes, analyses which treat body parts as grammatical devices do not seem possible.

3.6.2.5 Spatial morphemes?

Like later attempts by Liddell & Johnson (1987), Supalla's analysis of spatial loci used in polycomponential verbs claimed that a linguistically definable base grid system could account for the use of space in these constructions. Just as we have seen with indicating verbs, however, it appears that polycomponential verbs can make use of an unlimited number of points in the signing space. It would be possible, for example, to move the polycomponential verb of motion PERSON$_1$-WALK-TO-PERSON$_2$ between any number of spatial loci. Furthermore, the use of space is analogic in such signs. To signal that the first person (PERSON$_1$) walked right up to the second person (PERSON$_2$), the signer moves the dominant hand from a locus on one side of the signing space until it makes contact with the subordinate hand. If this sign were to be modified by ending the movement only halfway to the subordinate hand, this would represent PERSON$_1$-WALK-HALFWAY-TO-PERSON$_2$ The sign may be part of a complex combination of movement patterns like that shown in Figure 2.11 in the previous chapter. Moreover, the spatial relationships represented by such signs may work in all three dimensions (up-down, left-right, and near-far), so that a range of potential movements between a vast number of spatial locations would be possible (Liddell, 1990).

For Liddell (2000b), all such signs use spatial loci by means of blended mental spaces. In the ASL example in Figure 3.26 below, the signer maps a representation of a fence and a cat onto the handshapes and specific areas of the signing space ahead of her. This enables her to convey the spatial arrangement of the two referents. In the first illustration, she is using a lexical sign FENCE (albeit the form she produces is modified in both location and direction of movement from the citation form shown in Costello (1994), so that this form might be analyzed as a polycomponential modification of this lexical sign). After the completion of the sign, the subordinate hand is held in place as a visible landmark of part of the fence. The spatial characteristics of the fence are then mapped onto the hand, as shown by the lines connecting the illustration of the mental space to an oval in the photograph. The index finger side of the hand represents the top of the fence, for example. The signer then produces the lexical sign CAT, which identifies the next referent to be added to the blended space. The third photograph shows the signer placing the hooked V handshape on top of the subordinate handshape. The V'': *animate* handshape, as mentioned above, is identified by Supalla (1982) as a semantic classifier for small animals. As a result of the use of the lexical sign CAT and the blending, however, it would be specifically understood here as referring to a cat. The spatial relationship between the cat and the fence is conveyed by the physical relationship between the two hand configurations. These two polycomponential verbs of location can be located in an apparently unlimited number of loci in the signing space around the signer. Therefore, as with the analysis of indicating verbs in 3.5.2.2 above, a morphemic solution to the use of space in such signs is not possible.

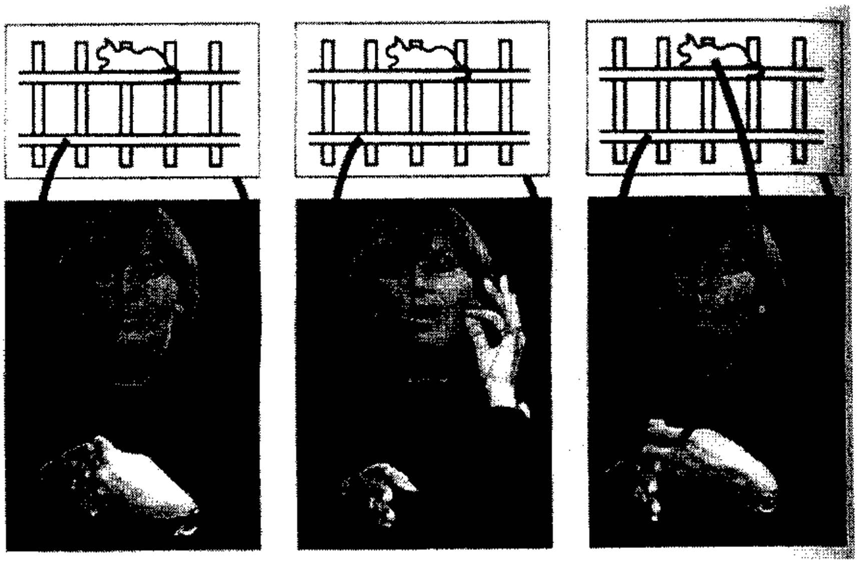


Figure 3.26

3.6.2.6 The handshape component as classifier morpheme?

As a component of polycomponential verbs of motion, location, and handling, the handshape has been widely referred to as a *classifier* morpheme. The reasons for this analysis of handshapes in these constructions, and its problematic nature, is discussed in more detail in the next chapter, so I will not take up this issue here.

Although the term *classifier* has been widely adopted to refer to the meaningful unit realized by handshapes, there has also been little agreement about the different subclasses of proposed classifier handshapes in polycomponential verbs, with different researchers suggesting very different analyses. As we have seen Supalla (1986) suggested five subtypes of classifier morpheme (*size-and-shape-specifier, semantic, body, bodypart* and *instrument*). A cotemporaneous analysis by McDonald (1982), however, proposed that there were only two basic categories, which she called *x-type of object* and *handle x-type of object* classifier forms. Johnston (1991), Shepard-Kegl (1985), Wallin (1996) and Zwitserlood (1996) also suggested a two way division between forms which represent objects and those which indicate the handling of objects. Wallin (1996) and Zwitserlood (1996) appeared to exclude Supalla's tracing size-and-shape specifiers from their descriptions, but most other researchers include them. McDonald (1985) placed them in the x-type of object category, and Johnston (1991) grouped them with handling (or *manipulator*) forms. Other researchers have expanded the number of subclasses. Schick (1987) suggested three main classes (*class, handle* and *size and shape specifier* morphemes), Engberg-Pedersen (1993) listed four (*whole entity, limb, handle,* and *extent*); Corazza (1990) proposed five (*grab, surface, quality, descriptive,* and *perimeter*); Brennan (1992) described six (*semantic, size-and-shape, tracing, handling,* *instrumental* and *touch* morphemes); and Liddell and Johnson (1987) proposed seven classes of classifier morpheme (*whole entity*, *surface*, *instrumental*, *depth and width*, *extent*, *perimeter-shape*, and *on-surface* morphemes).

Table 3.8 Other analyses of handshape in polycomponential verbs

	Entity handshape components	*Handle handshape components*	*SASS handshape components*
Supalla	Static SASSes, semantic, bodypart, some instrument classifiers	Some instrument classifiers	Non-static SASSes
McDonald	Some x-type of object classifiers	Handle x-type of object classifiers	Some x-type of object classifiers
Shepard-Kegl	Shape/object classifiers	Handling classifiers	-
Johnston	Substitutors/proforms	Some manipulators	Some manipulators
Corazza	Surface, some grab, perimeter, and some quantity (?) classifiers	Some grab classifiers	Descriptive, some perimeter and some quantity (?) classifiers
Brennan	Semantic classifiers and some SASSes	Handling, instrumental and touch classifiers	Tracing classifiers, and some SASSes
Schick	Class classifiers, some SASSes	Handle classifiers	Some SASSes
Engberg-Pedersen	Whole entity stems and some limb stems	Handle stems and some limb stems	Extension stems
Liddell & Johnson	Whole entity, surface, on-surface classifiers, and some extent (?) classifiers	Instrumental classifiers	Depth and width, perimeter-shape, and some extent (?) classifiers
Zwitserlood	Object	Handle	-

The proliferation of categories and different terminology has prevented much needed crosslinguistic comparison of these forms, although even a cursory examination of the literature reveals that many of these forms are highly similar in the signed languages described, despite the differences in nomenclature. Only recently, however, have researchers begun to call for more consistent descriptions across different signed languages (Schembri, 1998; Zwitserlood, 1996). Table 3.8 above is adapted from work by Zwitserlood (1996) and attempts to provide a unified account of these constructions in various signed languages. Unlike Zwisterlood, however, I have grouped the various types into three major categories: *entity* (for those hand configurations that represent the whole or part of a referent), *handle* (for those handshapes that represent the handling of a referent), and *size and shape specifier* (SASS) handshape components (for those handshapes that represent salient aspects of a referent's visual-geometric characteristics). For a description of these three major categories, see section 3.7.3 below.

3.6.2.7 Polycomponential verbs as lexical signs?

Recent work by Liddell (2000c) has investigated unacceptable forms of polycomponential verbs of motion and location in ASL. As we have seen, Supalla (1982) and other researchers such as Brennan (1992) have proposed that individual polycomponential signs are assembled from a highly productive system in which any of a large number of handshape, movement, and location morphemes freely combine to produce an unlimited number of possible forms. Liddell (2000c) has suggested, however, that the system described by these researchers would predict large number of signs that native signers actually do not use.

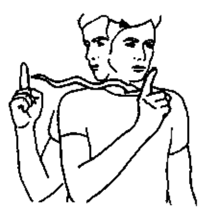


Figure 3.27

In Figure 3.27, we see an example of a polycomponential verb of motion in ASL. In this sign, the *G:animate* morpheme moves along a straight path with a superimposed bouncing movement. This is a form similar to the sign using *G:animate* we saw in the Auslan text in 3.2. In this ASL example, the signer also produces the non-manual adverb *mm* (Liddell 1980). In Supalla's (1982) analysis, the bouncing movement is a secondary manner of movement affix. It does not represent a bouncing manner of motion, however, since that would suggest that the referent is hopping. Instead, this form means that a person (or some other upright animate referent) is walking in an unhurried manner. This seems to be related to the way in which a human's head and body moves slightly up and down as the legs move.

Figure 3.28

In the second sign in Figure 3.28, the *V:animate* handshape (referred to as the *human* classifier in Figure 3.19 above) moves along a path while the fingers wiggle. If we treat the bouncing movement in Figure 3.27 as a manner affix, then it should be possible to attach that affix to the sign in Figure 3.28. The resulting sign, however, in which the *V:animate* handshape moves in a bouncing manner, is unacceptable in both ASL and Auslan. This suggests that this proposed affix may not be very productive, if indeed it is an affix at all. In fact, Liddell (2000c) showed that adding this bouncing manner of movement to the semantic classifier for vehicle does not produce an acceptable sign in ASL with a meaning related to that seen in Figure 3.27.

Liddell (2000c) outlined a number of other idiosyncratic forms in ASL, and suggested that these restrictions actually result from the fact that the motion seen in the sign in Figure 3.27 is not analyzable into separate path and manner of movement morphemes. He proposed instead that such a sign is an example of an incompletely specified s-morph or lexical verb, similar to an indicating verb except that the handshape in such a form is itself analyzable into a morpheme. The handshape morpheme and movement form the base of this sign. These fixed features of the sign are then combined with analogic and gradient uses of spatial loci to produce the sign seen in Figure 3.27. Liddell suggested that the claimed productivity results from the fact that a signer's mental lexicon includes a relatively larger number of similar lexical verb bases that can be placed and oriented in analogical ways using blended spaces of the kind described in section 3.6.2.3 above. His conclusion is as follows (Liddell, 2000c: 18):

> It is probably too early to speak with any confidence about productivity within this system. Before talking about productivity it will first be necessary to identify the units that are supposed to contribute to that productivity. This identification will need to be based not only on meanings expressed, but identifiable parts of signs that express that meaning.

3.7 Verbs in Auslan

In this final section of this chapter, I briefly propose a verb classification system for Auslan (shown in Table 3.9), drawing on my critical review of the literature. I have attempted to adapt Engberg-Pedersen's classification scheme by recognizing the problematic nature of her assumption that all meaningful units in so-called agreement verbs and in polycomponential verbs are best analyzed as morphemes. Thus, unlike Engberg-Pedersen (1993), I have subdivided verbs in Auslan into two main categories which exist as prototypical cases on opposite ends of a continuum: monomorphemic verbs (including plain verbs) and polycomponential verbs. The class of agreement verbs (which I have called indicating verbs, following the work of Liddell, 2000a) exist on a midpoint along this continuum.

In Auslan, as in Danish Sign Language, there is no sharp boundary between the monomorphemic and polycomponential ends of the continuum. Signs which may act as monomorphemic lexical items in some contexts may be reanalyzed into polycomponential constructions in a particular discourse, as we saw in the FENCE example discussed in 3.6.2.5 where a nominal sign was used as the base for a polycomponential verb of location meaning 'a fence was located on the right'. Plain, indicating and polycomponential verbs reflect their common origins in their ability to be combined with elements of constructed action (as in the Garfield example in 3.5.2.2 above). In addition, some specific polycomponential verbs appear to be semi-lexicalized combinations of handshape, orientation, and movement, as suggested by Engberg-Pedersen, 1993 and Liddell, 2000c.

The main difference between polycomponential and non-polycomponential is in the use of handshape and movement. In polycomponential signs, the handshape component appears to act as a meaningful unit. As we shall see in the data discussed in Chapter 5, it may represent classes of referents, such as vehicles or human beings, or quite specific referents, such as a duck or a rocket. Often it also indicates some specific size and shape characteristics of the referent, such as whether it is flat and wide, or small and circular. This is less often true of the hand configurations used in non-polycomponential verbs.

Table 3.9 Types of verbs in Auslan

Monomorphemic verbs <----------	----------	----------> Polycomponential verbs
Plain verbs KNOW, LIKE, UNDERSTAND	Double indicating verbs OBJECT-TO, PAY, INVITE Single indicating verbs THANK, TELL, REMIND Ambiguous indicating verbs BUY, TALK, MAKE	Verbs of motion &location G: animate +(r + move-line + l) "A person passes by" Verbs of handling (2H) 5": handle-lump-like-entity+(c + move-arc + f) "(Someone) give(s) someone a lump-like object" Predicates of visual-geometric description G: two-dimensional-outline+(trace: circle) "An object is circular shaped"

Moreover, the types of movement possible with polycomponential verbs are also distinct. With non-polycomponential verbs, only a limited range of movement types are possible, but this is less true of polycomponential verbs in which the specific manner, direction, and path of a referent's motion may all be represented.

3.7.1 Plain verbs in Auslan

Plain verbs form part of the category of non-polycomponential verbs. These verbs constitute a large group of signs in Auslan. As in Danish Sign Language (Engberg-Pedersen, 1993), they may be transitive (LOVE, TASTE, OWE) or intransitive (CRY, SLEEP, SMILE), denote states (KNOW, FEEL, LIKE), events (TRY, FORGET, SWALLOW) or processes (WORRY, DREAM, BREATHE).

Following Engberg-Pedersen (1993) and like Johnston (1991b), I use the term to refer to a class of signs that is somewhat distinct from the class originally described by Padden (1988). As pointed in 3.5.1.2 above, Padden's (1990) work did not consider signs which may be modified to show pragmatic agreement as a subtype of agreement verb, but included them in her category of plain verbs. I will use the term, however, to refer only to those verbs signs that cannot be modified spatially at all. Johnston (1989) has pointed out that there is a strong tendency for this class of verbs to have a place of articulation on the signer's body, rather than in space. Thus, the relative lack of spatial modification possible with these signs may partly reflect articulatory constraints. In some cases, the use of a location on the body may reflect some degree of visual motivation (e.g. the sign KNOW is produced on the forehead, and TASTE is made near the lips), but not all can be described as iconic in this way. There seems no reason, for example, why a sign like PRETEND should be made on the chin. There are other plain verb signs that do not have a place of articulation on the body, such as the sign RUN.

Although plain verbs may not be modified spatially to show who or what in the environment corresponds to the semantic role of agent or patient, it is possible for some members of the group to be modified for aspect (Engberg-Pedersen, 1993). They also may combine with the use of pointing signs that may be modified spatially to indicate who is doing what to whom, or with the use of constructed action.

3.7.2 Indicating verbs in Auslan

Indicating verbs fall into three categories: *double indicating verbs*, *single indicating verbs*, and *ambiguous indicating verbs*. Double and single indicating verbs are equivalent to Padden's class of double and single agreement verbs and include her class of spatial verbs without classifiers, while the class of ambiguous indicating verbs are the same as Engberg-Pedersen's (1993) pragmatic agreement verbs and Johnston's (1991b) class of freely-locating signs.

The distinction between indicating signs and plain verbs is not sharp. The continuum in Table 3.9 is intended to show how the categories of plain, indicating, and polycomponential verbs overlap to a certain degree. In Auslan, some single indicating verb signs that begin or end their movement on the body (and thus partially resemble plain verbs) may be partly modified spatially to indicate who or what corresponds to the semantic roles of agent, patient etc. Verbs of this kind include SEE, THANK, PLEASE-YOURSELF, REMIND, and GIVE-BACK. The sign THANK begins near the mouth, SEE near the ipsilateral eye, REMIND on the forehead and PLEASE-YOURSELF begins on the chest. The regional Auslan sign GIVE-BACK may have its initial place of articulation modified spatially to signal who or what is in the role of agent, but always ends on the signer's chest to show patient roles. Moreover, as previously mentioned, many plain verbs may be modified spatially by the use of body leans or role shifts during signing (see Johnston, 1996).

3.7.3 Polycomponential verbs in Auslan

My classification of predicate types in Auslan is represented schematically in Table 3.9. As can be seen, I group polycomponential verbs into three main categories: verbs of motion and location, verbs of handling, and verbs of visual-geometric description. These categories are based on the meaning of particular combinations of handshape and movement components, but the problematic nature of the analysis of these forms outlined above means that I will only discuss the handshape components here. I group handshapes into three major categories: entity, handle and size and shape specifier (SASS) handshapes. Note that these descriptions are preliminary, and may be subject to later revision.

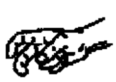
3.7.3.1 Entity handshapes

Verbs of motion and location involve the use of *entity* handshapes. Entity hand configurations fall into two classes: *whole-entity* and *part-entity* handshapes. Examples are given in Table 3.10 below. The whole-entity category handshapes include all of Supalla's (1982, 1986) semantic classifiers, and some of his SASS classifiers (where the handshape may be used to describe the motion and location of an entity). The part-entity category handshapes include Supalla's bodypart classifiers.

As the name suggests, whole-entity handshapes are used in process verbs that describe the motion and location of specific entities (such as G: *animate* and V: *animate*), a mass of entities regarded as a whole (such as 5: *many-animates* in Figure 3.1), or a specific number of entities as a whole (such as V: *two-animates* in Figure 3.1) (Engberg-Pedersen, 1993). These handshapes may combine with a range of movement types, but there do appear to be unacceptable combinations similar to what has been described for ASL (Liddell, 2000c) and Danish Sign Language (Engberg-Pedersen, 1993), such as the combination of the movement in Figure 3.27 with the handshape in Figure 3.28. In some cases, the unacceptability of handshape and movement combinations may be explained by general world knowledge, in that particular types of motion are unusual for particular referents. The specific kinds of unacceptable combinations (and their relationship to uncommon real-world phenomena), however, must await further detailed investigation.

Part-entity handshapes, like Engberg-Pedersen's (1993) class of limb stems, are used in verbs to denote the motion or location of entities indicated by the motion or location of their parts. An important subcategory of part-entity handshapes are those that are used to describe the motion of animate entities by representing the motion of their limbs (such as G: *legs* and B: *feet*), but at least two handshapes that represent wheels are also used in Auslan to refer to the motion of vehicles (F: *wheels* and 5: *wheels*). Unlike wheel handshapes, however, limb handshapes frequently co-occur with constructed action, and overlap to a certain extent with the handle handshapes discussed below.

Table 3.10

	Handshape component	Function
	Whole-entity handshapes	
	*G: animate (unmarked orientation is for the index finger to be pointing upwards)*	To represent upright animate entities, particularly humans. This may be modified to refer to a specific number of animates (as in V: *two-animates,* W: *three-animates,* and 4: *four-animates*)
	*G: short-thin-entity*	To represent thin narrow entities, such as pens, pencils etc
	*V: animate (unmarked orientation is for the fingers to be pointing downwards)*	To represent two-legged entities, particularly humans and animals
	*V": animate (unmarked orientation is for the fingers to be pointing downwards)*	To represent two-legged entities, particularly seated humans
	*B: vehicle (unmarked orientation is for the fingers to be pointing forwards and the palm to be oriented sideways)*	To represent flat wide entities, such as vehicles, (particularly cars, bicycles, trucks, buses, and trains)
	*B: flat-wide-entity (unmarked orientation is for the fingers to be pointing forwards and the palm to be oriented downwards)*	To represent flat wide entities, such as sheets of paper, books, rugs, tables, paintings,plates but also including some vehicles (particularly cars). This may also be used with the orientation palm upwards to imply that the salient side (i.e., the text side of a piece of paper or the picture side of a painting) is visible
	*B+: surface (the B handshape and the lower arm: unmarked*	To represent surfaces, such as the ground, or edges of large bodies of water, such as falling or rising water. The B handshape may be used alone with a

	orientation is for the fingers to be pointing sideways and the palm to be oriented downwards)	similar meaning.
	*5+: tree (the 5 handshape and the lower arm: unmarked orientation for the fingers to be pointing upwards and the palm to be oriented away from the signer)*	To represent trees
	*G+: tall-thin-entity (the G handshape and the lower arm: unmarked orientation for the fingers to be pointing upwards and the palm to be oriented away from the signer)*	To represent tall thin entities, such as telegraph poles, trees etc
	*5": lumplike-entity (unmarked orientation for the fingers to be pointing away and the palm to be oriented downwards)*	To represent rocks, lumps, groups of entities etc
	*bC: cylindrical-entity (unmarked orientation for the little finger side of the hand to be pointing downwards)*	To represent cylindrical entities, such as glasses, cups etc
	*gC>: bird (unmarked orientation is for the palm down)*	To represent birds
	*F>: insect (unmarked orientation is to have the palm away)*	To represent flying insects
	*G: general-entity*	To represent anything that can be located or move
	*B: general-entity*	To represent anything that can be located or move
	Part-entity handshapes	
	*G: legs (two-handed: unmarked orientation is to have the fingers pointing downwards)*	To represent animates walking, limping etc

	*B: feet (two-handed: unmarked orientation is to have the palm downwards)*	To represent animates walking on foot
	*B>: paws (two-handed: unmarked orientation is to have the palm downwards)*	To represent paws
	*5": claws (two-handed: unmarked orientation is to have the palm downwards)*	To represent claws
	*F: wheels*	To represent the wheels of vehicle
	*5: wheels*	To represent the wheels of a vehicle, or propellers of an airplane

3.7.3.1 Handle handshapes

Compared with whole-entity and part-entity handshapes, handle handshapes do not represent all or part of an entity in a motion event, but in many cases they represent more than one entity. As in Danish Sign Language, usually they are used in process verbs in which both the handler and the entity handled are described (Engberg-Pedersen, 1993). Examples are present in Table 3.11 below.

Verbs of handling use manual articulators that imitate human hands, animal limbs, body parts or other kinds of instruments manipulating or interacting with something. Handle handshapes can thus be divided into two subcategories: *agentive* and *instrumental* handshapes. The agentive and instrumental handle handshapes are equivalent to Supalla's (1982, 1986) instrumental and tool categories, although the agentive category also includes limb and bodypart handshapes that are used to refer to the handling of and interaction with entities rather than to the motion of entities.

Handle handshapes frequently combine with constructed action. Unlike limb handshapes, agentive and instrumental handle units may be used to refer to one referent, while the signer's head and body are used to refer to another referent. A signer may, for example, describe how one person put a gun to the head of another person by using a handle-instrument handshape to represent the handling of a gun, and point this handshape first away at a locus away from their body, and then shift the body and point it at their own forehead (Morgan & Woll, 2000). Thus the signer's handshape may represent a criminal holding a gun, while the signer's head is used to represent the victim.

Agentive handle units can be double-handed to denote the handling of two entities (such as holding a knife and a fork), of a larger entity or mass (such as a large ball), or the handling of one entity with two hands (such as a guitar).

Table 3.11

	Handshape unit	Function
	Agentive units	
	*S: handle-handle*	For representing the handling of a bag, mug, skis, stick, hammer etc
	*bO>: two-dimensional-entity*	For representing the handling of a piece of paper or other flat entity
	*bC>: three-dimensional-entity*	For representing the handling of a flat entity that has some thickness, such as a book
	*bC: handle-cylindrical-entity*	For representing the handling of a glass, cup, or jar
	*5": handle-lumplike-entity*	For representing the handling of a lump, piece of fruit, small ball etc
	*Y: handle-telephone-receiver*	For representing the handling of a telephone
	Instrumental units	
	*V: handle-scissors*	For representing the use of scissors
	*Lh: handle-gun*	For representing the use of a gun

3.7.3.1 Size and shape specifier handshapes

Stative verbs of visual-geometric description use SASS handshapes. Some examples are presented in Table 3.12. In many cases, these handshapes may be similar to entity or handle handshapes. The difference is that the handshapes may combine with *hold* to indicate something about the physical dimensions of a referent, or they may combine with a movement unit that does not denote the motion of a referent, but iconically traces the outline of its size and shape. The first category are equivalent to Supalla's (1982, 1986) static SASS handshapes, and the second are identical to his tracing SASS handshapes.

There is some overlap between entity handshapes used in verbs of location and SASS handshapes described here. It is quite possible for a non-static SASS handshape to be used in a tracing construction that is itself located in a specific part of the signing space. In this case, the sign describes something about both the physical state and location of a referent.

Table 3.12

	Handshape unit	Function
	*B: flat-wide-surface*	For representing the size and shape of flat wide surfaces, such as walls, floors, buildings, mountains etc
	*B": curved-wide-surface*	For representing the size and shape of bumps, holes etc
	*5":curved-large-surface*	For representing the size and shape of large entities, such as rocks, piles of goods, muscles etc
	*gC>: thin-entity-surface*	For representing thin narrow objects, such as wooden boards, frames, or rulers
	*F: thin-cylindrical-entity-surface*	For representing thin cylindrical entities, such as small trees, pipes, cables etc.
	*F>: tiny-entity-surface*	For representing the size and shape of very thin entities, such as wire, string, straw etc
	*G: two-dimensional-outline*	For representing the size and shape of any thin entity

3.7.3.1 Mutual interdependence of handshape and movement

In this analysis, it is important to stress the mutual interdependence of handshape and movement (Engberg-Pedersen, 1993). In many cases, an identical handshape may act as an entity handshape, handle handshape, or SASS handshape unit. The exact role of the hand configuration depends on the interpretation of the polycomponential verb as a whole. In the examples in Figure 3.29 below, we see that the same bC handshape is used to refer to the motion of the referent, the handling of the referent, and the size and shape of the referent. In all of these signs, the handshape unit plays a similar role, since it suggests that the referent in question is a medium-sized, cylindrically-shaped entity. In each case, however, the type of movement, the role of the subordinate handshape unit, and the context play a role in determining the particular analysis of the handshape in question.

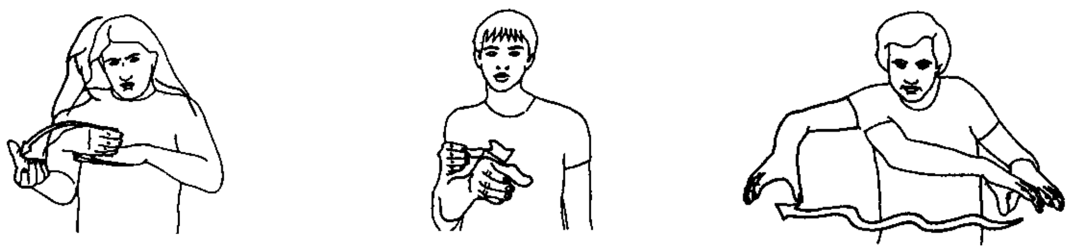


Figure 3.29

3.8 Summary

In this chapter, I have provided an introduction to polycomponential verbs in signed languages. In the introductory sections, I discussed issues relating to terminology in this area, and gave an example of a narrative text in Auslan in which I described the use of a number of polycomponential verbs. I then moved on to contextualize the study of these constructions by providing some background about verbs in signed languages generally, and the relationship between polycomponential and non-polycomponential verbs. I reviewed a number of proposed verb typologies that approached the description of signed language verb systems from within both homogeneous and heterogeneous models of signed language structure. I then outlined the seminal work of Supalla (1982, 1986) whose attempt to analyze polycomponential verbs as polysynthetic, multimorphemic constructions has proven enormously influential in the signed language linguistics literature. A discussion of problems with Supalla's account then followed, and I then provided a brief outline of my own proposal for a heterogeneous verb typology for Auslan.

In the following chapter, I will discuss the widely accepted proposal that the handshape unit in polycomponential verbs acts as a classifier morpheme, similar to what is found in nominal classification systems in some spoken languages.

Chapter 4
Classifier systems in spoken and signed languages

4.1 Introduction

In this chapter, I focus on the nature of the meaningful component expressed by the handshape in polycomponential verbs. As explained elsewhere, it has generally come to be described as a classifier morpheme, since the choice of hand configuration appears to vary according to the semantic characteristics of the referent.

An increasing number of researchers, however, have argued against the analysis of these forms as containing classifier morphemes (Cogill, 1999; Edmondson, 1990; Engberg-Pedersen & Pedersen, 1985; Engberg-Pedersen, 1993), or have raised questions about the use and usefulness of this terminology (Brennan, 1986; Deuchar, 1987; Johnston, 1991b; Slobin et al., 2000; Sutton-Spence & Woll, 1999; Zeshan, 2000a; Zwitserlood, 1996). Such criticisms, however, have only recently begun to receive widespread attention. This is surprising because, as we saw in Chapter 3, there has been little agreement about how these hand configurations and the polycomponential verbs in which they occur should be analyzed (even amongst those who accept the analysis of the handshape unit as acting as a kind of classifier), and the same terminology has been used in somewhat different ways by different signed language researchers (Engberg-Pedersen, 1993; Zwitserlood, 1996). This lack of consensus in the signed language literature has most likely been exacerbated by the terminological confusion surrounding the use of the term *classifier* in spoken language linguistics (Craig, 1994). Signed language researchers have only recently begun to address in any detail the problems with the current analysis of polycomponential verbs (Cogill, 1999; Edmondson, 2000; Emmorey & Herzig, 2000; Engberg-Pedersen, 1993; Liddell, 2000c), while at the same time linguists have begun to clarify the notion of classifier morphemes in spoken languages (Aikhenvald, 2000; Craig, 1994; Grinevald[1], 1996, 2000). These recent developments present a new opportunity for sign linguists to re-evaluate the notion of classifier morphemes in signed languages. Drawing on recent research on a range of spoken and signed languages (Aikhenvald, 2000; Craig, 1994; Engberg-Pedersen, 1993, 1996; Grinevald, 1996, 2000), this chapter will show how comparison between the handshape unit in these polycomponential verbs and classifiers in spoken languages remains somewhat problematic. The typologies of classifier languages proposed by Allan (1977) and Grinevald (1996, 2000) will be compared and contrasted,

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[1] Colette Grinevald formerly published under the name of Colette Craig.

particularly focussing on their differing accounts of the predicate classifier languages with which signed languages have been compared. This chapter will suggest that, although these handshape units appear to have much in common with spoken language classifiers and other forms of nominal classification, they exhibit a range of distinctive characteristics which may make them a phenomenon unique to signed languages. The primary goal of the present work is thus to provide a brief overview of recent developments in the study of nominal classifications systems in spoken languages and to encourage more detailed description and discussion of the handshape unit in polycomponential verbs of motion and location by attempting to sketch some of the issues that need to be considered.

4.2 The handshape unit as classifier morpheme

Frishberg (1975), discussing examples of verbs of motion and location in ASL, appeared to have been the first to use the term classifier to refer to the handshape unit:

> ASL uses certain handshapes in particular orientations for certain semantic features of noun arguments. Thus the verb MEET[2] has no "neutral" form; the citation form actually means "one person meets one person", or perhaps more specifically "one self-moving object with a dominant vertical dimension meets one self-moving object with a dominant vertical dimension". If trees started walking, they would MEET one another in the same way. Many of these classifiers are productive and analysable, although not strictly transparent.

Frishberg had earlier published work on Navajo (Frishberg, 1972), but she did not explicitly compare these handshape units with classifiers or classificatory verbs in any spoken language. It was left to other researchers, such as Supalla (1978) and McDonald (1982), to draw an analogy between these forms in ASL and so-called *predicate classifiers* in the Athabaskan language family. Although Frishberg (1975) only referred to the so-called classifier handshapes in passing, and did not attempt any detailed description or discussion of concept, the notion that these polycomponential predicates in signed languages contain classificatory morphemes has since gained widespread acceptance in the sign linguistics literature, both in the United States and elsewhere. There appear to have been a number of reasons for this terminology.

Firstly, sign linguistics was a new and rapidly expanding area of research at the time, and there was a strong need for standard terminology. Borrowing terminology from spoken language description seemed the most appropriate solution, perhaps because initial attempts to devise a signed language specific vocabulary, such as

[2] This is the same sign shown in Figure 2.12 in Chapter 2.

chereme and *cherology* for the visual-gestural equivalents of *phoneme* and *phonology* (Stokoe, 1960), had not met with much success.

Secondly, signed language researchers were also still struggling to overcome the assumption amongst their peers that only spoken languages were "worthy" of serious linguistic study (Armstrong, Stokoe & Wilcox, 1995). This is perhaps the motivation for what others have called the *test and transfer* approach to sign linguistics—findings about a particular phenomenon in signed languages were described in accordance with what was known about spoken languages (Uyechi, 1996; Zwitserlood, 1996). As this chapter will attempt to show, the test and transfer approach to the study of signed languages can be useful, but its benefits may be limited when there is little consensus about the nature of particular findings in spoken languages.

Thirdly, a greater understanding of this area of signed language grammar was also sorely needed. The classifier morphemes described by Frishberg (1975) appeared to play a central role in the derivational morphology of ASL. It has even been claimed that all signs in the lexicon of ASL include classifiers, or are derived from polycomponential constructions that contain classifier morphemes (McDonald, 1982; Shepard-Kegl, 1985), yet previous research had generally ignored this category of signs. As a result, the work of Supalla (1978, 1982) on these constructions proved to be very influential. Supalla, along with McDonald (1982), Schick (1990a) and others, drew on the description of classifiers in spoken languages by Allan (1977), which seemed to indicate that signed languages ought to be considered examples of predicate classifier languages. The importance of these classifier morphemes in ASL, as Engberg-Pedersen (1993) explained, was confirmed by several studies of their acquisition by both native and non-native signers (Kantor, 1980; Newport, 1982; Schick, 1987; Supalla, 1982), and their role in the creation of new lexical items (Bellugi & Newkirk, 1981; Klima & Bellugi, 1979). The term also came to be used in studies of BSL (Brennan, 1990, 1992, 1994; Kyle & Woll, 1985), Auslan (Johnston, 1989; Schembri, 1996), and New Zealand Sign Language (Collins-Ahlgren, 1989; Moskovitz, 1996), as well in a wide variety of other signed languages. The central role of these polycomponential constructions in signed languages has also meant the term *classifier* was adopted by writers of curriculum materials designed to teach ASL, BSL, and Auslan (Baker-Shenk & Cokely, 1980; Branson et al., 1995; Humphries, Padden & O'Rourke, 1980; Miles, 1988; Smith, Lentz & Mikos, 1992), and it is now widely used and accepted by teachers of Auslan as a second language and educators of deaf students.

4.3 Classifier systems in spoken languages

In the last three decades, classifier systems have attracted the attention of a growing number of spoken language linguists, perhaps because they have provided a very useful testing ground for a number of questions about the nature of language (Grinevald, 2000), such as the relationship between conceptual representations and linguistic categorisation (e.g., Lakoff, 1987; Lakoff & Johnson, 1980). In the context of such increasing interest, a need for a description of the diverse types of classifier systems in the world's languages has emerged. Three seminal articles represented the earliest attempts at creating typologies of classifier systems, focusing on aspects of their semantics and morphosyntax: Adams and Conklin (1973), Denny (1976), and Allan (1977).

Adams and Conklin (1973) focused on the classifier systems of South East Asian languages, demonstrating that the three major shapes identified in such systems (classifying objects as either *long-rigid, flat-flexible,* or *round*) appeared to have developed from lexical items for *tree, leaf,* and *fruit* respectively. Denny (1976) built on this work, proposing that the many types of classifier systems in the languages of the world reflect the three major types of interaction speakers have with objects in their environment: social interaction (classifying objects as human, non-human, or deity), physical interactions (reflecting the material essence or shape of objects), or functional interactions (categorizing objects as, for example, sources of food or forms of transportation).

Allan's (1977) study was the first attempt to survey classifier systems in some fifty languages from Asia, Africa, North America, Australia and Oceania. He set out to look for shared semantics in the organization of these classifier systems, and was able to suggest that a list of seven basic semantic categories involved in the development of classifier systems in the languages he studied, in which referents were categorized on the basis of (1) material, (2) shape, (3) consistency, (4) size, (5) locus, (6) arrangement in space, and/or (7) quantity.

Although groundbreaking, Allan's (1977) typology of classifiers in spoken languages has been the subject of considerable criticism in the two decades since its publication (Croft, 1994; Dixon, 1986; Engberg-Pedersen, 1993; Grinevald, 1996, 2000). Many writers have pointed out that the Allan study did not distinguish between classifier systems and other types of nominal categorization, such as noun classes and measure terms. In addition to this, the description of many previously undocumented spoken languages in the last two decades has also provided new data. As a result, both Aikhenvald (2000) and Grinevald (1996, 2000) have proposed a revised definition and typology of classifier systems. Despite their relevance to our understanding of polycomponential verbs in signed languages, these developments have remained largely overlooked in the sign linguistics literature. I will thus present a brief review of the work of both Aikhenvald (2000) and Grinevald's (1996, 2000) here. Before discussing their proposals, however, I will provide a review of Allan's (1977) typology.

4.3.1 Allan's (1977) typology

It is Allan's (1977) seminal paper that has in fact been the single most important source of comparisons between the handshape unit in polycomponential verbs in signed languages and classifier systems in spoken languages (it is cited, for example, in Brennan, 1990; McDonald, 1982; Schembri, 1996; Schick, 1990a; and Supalla, 1978). The reason for the importance of this work reflects the fact that, in creating this typology, Allan (1977) claimed to have discerned those characteristics of classifier languages which distinguish them from languages of the non-classifier type, and suggested that these languages fall into four major categories. Building on these generalisations, Allan (p. 285) attempted to articulate defining criteria for classifiers in spoken languages:

> Within the terms of this paper, classifiers are defined on two criteria: (a) they occur as morphemes in surface structures under specifiable conditions; (b) they have meaning, in the sense that a classifier denotes some salient perceived or imputed characteristic of the entity to which an associated noun refers (or may refer).

Using this definition, Allan conducted a survey of the existing literature and drew up a typology of classifiers in spoken languages which grouped these languages into four categories based on the major type of classifier morpheme found: (i) *numeral classifier* languages, (ii) *concordial classifier* languages, (iii) *predicate classifier* languages, and (iv) *intra-locative classifier* languages. He illustrated the four types of classifier languages using a large number of examples taken from an impressively long list of primary sources. He admitted that the reliability of this data is variable, since the bulk of it represented his own interpretation of data which appeared to mostly have come from descriptions collected by (non-native speaker?) linguists working on a range of African, East and South-East Asian, American and Australian languages, although the personal contributions of native speakers are acknowledged from languages such as Japanese and Luganda.

4.3.1.1 Numeral classifiers

The first type discussed here are the *numeral classifier* languages. This type of language represents the most common and most widely recognized classifier language. Here the classifier occurs as a compulsory part of a noun phrase. In English, noun phrases may include a demonstrative (e.g., *this*, *that*, *these*, *those*) and/or a quantifier (e.g., *one*, *four*, *some*, *any*, *few*). In numeral classifier languages, however, there is an additional free or bound classifier morpheme that must also be used in combination with the demonstrative and quantifier (and sometimes the adjective). In most numeral classifier languages, different classifiers will be used for different classes of noun. Some examples from Thai (Allan, 1977) and Indonesian (Crowley, Lynch, Siegel & Piau, 1995) are shown below:

4-1. Thai

(a) dèk săam khon
child three CL
"three children"

4-2. Indonesian

(a) dua orang mahaguru
two CL lecturer
"two lecturers"

(b) sàmùt sǎam lêm
notebook three CL
"three notebooks"

(c) dèk lɔ̀ɔ sǎam khon níi
child beautiful three CL these
"these three beautiful children"

(d) mǎatua nán
dog CL that
"that dog"

(e) sìi tua
four CL
"four (animals)"

(b) dua biji bola
two CL ball
"two balls"

(c) dua batang potlot
two CL pencil
"two pencils"

In Thai, if the noun is *dek* "child", then the appropriate classifier is *khon* meaning "human". If it is a book, then the classifier *lem* meaning "flat-object" is used. For animals, *tua*, meaning something like "body" in this context, occurs. In the Indonesian examples, there are three examples of classifiers: *orang* for "human", *biji* for 'small thing" and *batang* for "long cylindrical thing". According to Allan (1977), the classifier may also be used in anaphoric expressions, as in (e) above, in all numeral classifier languages. It can also be used in combination with demonstratives, as examples (c), (d) and (e) from Thai illustrate. Thus, the term numeral classifier is something of a misnomer, and other terms such as noun or nominal classifier are often used in the literature (Grinevald, 1996).

4.3.1.2 Concordial classifiers

The next category of classifier language Allan (1977) illustrated are what he called the *concordial classifier* languages. Allan acknowledged that there is considerable disagreement about the inclusion of this language type in a typology of classifier languages. Many descriptions in the literature characterize these languages as having noun classification systems rather than classifiers per se. In concordial classifier languages, classifying morphemes are affixed (often prefixed) to nouns and to their modifiers within the noun phrase, as well as to their predicates and proforms. Many African languages, such as Tonga and Swahili, as well as Australian and Oceanic languages fall into this category. Since their status as classifier languages is disputed, two of Allan's (1977) examples from the Bantu language Tonga and the Oceanic language Gwi:ni will be sufficient to illustrate this type (in each case the classifier morpheme means "human"):

4-3. Tonga	4-4. Gwi:ni
ba-sika ba-ntu bo-bile	b-edjin b-ugala b-une:wur b-ramarimari waral b-unana
CL-arrive CL-man CL-two	*CL-man CL-that CL-big CL-went away I-saw CL-him*
"Two men arrive"	"That big man who went away, I saw him"

4.3.1.3 Predicate classifiers

The third type of classifier language in Allan's (1977) typology is the *predicate classifier* type. It is this category of classifier languages that, as discussed above, have been compared to signed languages. In the examples shown in (4-5) below, it is clear that part of the predicate construction meaning 'something is lying there" is different in each case. These differences in the form of the predicate are explained by Allan as due to the inclusion of a meaningful element which reflects some aspect of the referent, whether it is part of the class of round objects, flat flexible objects or objects in a pile. Similar predicates occur in other Athabaskan languages, in languages of the Hokan family, and a more limited system is also reported for Dakota (Croft, 1994).

4-5. Navajo

(a) béésò sĭ-ŋa
money PERF-lie: round-object
"A coin is lying there"

(b) béésò sĭ-ltsòòz
money PERF-lie: flat-flexible-object
"A note is lying there"

(c) béésò sĭ-ñĭl
money PERF-lie: collection
"A pile of change is lying there"

4.3.1.4 Intra-locative classifiers

The final type considered by Allan (1977) is the *intra-locative classifier* languages. In these languages, he claims that a classifier morpheme is affixed to the locative expressions that obligatorily co-occur with nouns in most environments. Allan (1977) can only offer three languages of this type: the South American language Toba, the Australian language Dyirbal, and Eskimo. He provides no primary data from the languages in question, but explains that these languages have a small set of classifier morphemes which are affixed to locative expressions with meanings like "up there", "out there", "visible and here", "visible and there", and "not in view". The Dyirbal and Eskimo examples he mentions also appear on interrogative expressions and can be used as demonstratives.

4.3.2 Criticisms of Allan's (1977) typology

A number of writers have disputed some of the details of Allan's work (Aikhenvald, 2000; Croft, 1994; Engberg-Pedersen, 1993; Grinevald, 1996, 2000), claiming, for example, that his typology appeared to confuse true classifiers with other forms of nominal categorization. As mentioned above, many have suggested that a distinction ought to be made between noun class systems (which Allan referred to as concordial classifiers) and classifier systems (Dixon, 1982, 1986; Grinevald, 1996, 2000). Noun classes ought not be considered examples of classifiers, Dixon (1986) explained, because there are morphosyntactic and semantic grounds for distinguishing between the two types of nominal classification. Grinevald (2000) proposed nine aspects of classifier form and function that differentiate them from noun class or gender systems. These are summarized in Table 4.1. I shall only discuss three of these here. Firstly, in languages with noun class systems, all nouns are assigned to a noun class. This appears to be less true of classifier systems. Secondly, many highly grammaticized noun class systems show very little semantic motivation (Corbett, 1991). Allocation of nouns to particular noun classes may be seemingly arbitrary in such systems, and need not reflect characteristics of the referent, such as its shape or function. And thirdly, unlike what is found in most classifier systems, noun classification is obligatorily marked on a range of lexical classes (these vary from language to language and include adjectives, determiners, numerals, pronominals, predicates, etc.).

Table 4.1: Noun class systems versus classifier systems

	NOUN CLASS/GENDER SYSTEMS	CLASSIFIER SYSTEMS
1.	classify all (common?) nouns	do not classify all nouns
2.	are realized as only a small number of classes	are realized as a large(r) number of classes
3.	form a closed system	form an open system
4.	are fused with other grammatical categories, such as case	do not fuse with other grammatical categories
5.	can be marked on the noun itself	are not marked on the noun itself
6.	form a system of agreement or concord	do not form an agreement system
7.	each noun is usually assigned to one class	each noun may be assigned to several classes
8.	show no speaker variation	may show speaker variation
9.	show no register variation	differ in formal versus informal usage

Much of the criticism of Allan's (1977) description has centered on the class of predicate classifier languages. Engberg-Pedersen (1993) and Croft (1994) pointed out that Allan attempts to set up a contrast between the predicate classifiers in Athabaskan languages (as illustrated by the Navajo examples above), and the verbs in languages such as English and the Central American language Tarascan. He did not consider English to be a classifier language, even though English possesses collective nouns, such as *stick*, *packet* and *dozen*, which are almost identical in meaning and function to the Thai classifier morphemes *muan*, *sɔɔŋ* and *lɔ̂ɔ*, because Allan claimed that these collective nouns are not obligatory in quantified noun phrases as they are in Thai (numeral classifiers also differ in a number of other ways from English measure terms, as explained below). He attempted to demonstrate that earlier characterization of Tarascan by Friedrich (1970 cited in Allan, 1977) as being both a numeral classifier and predicate classifier language is incorrect. Allan agreed, however, that Tarascan is a numeral classifier language due to the presence of a classifier morpheme in the quantifying constructions shown in 4-6 (a) and (b).

4-6. Tarascan

(a)	Cima-ni	icuhku	icuskuta
	two	*CL*	*tortillas*
	"two tortillas"		
(b)	Cima-ni	icuhku	
	two	*CL*	
	"two of those flat things"		

He claimed, however, that Tarascan verbs differ from the verbal constructions found in the predicate classifier class. The verbs which erroneously led to the classification of Tarascan as a predicate classifier language are a group of verbs which only co-occur with nouns of a particular class. Allan (1977: 289) provided the following example for the verb meaning "be fat" in Tarascan: it is "*tepa-* if the entity predicated is in the long (saliently one-dimensional) class, *taya-* if it is in the flat (saliently two-dimensional) class, *pore-* or *toyo-* if it is in the round (saliently three-dimensional) class." This group of verbs, like the numeral classifiers, only co-occurs with nominals that refer to referents of a particular shape. But these verbs do not include any specific classifier morphemes that reflect the classification of the co-occurring nominal into a particular shape category. Allan (1977) claimed that these Tarascan verbs are unlike the classifier verbs used in Athabaskan languages, such as Navajo, which he believed to include separate classifier morphemes. He explained that, although English has no identical constraints, the pattern of noun-verb co-occurrence in Tarascan is similar to those between sets of nouns and verbs in English (1977: 289):

> ...noun-verb collocation in Tarascan is conditioned by the covert co-occurrence constraints of the kind familiar in English. Although there is not exact parallel in English, what I have in mind is, e.g., that the verb *eat* "ingest solids" contrasts with the verb *drink* "ingest liquids" so as to classify the object eaten as solid, where drink classifies the stuff drunk as liquid.

This is an important distinction. Without it, any language that has classes of nouns co-occurring only with particular modifiers and predicates could be considered a classifier language and "the label would become meaningless" (Allan, 1977: 290). In attempting to clarify this distinction, however, Croft (1994) and Engberg-Pedersen (1993) argued that Allan (1977) has only succeeded in undermining his own analysis of the Athabaskan languages as predicate classifier languages. Allan's (1977) own definition stated clearly that classifiers are realized as separate morphemes. Croft (1994: 159) explained that, given Allan's (1977) inclusion of the Athabaskan languages as classifier languages, English could indeed be a possible candidate for inclusion in his typology:

> Given that English speakers can use...expressions such as *flow* "move [liquid/particulate mass]" and *ooze* "move [viscous material]", it could be said that English is also a classifying language...This is not absurd because none of the "predicate classifier" languages actually have separate classifier morphemes; instead they have distinct verb roots for the motion, location or manipulation of various object classes.

Croft (1994) is perhaps oversimplifying the difference between classificatory verbs in Athabaskan and the English examples. Unlike Navajo, oppositions such as liquid versus solid, or liquid versus viscous substance are not systematic across a range of verbs in English. But it appears to be the case that, as Croft (1994) and others (Craig, 1994; Engberg-Pedersen, 1996) have observed, the verb stems of Athabaskan (and other languages families such as Hokan) do not in fact include an overt classifier morpheme. In Navajo, the classificatory meaning of the verb is instead conflated with the predicate meaning. Engberg-Pedersen (1993) pointed out that Athabaskan linguists do not themselves refer to the so-called predicate classifier verb forms as classifiers, but as classificatory stems (Young & Morgan, 1987). The term *classifier* is in fact traditionally used in descriptions of Athabaskan languages to refer to four preverbal morphemes. These morphemes, however, do not appear to have a classificatory function. Recent work by Kibrik (1996) has proposed that they are in fact transitivity indicators marking changes in the semantics of a verb that increase or decrease its transitivity. The term classificatory *stem* is used because these forms exhibit considerable allomorphic variation (as illustrated in 4-7 below), and Athabaskan linguists recognize that this allomorphy derives historically from a combination of root morpheme and a set of archaic suffixes indicating modal and aspectual information (Cook & Rice, 1989; Kari, 1976; Young & Morgan, 1987).

Despite this terminology, the classificatory verb stems appear in fact to be synchronically monomorphemic, and the various forms are best analyzed as examples of suppletion. It seems, however, that Allan (1977) interpreted *stem* to mean that the Athabaskan classificatory verb consists of a verb root plus a classificatory morpheme. Linguists may use the term *stem*, however, in different ways, as the following definition from Crystal (1991) demonstrates:

> **Stem.** A term often used in linguistics as part of the classification of the kinds of elements operating within the structure of a word. The stem may consist solely of a single root morpheme (i.e., a 'simple' stem, as in *man*), or of two root morphemes (e.g., a 'compound' stem, as in *blackbird*), or of a root morpheme plus a derivational affix (i.e., a 'complex' stem, as in *manly*, *unmanly*, *manliness*). All have in common the notion that it is to the stem that inflectional affixes are attached.

It is the latter notion, together with the recognition of historical processes of derivation, that appears to be the reason for the use of the term *stem* for the classificatory verb forms in Athabaskan languages. The Navajo verb is a highly complex construction: the stem takes several possible inflectional prefixes to indicate person, number, mode, tense, and aspect, as well as one or more derivational prefixes which are mainly adverbial in function (Kari, 1976). A stem may, however, be a synchronically monomorphemic form, as Crystal (1991) explained above, and this appears to be case for Navajo.

4-7. Navajo: allomorphic variation in the classificatory verb stem -*ŋá*, "handle a solid roundish object".

	Imperfective	Usitative/ Iterative	Performative	Progessive/ Future	Optative
S1	-*ŋààh*	-*ŋááh*	-*ŋa*	-*ŋáą́*	-*ŋáą́*
S2	-*ŋá*	-*ŋáàh*	-*ŋám*	-*ŋaą̀*	-^{w}*aaυ*
S5	-*ŋààh*	-*ŋááh*	-*ŋám*	-*ŋaą̀*	-*ŋáą́*
S6	-*ŋá*	-*ŋááh*	-*ŋa*	-*ŋáą́*	-*ŋáą́*
S7	-*ŋààh*	-*ŋáàh*	-*ŋám*	-*ŋáą́*	-*ŋáŋ*
S8	-*ŋààh*	-*ŋáàh*	-*ŋàŋ*	-*ŋaą̀*	-*ŋáŋ*

In order to understand the motivation for Allan's (1977) decision to include Navajo in his typology of classifier languages, as well as the reason for comparisons with the polycomponential verb constructions of signed languages, I shall now provide a brief outline of the classificatory verb stem system in Navajo.

4.3.3 Classificatory verb stems in Navajo

The classificatory verb stems in Navajo form a subset of all verb forms in the language. As mentioned above, verbs in Navajo consist of a stem and a number of prefixes. Although the prefixes do not include any morphemes with a classificatory meaning, it is interesting to note that one of the prefixes is traditionally referred to as a *classifier* in the Navajo literature. Young and Morgan (1987) claimed that the label is a misnomer, however, since the so-called classifier prefixes do not actually have any classificatory function, but realize a range of semantic-grammatical meanings related to notions of voice and transitivity (although in other cases, the classifier prefix is simply a fixed part of the verbal construction and has an uncertain or unknown function). Engberg-Pedersen (1993) pointed out that Allan (1977) quite correctly appeared to ignore this prefix since it has no classificatory function, and focussed instead on the classificatory stem, which he interpreted as incorporating a classifier morpheme.

Grammatically, verb stems in Navajo may be divided into two classes: (1) static or neuter verbs, including adjectivals, which have two forms only: those which express perfective and continuative aspect; and (2) dynamic or active verbs which have nine forms for specific aspectual and/or modal meanings, being future, imperfective, continuative, perfective, reiterative, optative, progressive, neutral and habitual aspect (although not all verb stems have allomorphs realizing every aspectual or modal distinction). Active and neuter verbs also differ semantically. Active verbs represent actions or processes (such as moving or working), while neuter verbs refer to states of being (such as lying, standing, or sitting) (Davidson, Elford, & Hoijer, 1963). They each take a different set of inflectional prefixes.

These two classes of active and neuter verb are themselves traditionally divided into two subclasses by Athabaskan linguists. Young and Morgan (1987) distinguished between those active and neuter verb stems in Navajo which simply describe an action or state of being and those which describe an action or state and also define a particular class of nominal referent. The class of referent is "...distinguished on the basis of physical characteristics (size, shape, texture, animacy), number (singular, dual, duoplural, plural), or containment in an open vessel" (Young & Morgan, 1987: 128). It is the latter class of verb stems that are known as the classificatory verb stems.

The classificatory verb stems, like non-classificatory stems, appear in both active and neuter verb forms. Classificatory verb stems differ from other verb stems, however, in that the active and neuter forms are morphologically related. Furthermore, for any one category of classificatory verb stems, there is a set of related active and neuter stems which distinguish the manner in which the action or state of being is realized in five major ways (Young & Morgan, 1987): (1). *Handle stems*: where the movement of the referent(s) is the result of some kind of on-going physical contact between the referent and an animate agent, as in verbs of carrying, handing over, picking up, putting and taking (e.g., the verb stem -*ʔá* in *namimŋá* "he carries a round solid object around"); (2). *Propel stems*: where the movement of the referent is the result of the actions of an agent, as in verbs of throwing, dropping, and tossing (e.g., the verb stem -*neŋ* in *namimneŋ* "he drops a solid round object"); (3). *Independent motion stems*: where the movement is caused by the referent, independent of any agent, as in verbs expressing notions such as flying through space, falling, or moving over a surface; (4). *Be at rest stems*: where the referent is not moving, as in verbs of sitting, lying or being a in particular position or location; (5). *Keep at rest stems*: where the referent's lack of motion is caused by the actions of an agent, as in notions of keeping something in a particular position or location, or preventing something from falling or moving.

Young and Morgan (1987) grouped the classificatory verb stems into two broad classes, known as *primary* and *secondary* stems respectively. The primary class include eleven stems which appear to have related forms for the five manners of motion and location. The secondary class, however, do not have related forms for all five manners of motion and location in the active and neuter verb categories. These set of verb stems, intermediate between classificatory and non-classificatory stems, are sometimes known as "pseudoclassificatory" verbs stems (Davidson, Elford & Hoijer, 1963). Mention will again be made of these secondary classificatory verb stems forms in later discussion.

Young and Morgan (1987: 128) listed the eleven primary classes of object which are relevant for the classificatory verb stems as follows (I have also included illustrative examples taken from Davidson, Elford & Hoijer, 1963: 31-2): (1). *Single solid roundish object (SRO)*: this class includes round objects such as a ball, rock, coin, seed, grain of sand, the sun, but also a bottle, box, hat, knife, book, boot, a newborn baby bundled in a blanket, and seemingly arbitrary referents such as a plot or piece of land, a song, a news item or story, and a business proposition; (2). *Load, pack burden* (LPB): this class includes any large bulky object such as a load, box, crate, body of water, backpack, large sack, saddle and a heavy overcoat; (3). *Non-compact matter* (NCM): this class includes a wide range of generally loose, amorphous collections of matter such as a bunch of grass or arrows, a handful of salt, hair, a wig, a cloud, smoke, fog, gas or dust; (4). *Slender flexible object* (SFO): this is a rather mixed class that includes slender and flexible animates and inanimates such as a length of rope, sapling, chain, necklace, snake but also mittens, gloves, shoes, socks, scissors (i.e., anything that comes in pairs) and a set of tools, a pile of fried onions, or the words of a language (i.e., plural masses). It is also used for objects of an unknown class (such as the unknown content of a person's pocket); (5). *Slender stiff object* (SSO): this class includes anything that is long and rigid, such as an arrow, cane, pencil, cigarette, or rifle, and anything that is flat and rigid, such as a wedding basket, a plank, saw, or sheet of tin; (6). *Flat flexible object* (FFO): this class includes anything that is flat, thin and flexible such as a bed sheet, blanket, shirt, handkerchief, and a piece of paper, as well as small sacks and bags and its contents, such as a sack of groceries, smoking tobacco and coffee; (7). *Mushy matter* (MM): this class includes anything that this soft, moist and mushy, as in butter, peanut butter, wet mortar or cement, cream, mud, as well as frogs, soggy towels and by extension, a decrepit old hat or drunken person; (8). *Plural objects 1* (PLO 1): this class applies to a number of relatively large objects in comparatively low numbers, such as a few eggs, kittens, balls, books, coins, animals, shoes, corpses, sacks of potatoes, or areas of land; (9). *Plural objects 2* (PLO 2) applies to a profusion of small objects, as in a number of marbles, seeds, coins, grains of sand, sugar, salt, insects, matches, arrows, pencils, but not generally used for larger animates, such as horses, dogs, humans and objects that are too large to be handled; (10). *Open container* (OC): any object if it is moved or held in an open container, such as a jar of fruit, a glass of water, a spoonful of food, a dish of food, a shovel of dirt, and a corpse in a coffin; (11). *Animate object* (AO): this class includes single animate objects, such as a microbe, fish, person, dog or sheep, as well as a corpse or carcass of a killed animal, and anything made in the likeness of an animate object such as a doll or fetish.

The table of stems (in the Perfective aspect form only) given in Young and Morgan (1987: 128) illustrate the allomorphy of the different classificatory verb stems. This is reproduced in 4-8 (the stems are listed here complete with the stem classifier prefixes). The primary classificatory verb stems, on the whole, do appear to group their referents into categories, and to specify whether the referent is at rest, being handled or thrown by an agent, or freely moving. As can be seen in the table above, there is no single Navajo verb with the general meaning of "be located", but a set of eleven verbs conveying this sense for specific classes of animate and inanimate object, specifying the referent by number, shape, consistency, and containment. The category of primary classificatory verb stems does, however, seem to be a rather mixed bag, with some of the listed forms taking quite specific referents of a particular class, while others appear to be used in a very arbitrary fashion. The so-called single solid roundish object stem-*Ø'ą́* is also used for referring to stories, songs, and business propositions, and the slender flexible object stem -*Ølá* is used for plural masses of objects, as well as objects of unknown class. Furthermore, Young and Morgan (1987: 128) explain that the plural object classes exhibit "...a wide area of overlap where either one may be applied", and the class of animates is also used to refer to highly inanimate corpses, carcasses, and dolls. Some of these examples appear to be cases of metaphorical extension. The stem for slender flexible objects, for example, includes rope-like objects and it has been suggested that the rope-like meaning was once the primary meaning, while the plural meaning is an extension since rope was used to tie many objects together (Cook & Rice, 1989).

4-8. Navajo: classes of object in classificatory verb stems.

	ACTIVE VERBS			NEUTER VERBS	
	TRANSITIVE		INTRANS.	INTRANS.	TRANS.
	1	2	3	4	5
OBJECT CLASS	HANDLE	PROPEL	INDEPEN-DENT MOTION	BE AT REST	KEEP AT REST
1. SRO	*-Ø'ą́*	*-łne'*	*-łts'id*	*-Ø'ą́*	*-ł'ą́*
2. LPB	*-Øyį́*	*-Øyį́*	*-łhęęzh*	*-Øyį́*	*-łhį́*
3. NCM	*-łjool*	*-łjool*	*-Øjool*	*-Øjool*	*-łjool*
4. SFO	*-Ølá*	*-łdééł*	*--Ødééł*	*-Ølá*	*-lá*
5. SSO	*-Øtą́*	*-łt'e'*	*-Økę́ę́z*	*-Øtą́*	*-łtą́*
6. FFO	*-łtsooz*	*-Ø'ah* *-Ø'ad*	*-Øna'*	*-łtsooz*	*-łtsooz*
7. MM	*-Øtłéé'*	*-Øtłéé'*	*-łhęęzh*	*-Øtłéé'*	*-łtłéé'*
8. PLO 1	*-Ønil*	*-Ønil*	*-ni-Ødee'*	*-Ønil*	*-łnil*
9. PLO 2	*-Øjaa'*	*-łkaad*	*-ni-Ødee'* *-łdááz*	*-Øjaa'*	*-łjaa'*
10. OC	*-Øką́*	*-łkaad*	*-Økaad* *-łdááz*	*-Øką́*	*-łką́*
11. AO	*-łtį́*	*-łt'e'* *-łgo'* *-łtłizh*	*-Øgo'* *-Øtłizh*	*-Øtį́* *-Øtéézh* *-Øjéé'*	*-łtį́*

Like the primary classificatory verb stems, the category of secondary classificatory verb stems include a variety of verbs which specify referents of a particular size, shape, texture, or number. The secondary classificatory stems, as mentioned above, are not distributed in the same manner as the primary stems. Some of them only appear to have active verb forms, such as the transitive form *-Ønizh* "to break a flexible, string-like object", while others only have neuter verb forms, such as in the intransitive form *Ølį́* "to flow in a stream (of water or other liquids)". On closer inspection, some of these so-called secondary classificatory verb stems seem to be little different from those verbs in English that co-occur with particular referents. Young and Morgan (1987) included amongst the secondary classificatory verb stems six verbs of chewing and eating that they claim classifies the object being ingested. One of these stems *-dlą́ą́'* describes the ingestion of liquid, and appears to be very similar to the English verb *drink* (see Allan's (1977) discussion above). Another intransitive form *-Ønizh* that is used to describe the slow, flowing movement of a viscous liquid, appears very similar semantically to Croft's (1994) example of the English word *ooze*. Other examples include the forms *łts'ił* used to describe the breaking up into fragments of a brittle or fragile object, not unlike the English verb *shatter*, while the form *-Øbaal* meaning to turn or revolve quickly appears to be equivalent to English *whirl* or *spin* (and both these forms are translated as such by Young and Morgan, 1987). Thus, given that these forms are best analyzed as suppletive, it seems that the secondary classificatory verbs are not very different from verbs in English such as *flow*, *ooze*, *drink*, and *eat*. Indeed, Engberg-Pedersen (1993) argued that it is difficult to understand the justification for separating out a class of Navajo classificatory verb stems that are distinct from non-classificatory verbs. There appear to be many other verb stems in Navajo that co-occur with specific nouns associated with particular classes of referents, and in fact, it might even be claimed that all active verbs in Navajo reflect certain physical properties of their referents. Croft (1994) argued that the classificatory verb stems do not in fact form a closed set, despite the terminology used by Athabaskan linguists. He refers to one linguist, Rice (1989), who pointed out that in Slave, another Athabaskan language, there are many more verb stems (beside the classificatory verb stems) that indicate characteristics of their referents. In a discussion comparing the classificatory stative and motion verbs of another Athabaskan language, Koyukon, with non-classificatory verbs of position and motion in the same language, Engberg-Pedersen (1993: 237) observed:

> ...it is not always easy to see in what way the classificatory verbs are more semantically classificatory than the positional verbs and the nonclassificatory motion verbs. A verb meaning "burning object be located" or a verb meaning "plural object be located", both of which are classificatory stative verbs, can hardly be said to be more semantically classificatory than a (nonclassificatory) positional verb meaning "stand" which can only be used for animates.

In fact, the distinction between classificatory and non-classificatory verb stems does not appear to have a semantic basis at all, but to simply reflect differences in the grammatical patterning of the two verb types. The sole basis for this grouping, Engberg-Pedersen (1993: 237) suggested, appears to be that the primary classificatory verb stems "...group nouns in the same classes across the stative-motion distinction". As we have seen, there are eleven active primary classificatory verb stems that correspond semantically with eleven neuter primary classificatory verb stems. This is not true of the secondary classificatory stems, or of other non-classificatory verb stems in the language. Engberg-Pedersen (1993: 240) concluded that this appears to be their sole defining characteristic:

> The classificatory verbs...differ from the nonclassificatory in that they are semantically and morphologically...related across the stative-motion distinction. Otherwise, like the nonclassificatory stems, the classificatory stems can historically be analysed as consisting of a root and an aspect marker, they have one or more aspects like the nonclassificatory stems, and like them they can take derivational strings. That is, the classificatory verbs do not have a different morphological composition and they cannot even be said to differ radically semantically from the nonclassificatory stems.

Thus, not only is the category of predicate classifier languages somewhat questionable, but the distinction between classificatory and non-classificatory verb stems appears to be unclear. As Croft (1994) explained, "...it appears difficult to separate a set of 'classificatory' verbs from the general range of verb types that describe manner of motion, carrying, manipulating" and this fact "...belies the popular view of these languages having elaborate predicate classification systems". He concludes the category of classificatory verbs "...is probably illusory".

4.3.4 Grinevald's (1996, 2000) typology

Having discussed criticisms of Allan's (1977) work and examined the case of Navajo in detail, I shall now return to the discussion of classifier systems in general.

Recent attempts by Grinevald to construct a typology of classifier languages have responded to some of the criticisms of Allan's (1977) description and have excluded his two classes of concordial and predicate classifier languages (Craig, 1992, 1994; Grinevald 1996, 2000). Since Allan's definition of classifier remains problematic, Grinevald (1996) has attempted to clearly redefine the notion of a classifier morpheme, and draw a distinction between classifier systems and other types of nominal categorization.

4.3.4.1 Classifiers and other types of nominal classification

Classifier systems, Grinevald (1996, 2000) claims, are found in many languages of Asia, Oceania, Australia, Africa, and the Americas, but not in European languages. The latter group of languages do, however, exhibit classification phenomena that are related to true classifier systems (Craig, 1994). As explained above, these include the grammaticalized gender or noun class systems in French (as in the following examples: *le* (masculine) *couteau* "the knife" and *la* (feminine) *table* "the table"), as well as the lexical *mensural* (or *measure*) expressions of English (as in *a piece of paper*, *a cup of milk*, *a handful of candles*, *a pile of clothes*). In the distinction between measure terms and classifiers, Craig (1994) and Allan (1977) appear to be in agreement. According to Craig (1994: 565), classifiers can be distinguished from measure terms because "...they exist in other contexts beside quantification".

Another distinct category of nominal classification proposed by Grinevald (2000) are what she calls *class terms*. These are classifying morphemes that are involved in the lexicogenesis of a language. They clearly derive from lexical items, but are involved in compounding processes in which they represent a class of referents. Examples from English would include *–berry* (as in *strawberry*, *blueberry*, *raspberry*, *gooseberry*, etc.), and *tree* (as in *apple tree*, *banana tree*, *orange tree*, *cherry tree*, etc.)[3].

4.3.4.2 A new classifier typology

Like Allan (1977), Grinevald (1996, 2000) notes that there is a great deal of variation in the use of terminology in this area of language description. Engberg-Pedersen (1993) has explained that some writers (such as Dixon, 1986, for example) appear to use the term classifier only for free morphemes which appear in noun phrases, while others (such as Mithun, 1986) use it to refer to nominals incorporated into verb complexes. Other researchers seem to use basic terms such as *noun class*, *noun classifier* and *numeral classifier* interchangeably (Grinevald, 1996). As is also true of signed language description (see above), there is a proliferation of terms which exceeds the number required for accurate classification of nominal categorization phenomena: *gender, class, noun class, noun marker, classifiers, class terms, number-, numerative-, relational-, genitive-, possessive-, verbal-, predicate-, concordial-, locative- classifiers* etc.

In response to this terminological confusion, Grinevald's (1996) definition suggests the following four criteria for distinguishing true classifiers from related classificatory phenomena: (a) classifiers are overt morphemes; (b) they constitute a morphosyntactic sub-system; (c) they are semantically motivated systems of classification that do not classify all nouns; and (d) they are subject to discourse-pragmatic conditions of use.

Grinevald (1996) does not explain each of her criteria in great detail. The reasoning behind each of the criteria seems clear, however. Criterion (a), for example, works to exclude English expressions such as *flow* "move [liquid/particulate mass]" and *ooze* "move [viscous material]" because they do not contain a separate overt morpheme meaning something like "particulate mass" or "viscous material". Criterion (b) suggests that classifier morphemes must be intermediate between grammatical and lexical morphemes. Thus, English measure terms, for example, cannot be considered examples of true classifiers because they constitute a lexical system. Criteria (c) and (d) clarifies the difference between classifiers and noun classes. As we have seen, phenomena such as grammatical gender are rarely semantically motivated, and are obligatorily marked on all nouns. Aspects of the discourse-pragmatic environment in which they occur rarely influence their use.

In summary then, noun classes in French are excluded by criteria (c) and (d), English lexical measure terms by (b) and (d), and Navajo classificatory verbs by (a), (b) and (d). Grinevald (1996) thus appears to be

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[3] Grinevald (2000) suggests that these are both examples of class terms, despite their different orthographic status in English.

substantially in agreement with Croft (1994) by suggesting that predicate classifiers appear not to be a category of classifiers at all.

Using this definition, Grinevald (1996, 2000) has suggested a new typology of classifier languages, based on the morphosyntactic locus of the classifier. This is very much work in progress, and she stressed that it is important to recognize that each type represents a focal point on a continuum, not a discrete category, and that additional types may be added as more data becomes available. Grinevald's (1996) typology recognized four main classes of classifier morpheme in the languages of the world: (1) noun classifiers, (2) numeral classifiers, (3) genitive classifiers, and (4) verbal classifiers.

Noun classifiers

The first classifier type, the noun classifiers, appears to be a category not identified in Allan (1977). In fact, according to Craig (1994), the noun classifiers have not been widely recognized as such in the literature, perhaps due to their comparative rarity cross-linguistically, and are often mistakenly grouped together with noun classes. The term *noun classifier* itself is often used to refer to numeral classifiers, as mentioned in the discussion of Allan's (1977) typology above, but Grinevald's category of noun classifiers are used independently of quantification. They may be free morphemes that appear next to a noun, or affixes which attach to them. Grinevald (1996) suggested that they function as referent tracking devices, since they have appear to have a role not unlike determiners and also can be used pronominally. The Central American language Jakaltek is an example of a language with a noun classifier system. It appears to have an inventory of twenty-four classifier morphemes, divided into systems that reflect the referent's social status (for deities and humans) or its physical and functional qualities (for non-human animates and inanimates). The following example from Grinevald *(1996) illustrate the use of the classifiers naj*("male non-kin") *and noŋ* ("animal"), *ix* ("female non-kin") and *ixim* ("corn or substance made of corn"):

4-9. Jakaltek

(a) xil naj xuwan noŋ laba
saw CL John CL snake
"John saw the snake"

(b) xil naj noŋ
saw CL CL
"He saw it"

(c) swatxix ix ixim bitx
made CL CL tamale
"The girl made the tamales"

Numeral classifiers

The second category discussed by Grinevald (1996) are the numeral classifier type. This class is very similar to the numeral classifier category described in Allan's (1977) work, so I will not review them again here.

Genitive classifiers

Craig (1994) explains that genitive classifiers are also known as possessive or attributive classifiers in the literature, and occur mostly in Oceanic languages. This class is exemplified by the Ponapean data shown below. The genitive classifier is a bound morpheme, affixed to the possessor noun while referring to the semantic class of the possessed noun. In Ponapean, the classes reflect functional categories, classifying the nominal referent as an edible or drinkable substance, for example, or as a vehicle, building, or piece of clothing. The two examples in (8) are the classifier *kene* "edible substance" and *were* "vehicle":

4-10. Ponapean:

(a) were-i pwoht
CL-GEN1 boat
"my boat"

(b) kene-i mwenge
CL-GEN1 food
"my food"

Verbal classifiers

The fourth and last major category of classifiers described by Grinevald (1996) are what she refers to as verbal classifiers. In Craig (1994), she claims this type of classifier is found in indigenous spoken languages of North and South America, Australia, and in ASL. Grinevald (1996) explains that verbal classifiers are morphemes that appear inside the verb, referring to nominals outside of the verb form. She recognized two subclasses: incorporated generic nouns which act as classifiers of the nominal referent, and classifying verbal affixes. Three examples of the incorporated classifier can be found in 4-10 and 4-11 below from the North American Iroquoian language Cayuga (*hon·at* "potato", *nahskw* "domestic animal" and *treh* "vehicle"), and the two examples of the classifying affix are from Diegueño (*tu* meaning "round object" and *a* for "long object").

4-11. Cayuga

(a) o-hon:at-atke: ak-hon:at-a:k
it-potato-rotten PAST-CL-eat
"I ate a rotten potato"

(b) so:wa:s akh-nahskw-ae:
dog I-CL-have
"I have a (pet) dog"

(c) skitu ake:-treh-tae:
skidoo I-CL-have
"I have a skidoo"

4-12. Diegueño

(a) tu-kat
CL-cut
"to cut with scissors or adz, to cut into chunks"

(b) a-kat
CL-cut
"to cut with a knife"

(c) tu-mar
CL-cover
"to cover over a small object"

(d) a-mar
CL-cover
"to cover over a long object, to bury someone"

Note that, although Craig (1994) includes ASL in this category, she does not provide any data to support this claim, and she does not suggest to which of the two subclasses of verbal classifier languages it belongs. In later versions of her typology (Grinevald, 2000), she explained that more study of signed languages is needed to distinguish between true classifiers and class terms in signed language verbal constructions.

Minor and hybrid classifier types

Grinevald (2000) emphasized that the types of classifiers presented in her typology represent only the most widely recognized and best documented examples. There are a number of other possible subtypes, such as a *demonstrative classifier* type independent of the numeral type in some Amazonian languages, and a *locative classifier* that has been documented in the Argentinean languages Toba and Pilaga, but these types appear to be comparatively rarer cross-linguistically than the four major types described above (Aikhenvald, 2000; Grinevald, 2000). New data coming from the indigenous languages of Brazil appear to show hybrid classifier types that combine aspects of the four classes described here (Aikhenvald, 2000). The data presented above also represent the most prototypical examples. Many languages have classifiers that blend features of each of these categories, and some also have classificatory morphemes that combine qualities of classifier systems and other forms of nominal categorization.

4.3.5 Criticisms of Grinevald's (1996, 2000) typology

Grinevald's (2000) typology has not as yet been the focus of much discussion in the literature. It has become clear, however, that not all researchers appear to accept all the details of her model. Although a recent major study by Aikhenvald (2000) claimed to largely adopt Grinevald's (1996, 2000) typology of classifier systems, in fact Aikhenvald appeared to have rejected any clear-cut division between classifiers and many other forms of nominal classification. In her work, *classifier system* is used as an umbrella term for a wide range of categorization devices, encompassing the lexical numeral classifiers of Southeast Asia, the classificatory verbs of North America, and the highly grammaticized gender systems of Indo-European languages.

Despite many references to Grinevald's work, Aikhenvald (2000) did not explicitly respond to Grinevald's (1996, 2000) narrower definition of classifier systems, nor the distinctions Grinevald makes between classifiers, noun classes, and classificatory verbs. Instead, Aikhenvald (2000) took the definition of classifiers by Allan (1977) as her starting point, and stressed the inter-relationship between the various forms of noun categorization by pointing out that they all share a similar semantic basis, and noting that one type may develop out of another through processes of language change and grammaticalization. We have already seen, however, that Allan's work is problematic, and that many researchers find it useful to separate classifier morphemes from other forms of nominal classification. These kinds of distinctions are also useful for an understanding of the handshape unit in polycomponential verbs of motion and location. Despite the importance of her wide-ranging studies, Aikhenvald's (2000) work did not directly criticize Grinevald's typology, so I will not discuss it here.

4.3.6 The universal semantic properties of classifiers

Grinevald (1996) suggested that classifier forms are generally semantically motivated. The studies of classifiers to date do seem to show that classifiers reflect universal aspects of human perception, cognition and cultural organization. As explained above, on the basis of his study of over fifty languages, Allan (1977) concluded that seven categories of classification can be identified. Although these categories can be subdivided into particular subcategories and particular languages differ in the number and range of classifiers used, Allan (1977) showed that all examples appear to fall into seven groups: (1) material classifiers indicating whether the referent is animate (some languages distinguish between human and non-human animates) or inanimate, (2) shape classifiers, for example, grouping referents into classes of long, flat, or round objects, (3) consistency classifiers, distinguishing between flexible, rigid or liquid referents, (4) size classifiers, indicating whether the referent is big or small, (5) location classifiers, including examples which distinguish plots of land, gardens, villages, and countries, (6) arrangement classifiers, used to indicate referents in some specific configuration, position or distribution, and (7) quanta classifiers, which distinguish singular, dual, and plural referents.

Using her revised typology and additional data, Craig (1994: 567) suggested that classifier morphemes can be divided into three major semantic domains: (1) material, (2) shape, and (3) function. The material domain includes animacy, gender, and substance (for inanimates, whether they are made of wood, liquid, or rock, for example). The shape domain classifies objects according to both "inherent and temporary physical characteristics...such as shapes, consistencies, and configurations". The shape category in classifier languages tends to reflect a three-way division into "the one-dimensional long shape, the two-dimensional flat shape, and the three-dimensional round shape". The domain of function reflects social interaction in human societies (such as status and kinship relations) and interaction with inanimate objects (transportation, edibles, clothing, tools etc).

Both Craig (1992, 1994) and Croft (1994) argued that the various types of classifier systems appear to correlate with particular semantic domains. Craig (1994: 567) observed that:

> "...noun classifiers draw on the semantics of material and social interaction, while numeral classifiers predominantly categorise by shape, and genitive classifiers by functional interaction. Verbal classifiers align themselves on the noun classifiers if they are of the incorporated subtype, classifying by material principally, while the older and phonologically more eroded subtype of verbal classifiers align themselves on the semantics of numeral classifiers, categorizing by shape."

Although these correlations between classifier type and semantics are revealing, they are complicated by the differences in the semantic structure of classes cross-linguistically. In some cases, as Allan (1977) explained, the different semantic categories overlap. Some languages have classifier morphemes that combine two or more of these classifications. Craig (1994: 567) also noted that the semantics of individual classifier morphemes range from relatively simple to "complex and heterogeneous". She illustrated this variety by comparing the restricted semantic range of the "unique" classifiers found in Jakaltek, Thai and Yagua, to the extreme heterogeneity of the Japanese classifier *-hon*:

4-13. Jakaltek
metx classifier of *txi*[w] "dog"

4-14. Thai
chŷag classifier of *cháaŋ* "elephant" in formal contexts

4-15. Yagua
na classifier of banana tree trunks when standing
mu classifier for chambira palm trunk when standing

4-16. Japanese
-hon: classifier for pencils, sticks, threads, ropes, needles, bananas, carrots, pants, guitars, teeth, cassette tapes, typewriter ribbons, camera films, telephone calls, letters, movies, television programs, medical injections, and home-runs in baseball

The Japanese example is similar in its semantic heterogeneity to a number of the Navajo classificatory stems discussed above, and appears to be the result of similar processes of metaphorical extension. In addition to the semantic complexity of classifier morphemes, there is a further problem with attempts to link particular types of semantic distinctions with different types of classifier. As Aikhenvald (2000) pointed out, in many languages, it appears possible to use the same classifier morpheme in different classifier environments.

4.3.7 The origins and development of classifier systems

The processes of semantic shift also seem to be responsible for the development of classifier morphemes historically. It is generally believed that the most common source of classifier morphemes is independent nouns (Craig, 1994). In many languages, classifier morphemes are identical to particular nouns, as Mithun (1986: 390) demonstrated:

> "The Caddo classifier for small round objects, -içah-, is also the noun stem for "eye". The Munduruku classifier for circular/spherical objects, -a-, is the noun "head". That for long, rigid, cylindrical objects, -ba-, is the noun for "arm". That for long, flexible, cylindrical objects is -bu-, the noun for "finger".

Verbs also serve as a major source of classifiers, as the following data from Tzotzil and Iaai from Craig (1994) indicate:

4-17. Tzotzil

Verb		Numeral classifier	
p'as	"to cut"	p'os	"short length"
k'as	"to break"	k'os	"piece broken off"

4-18. Iaai

Verb		Genitive classifier	
haal	"to raise"	haalee	"domestic animal"
həlk	"to warm oneself"	hlogu	"fire"

Although proposals for the origins and evolution of classifier morphemes remain speculative, Craig (1994) provided evidence that at least some classifier morphemes begin as specific classifiers for a single or small number of nominal referents, and then may be extended to refer to a larger class of nouns, evolving from concrete referents to more abstract and metaphorical, as the historical evolution of the Chinese classifier *-ge* illustrates (Craig, 1994: 568):

4-19. Chinese

-ge: unique: bamboo>specific: bamboo, lengths of bamboo>arrows, candles, dogs, chickens, horses>fruit, birds, people/general: people and unclassified objects

The most common example of such a process of extension from specific nouns to more abstract and generalized classifier forms is the development of classifier forms in many languages from the independent nouns for tree, leaf and fruit which subsequently evolve into classifiers that categorize referent on the basis of shape: the tree-like classifier coming to represent relatively long referents, the leaf-like classifier representing flat objects, and the fruit-like classifier for round objects (Craig, 1994). These arguments for the development of classifiers morphemes from other word classes are supported by historically attested examples, such as in Chinese, and by the fact that many languages have classifier morphemes that are identical or related to independent nouns and verbs. Dixon (1986: 110) also adds support to this idea, arguing that classifiers are 'sophisticated devices" which "must have arisen fairly late in the development of language", since they are not commonly found in pidgin or creole languages.

4.3.8 The function of classifiers

One of Grinevald's (1996) defining characteristics of classifier forms was that such morphemes are subject to discourse-pragmatic conditions of use. This characteristic is realized in two main ways. Firstly, compared to gender and noun classification systems, the use of classifier morphemes appears to be much more flexible. Agreement for gender in French and German, for example, is omnipresent and obligatory. Although languages such as Tzotzil, Chinese and Japanese may have large numbers of individual classifier morphemes, only small subsets of these appear to be used in casual speech (Craig, 1994). Many of the finer distinctions in classifier usage may only appear in formal settings. Secondly, many classifier languages allow the speaker a variety of possibilities for the reclassification of particular nominal referents, as the examples in 4-20 from Burmese illustrate (Craig, 1994: 569).

I shall now turn to a discussion of polycomponential verbs in signed languages and sketch some of the problems we encounter in attempting to define their relationship to classifier systems.

4.4 Classifiers in signed languages?

The handshape units used in polycomponential verbs in Auslan and other signed languages do appear to have some features in common both morphosyntactically and semantically with the classifier morphemes in the various languages discussed in Allan (1977), Craig (1992, 1994) and Grinevald (1996, 2000). Because the characteristics that handshape units and spoken language classifiers share have been well documented in the sign linguistics literature (Brennan, 1990; Collins-Ahlgren, 1990; Engberg-Pedersen, 1993; Schick, 1990a; Supalla, 1978, 1982, 1986; Wallin, 1996; Zwitserlood, 1996), I will not describe them in detail here.

4-20. Burmese

(a)	myiŋ tɨ yaŋ	'river one CL-place' (e.g., destination)
(b)	myiŋ tɨ san	'river one CL-line' (e.g., on a map)
(c)	myiŋ tɨ hmwa	'river one CL-section' (e.g., a fishing area)
(d)	myiŋ tɨ ɛsin	'river one CL-distant arc' (e.g., a path to the sea)
(e)	myiŋ tɨ̰ we	'river one CL-connection' (e.g., connecting two villages)
(f)	myiŋ tɨ ɛpa	'river one CL-sacred object' (e.g., in mythology)
(g)	myiŋ tɨ khuɛ	'river one CL-conceptual unit' (e.g., in a discussion about rivers in general)
(h)	myiŋ tɨ myiŋ	'river one CL-river' (e.g., the unmarked case)

These signed language morphosyntactic systems also seem to have many morphological and semantic characteristics in common with Athabaskan classificatory verbs (for discussion of this point, see Engberg-Pedersen, 1993; McDonald, 1982). We have seen, however, that the comparison between Navajo and signed languages appears to be misleading. As suggested above, Navajo and other Athabaskan languages are perhaps not appropriately viewed as classifier languages at all[4]. It seems that those researchers who originally proposed that ASL should be included in this class accepted the data in Allan (1977) second hand, believing that Navajo classificatory verbs included overt classifier morphemes. These researchers, such as Supalla (1978), were quoted widely in the sign linguistics literature, and, although recently a number of writers have begun to point out the error (Engberg-Pedersen, 1993; Schembri, 1998; Zwitserlood, 1996)[5], the description of ASL as a predicate classifier language (like Navajo) is still presented as unproblematic by many signed language researchers today (see, for example, Siple, 1997 and Wilcox & Wilcox, 1997).

[4] Aikhenvald (2000) presented some arguments as to why classificatory verbs might still be considered examples of verbal classifiers, but there appears to be widespread agreement that these ought to be treated as a separate phenomenon (Barron, 1982, cited in Engberg-Pedersen, 1993; Croft, 1994; Grinevald, 2000).

[5] In later work, Supalla (1986) himself recognized that the Navajo classificatory verb system was no longer productive, and in this respect unlike what had been described for ASL.

If the claim that Athabaskan languages are predicate classifier languages is not clearly supported by the available evidence, what are the implications of this finding for signed languages and the notion that polycomponential constructions contain classifier morphemes? Are perhaps the classifier morphemes in signed languages more appropriately considered a type of verbal classifier, as initially suggested by Craig (1994)? Or do we need to create a new subcategory of classifier morphemes for signed languages in Grinevald's (1996) proposed typology? I will not pursue these issues here. I would like instead to consider the possibility that the handshape unit in these constructions, although similar in form and function to other types of noun classification in the world's spoken languages, may not be examples of classifiers (in the strictest sense) at all.

This proposal is not new. Engberg-Pedersen (1993), for example, has argued strongly against an analysis of polycomponential verbs as including classifiers. She has shown how, at least in Danish Sign Language, the choice of handshape units do not serve a straightforward classificatory function. In verbs of motion, for example, the choice of handshape appears to be motivated by factors other than the class of referent (I will discuss this in more detail below). She also based much of her argument on the widespread misunderstanding of the Navajo data, and, like Grinevald (1996), pointed out the problematic nature and inconsistent use of the notion of classifier in the spoken language linguistics literature. But because Grinevald's (1996) new typology has, as I have shown, attempted to clarify the terminological and typological confusion in the description of spoken language classifiers, perhaps our understanding of these units in signed languages can similarly benefit from comparisons with her work.

If we consider handshape units in polycomponential verbs in relation to Grinevald's (1996) definition of classifiers, criterion (d) appears to hold true for this class of meaningful units in signed languages, but this is perhaps the most general of Grinevald's criteria and thus, in some ways, the least useful. Nevertheless, the use of handshape units does indeed seem to be subject to discourse-pragmatic factors, such as signers' use of differing perspectives on the events they describe or variation in lexical choice due to register and discourse form, although these factors are not yet very well understood (Ahlgren & Bergman, 1990; Brennan, 1992, 1994; Valli & Lucas, 1995). In the Auslan data discussed in the Chapter 5, signers often have a choice between representing the motion of an animate with a sign from the core native lexicon (such as FALL, JUMP, ROLL etc.) or a polycomponential verb. The motivation for different lexical choices in this area requires much more investigation, but we can assume that it at least partly reflects influences from the discourse-pragmatic environment (Engberg-Pedersen, 1993). It is not clear, however, to what extent criteria (a), (b) and (c) in Grinevald's (1996) definition apply to these forms.

4.4.1 Overt or fused morpheme(s)?

I shall discuss criterion (a) first. In all of the examples from spoken languages discussed above, the classifier morpheme is a single, overt morpheme. In signed languages, however, many researchers have proposed that the handshape in polycomponential constructions may itself be a morphologically complex unit rather than a single morpheme (Boyes-Braem, 1981; Engberg-Pedersen, 1993; Schick, 1987; Shepard-Kegl, 1985; Supalla, 1982, 1986; Wallin, 1990). Writers such as Schick (1987), Shepard-Kegl (1985) and Supalla (1982, 1986) have suggested that each of the fingers and the thumb of the hand may act as separate morphemes in some entity, handling and SASS handshapes. We have already seen how Supalla (1982) also suggested the use of other phonological features, such as the degree of bending or spreading of the fingers, may act morphemically. In the example shown in Figure 3.24 in the last chapter, we saw how the bending of the fingers is used to refer to a warped, deformed, or damaged referent (referred to as the *wrecked* affix by Supalla).

Wallin (1996) describes how parts of the B handshape used to represent vehicles in Swedish Sign Language may be given morphemic status. In his proposed analysis, the tips of the fingers represent the front, the wrist the back end, and part of the hand between the front and back denotes the central part of the vehicle. Placing a second handshape unit near these sub-morphemes would thus signal spatial relations (such as "in front", "behind" and "on") between the two referents concerned. This is illustrated in Figure 4.1.

Not all researchers agree with these analyses, however. Brennan (1990) suggests that the handshape as a whole is a single morphological unit in BSL, and attempts by Zwitserlood (1996) and Cogill (1999) to elicit grammaticality judgements from signers have not resulted in unequivocal evidence that all handshapes in these constructions are composed of several meaningful parts. If we consider the handshape unit a single morpheme, however, it is not apparent how we can explain the sources of spatial meaning seen in the Swedish Sign Language vehicle morpheme. On the other hand, if we accept the submorphemic analysis, it becomes unclear how exactly to segment proposed examples of multimorphemic handshape units, such as Wallin's (1996) example. How much of the central part of the hand represents the central part of the vehicle? Precisely where do the proposed morphemes for "front end" and "back end" begin? It is not clear which parts of the handshape represent separate overt morphemes, and which are fused into some kind of portmanteau morpheme. And, if indeed it is possible to isolate discrete meaningful parts of the handshape, are each of these to be considered types of classifier morpheme, or some other kind of meaningful unit? These issues remain largely unresolved.

The work of Liddell (1998, 2000a, 2000b) on mental space blends and recent psycholinguistic studies (Emmorey & Herzig, 2000) suggest an alternative solution to this problem. It may not be necessary to analyze any of the uses of space described by Wallin (1996) as morphemic. Liddell's (2000b) work on mental spaces showed how properties of physical space and of mental space may be blended in polycomponential verbs to describe spatial relationships between referents. Because a signer's hands also exist in space, it is possible that spatial relationships between referents may be mapped onto the hands isomorphically. There is thus no need to suggest a linguistic solution to this problem.

It also may be possible that modifications of the handshape unit to represent changes in the characteristics of referents such as the wrecked or broken affix described by Supalla (1982) are not morphemic. Emmorey & Herzig (2000) have described how handshape units may have analogue properties. In their research on polycomponential verbs of location, they showed how native signers of ASL comprehended and produced hand configurations which varied continuously in size to reflect referents which differed in size. Although such handshape units appear often to be used in a categorical fashion, modifications of the handshape unit are thus also possible to express analogue information.

If this recent work on the use of space and analogue modifications is correct, than the handshape unit in polycomponential constructions has a number of distinctive properties that have not been reported for classifier morphemes in spoken languages.

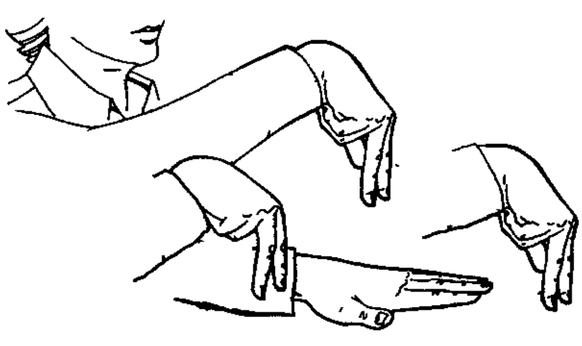

Figure 4.1

4.4.2 A morphosyntactic subsystem?

It is also not clear how criterion (b) of Grinevald's definition of classifiers applies to signed languages. This criterion seeks to differentiate classifier morphemes from lexical measure words and class terms on the one hand, and from grammatical noun class systems on the other. Grinevald (2000) has explained that classifiers are a morphosyntactic subsystem, placed at a middle point along a lexical-grammatical continuum. This also seems an appropriate description of the role played by the handshape unit in signed language polycomponential verbs, although this analysis has also come into question recently (Liddell, 2000c). Although polycomponential constructions have been analyzed as forming part of a morphosyntactic system in signed languages, there appears to be a complex relationship between this system and the lexicon, with some researchers suggesting (as we have seen) that there is a morphological continuum between polycomponential and non-polycomponential forms (Engberg-Pedersen, 1993). Others have suggested that at least some polycomponential verbs may be best considered a lexical system (Liddell, 2000c).

In other ways, however, these forms seem to have more in common with Grinevald's proposed category of class terms (see 4.3.1). Like class terms, handshape units play a central role in lexicogenesis in signed languages (Brennan, 1990; Johnston & Schembri, 1999; Schick, 1990a). The handshape units in polycomponential verbs can become part of lexicalized monomorphemic forms with highly specific, rather than general, meanings[6]. The core native lexicon of signed languages of Auslan appears to contain a significant percentage of signs, which seem to have been derived from the polycomponential forms described above (Johnston & Schembri, 1999). Many of these signs involve the use of handshapes which represent the movement of whole or part of the object, trace an outline of its shape, or imitate a handling action (see Figure 4.2).

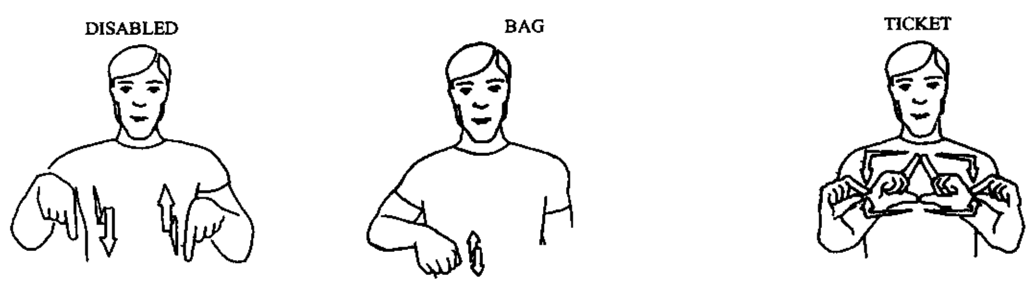

Figure 4.2

Auslan signs from the core native lexicon such as DISABLED, MEETING, PARK-CAR, and TOSS-AND-TURN appear to have been derived from the use of polycomponential verbs of motion and location; the signs TICKET, PLATE, HOUSE, and TABLE resemble the use of various signs of visual-geometric description; and BAG, SEW, DRIVE, SOCK, and DRINK seem to have developed from verbs of handling. Lexicogenesis does not appear, at least from the data presented in Aikhenvald (2000), Allan (1977) or Grinevald (1996, 2000), to be a major role of classifiers in spoken languages:

> Investigations of numeral and nominal classifier languages...have led researchers to suggest that, in general, classifiers are redundant and semantically empty (Craig, 1986; Denny, 1976, 1986). In many languages, speakers often use a more restricted set of classifiers in actual speech than exists in the language (Craig, 1986). Often, there are few options in classifier selection; the relationship between a referent and its corresponding classifier is frozen and idiosyncratic...it is clear that classifiers are not highly

[6] This also appears to be true of constructions involving classificatory verb stems in Navajo (McDonald, 1982).

> productive and do not play a major role in many languages (Schick, 1990: 37).

Although Schick (1990a) perhaps underestimated the diverse range of functions classifiers appear to serve in the world's spoken languages, Grinevald (1996, 2000) did suggest that these forms appear to be semantically redundant. Aikhenvald (2000), however, rejected this claim, and pointed out that classifier morphemes have a number of functions, such as quantifying and individuating mass nouns, or supplementing the lexical content of nominals. Unlike classifiers, however, there is no dispute about the role of handshape units in polycomponential verbs. These forms do not simply have a supplementary role in signed languages, but are instead at "...the heart of word formation devices and as such represent one of the most enduring aspects of language, the ability to create new lexical items"[7] (Schick, 1990a: 37).

Criterion (b) is also problematic because, as we have seen, the precise nature of the morphosyntactic system that includes polycomponential verbs is the source of some debate in the sign linguistics literature. If we wish to claim that, at least in some polycomponential constructions, each phoneme or phonological feature is also a morpheme (Brentari, 1995a; Wallin, 1996), then some writers have raised doubts about how we may maintain a consistent distinction between the two levels (Cogill, 1999; Engberg-Pedersen, 1996). In addition, we have to recognize that the inventory of formational elements (the use of particular movement patterns and vast number of possible spatial loci) used in polycomponential constructions is larger than that found in monomorphemic lexical items and stems. As Wilbur (2000) pointed out, we know of no spoken language in which particular features (such as the analogic movement patterns possible in polycomponential verbs discussed in the previous chapter) are reserved only for morphological purposes (i.e., only occur in a subset of polycomponential verbs) and never surface in a lexical item (i.e., the number and range of movement types in signs from the core native lexicon does not include all movement contours possible with polycomponential verbs). As discussed in the second and third chapters, researchers such as Liddell (1995) have responded to this issue by arguing that aspects of the grammar of signed languages may involve some conflation of linguistic and extra-linguistic elements. If we accept this reasoning, then this morphosyntactic subsystem may be not only intermediate

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[7] In some cases, however, the direction of the derivational relationship between polymorphemic predicates and monomorphemic lexical items is not clear. In the data reported in the next chapter, Auslan signers describe specific entities moving (such as a ruler or a toy duck) sometimes using a handshape unit in the polycomponential verb of motion that is identical or related to the handshape found in the equivalent lexical sign (i.e., the same as found in the sign RULER or DUCK). Native signers disagree about whether the source of the handshape unit is the handshape in the specific lexical sign, or vice versa.

between a lexical and a grammatical system (like classifier systems), but unique in its fusion of linguistic and visuospatial properties, and thus quite unlike anything we see in the world's spoken languages[8].

4.4.3 What do handshape units classify?

In criterion (c), Grinevald (1996) did not explain what she means by "classification", but my reading of her work suggests that she does not substantially disagree with Allan (1977). A classifier classifies in the sense that it denotes some salient inherent or perceived characteristic of the referent represented by an associated noun. Therefore, Engberg-Pedersen (1993) argued that the analysis of handshape units in polycomponential verbs as classifiers can only be justified if we can show that the choice of these handshapes is determined by inherent or perceived characteristics of the referents, and not by anything else.

As mentioned above, Engberg-Pedersen (1993) claimed that the choice of handshape does not depend solely on the attributes of the referent represented by an associated nominal. Instead, she pointed out that the choice of handshape and movement in these constructions in Danish Sign Language are mutually interdependent[9], and that it is not clear how the morphological relationship between the two is most appropriately analyzed. In keeping with the wide agreement in the spoken language literature that classifier morphemes are always units separate from the noun or verb root, Supalla (1982) and others have described the movement feature of these forms as the root of the predicate, and the classifier handshape as a type of affix. But, as discussed in Chapter 3, McDonald (1982, 1983) and Engberg-Pedersen (1993, 1996) found that that there is actually little morphological evidence for this division between movement as root and handshape as affix. This claim does indeed seem odd given the fact that neither the handshape nor the movement is in any sense morphologically basic. Both are combined more or less simultaneously, and both are more or less unpronounceable on their own (McDonald, 1982; Shepard-Kegl, 1985; Schick, 1990a). It seems that the root and affix analysis may be partly motivated by the description of the handshapes as classifiers, and the description of the choice of classifier as motivated by the characteristics of the referent and separate from the verbal meaning.

Although it is widely recognized that the choice of classifier in spoken languages is influenced by discourse-pragmatic factors (Aikhenvald, 2000; Foley, 1997; Grinevald, 1996, 2000), allowing the speaker a degree of choice and the possibility of reclassification, it seems that these different uses always reflect different

[8] Edward Klima (personal communication, April, 2000) has pointed out that the nearest equivalent may be ideophones in spoken languages such as Yoruba, which may blend features of sound symbolism with phonological structure.

[9] In his more recent work, Supalla (1990) also made a similar claim for ASL.

perspectives on the characteristics of the referent represented by an associated nominal, as we saw in example (4-20) from Burmese.

This is an area of classifier usage that has not, however, been very extensively researched, so our comparisons with the handshape unit in polycomponential verbs cannot be conclusive (Aikhenvald, 2000). It is not difficult, however, to show that while the choice of handshape unit is partially motivated by salient aspects of the referent, particularly its size and shape, this is not the only influence. I will illustrate this with reference to the three major categories of polycomponential verbs: verbs of handling, predicates of visual-geometric description, and verbs of motion and location in signed languages. The latter group appear to have been the first forms compared to classifiers in spoken languages (Frishberg, 1975; Klima & Bellugi, 1979; Supalla, 1978), and the class of handshape units most like the various types of spoken language classifiers described by writers such as Aikhenvald (2000), Allan (1977) and Grinevald (1996, 2000). In complex verbs of motion and location, the handshape represents either an agent, patient, or theme participant role conflated with the verbal element, represented by handshape units which appear to be selected according to whether or not the referent falls into the class of animate beings or vehicles, for example, classes which are common in the world's classifier languages (Schick, 1990a). The term classifier was, however, later extended to include the handshape units in other polycomponential verbs. Yet, unlike the handshape in verbs of motion and location, the handshape unit in verbs of handling and in predicates of visual-geometric description appears to share relatively few characteristics with classifiers.

In handling verbs, the handshape unit has traditionally been analyzed as a classifier reflecting the size and shape of a referent acting in the participant role of patient or theme (or sometimes the instrument), but it actually only indirectly reflects these aspects of the referent (Zwitserlood, 1996). In fact, the choice of handshape appears to be influenced by two factors: (1) the part of the patient or theme argument that is handled and (2) the characteristics of the agent's body part which is manipulating the patient or theme argument. The work of a number of writers, such as Engberg-Pedersen (1993) and Wallin (1996), has attempted to clarify the first of these two factors, explaining that specific handling handshapes (referred to as *agentive classifiers* by Wallin, 1996) are selected according to the part of the theme argument that is manipulated by the agent, and do not in fact always reflect characteristics of the theme itself: "Since the classifiers are chosen according to the part that is handled, and not according to the referent itself, the shape or size (or other property) of the referent...cannot be determined by the classifier" (Wallin, 1996: 125). In fact, the handshape usually only indicates the specific properties of the part of the referent which is handled. There are exceptions, however, as Wallin (1996) goes on to explain:

> Normally it is a part which is constructed for handling...e.g. the handle on a travel bag or a wood-saw, the ear of a coffee mug or a jar lid. This, however, is not necessarily always the case...A coffee mug can be held in the same way that a normal drinking glass is held. A pen and a book lack a particular part that is handled (Wallin, 1996: 124).

The handshape thus represents the characteristics of only part of the referent represented by the theme argument, or the referents associated with both the theme and agent argument. So, for example, if a pen is being held by a human who is using it to write, for example, then a signer would choose perhaps a curved gO or an F handshape to represent this action. However, if the agent is using the pen as a weapon, then the S handshape might be selected by the signer as this more accurately imitates the handshape used by the agent. Similarly, if a non-human animate was manipulating the pen, such as an elephant with its trunk or an eagle with its talons, then the choice of handshape may be the forearm with the hand shaped into a flat bO to represent the elephant's trunk, or a hooked W to mimic the appearance of an eagle's talons. The choice of handshape thus does not, in any real sense, only classify the theme argument. This is clear in the examples in Figure 4.3. In each case, the change of handshape represents a change in the hands of the agent, and not simply a change in the size or shape characteristics of the patient. Unlike classifiers, the handshape unit may simultaneously represent two entities: the first entity acting as "handler" and the part of the second entity that is handled.

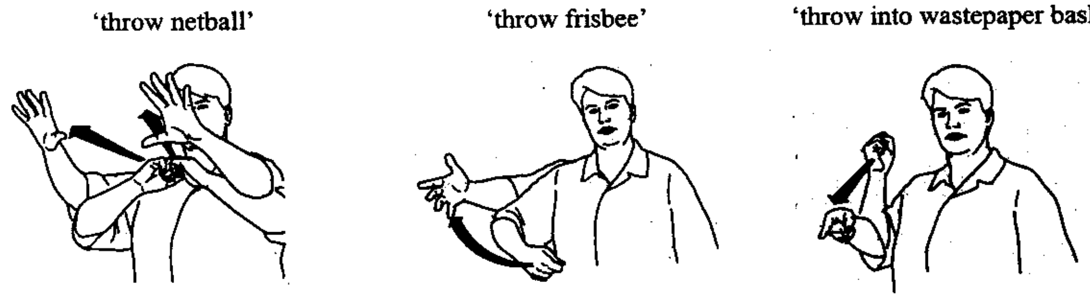

Figure 4.3

In predicates of visual-geometric description, the choice of the SASS handshape is based on salient characteristics of the referent, such as its relative depth and width. Thus, as the data presented in Chapter 5 will show, for a small round object such as a coin or button, the F handshape might be used. For a medium-sized round object, the gC handshape would be appropriate. An increase in the dimension of an object can be realized by the addition of fingers, so that the bC handshape would represent a medium-sized object of greater depth. In many of these predicate forms, however, the handshape is not used alone, but combined with a tracing movement that outlines the perimeter of the object. Without the movement, the same handshapes could also be used to signal the location of an object of a particular size and shape (i.e., it might equally belong in the class of complex verbs of motion and location). The meaning and function of the handshape may, however, be quite different when the tracing movement is added (Zwitserlood, 1996). Thus, it is clear that the movement may be an inseparable part of the meaning of the construction. Although the handshape provides some information about the width and depth of the referent, it is the movement that outlines its size and shape. Indeed, it might be argued that the movement itself is a type of classifier because it, like the handshape, denotes some salient characteristic of the referent. This is where the comparison with spoken language classifiers begins to break down, however, since the function of these forms is not to classify the referent, but to give descriptive information about its visual-geometric characteristics. The handshape and the movement may both contribute to the meaning of these constructions, creating visually analogue adjectival predicates that have no parallel in any of the classifier systems documented in spoken languages.

Figure 4.4

In complex verbs of motion and location, as explained above, the choice of the handshape appears to reflect semantic characteristics of the referent, such as whether it falls into the class of animates or vehicles. As in Danish Sign Language (Engberg-Pedersen, 1993), however, the different lexical forms that can be used to describe the motion and location of animates in Auslan also partly signal various aspects of the motion event, rather than being entirely motivated by the different classes of referent involved. Verbs of motion that can be used to describe human beings include lexical forms at one end of the morphological continuum, such as ARRIVE, LEAVE, SIT, RUN, and TRAVEL, and polycomponential constructions using various types of handshape units at the other, such as the G: *animate* and V: *animate* handshapes (see Figure 4.4).

If an Auslan signer wishes to add more detail about the type of motion event, there are a range of handshape units for representing the movement of different parts of the body, such as the two-handed G: *legs*, and the two-handed B: *feet*. One form (the S+: *head-and-torso*) involves the use of the S handshape together with the lower arm to describe movements of the torso (as demonstrated in section 3.2). Each of these handshape units can be found at different points along the lexicalization and grammaticalization continuum, and thus they each have idiosyncratic meanings and behavior. They differ in the kinds of movement units they can combine with, and in the various types of spatial arrangement in which they may occur, as the examples in (4-21) demonstrate.

4-21. Auslan

____t___

(a) WOMAN G: *animate* + (loc + forward) MAN G: *animate* + (forward-right +move-line+ forward-left)
"As for the woman, the man passed her by"

(b) TRUCK B: *vehicle*+ (loc + forward) BOY V: *animate* + (forward + fall + center)
"The boy fell off the truck"

(c) GIRL SLOW G: *legs*+ (move-analogue: limp) G: *animate* + (forward +move-line+ center)
"The girl slowly limped towards me"

As in Danish Sign Language, the data presented in Chapter 5 shows that there is a consistent tendency in Auslan signers to prefer the use of the V: *animate* handshape for particular types of motion, such as falling, jumping, sitting, and lying. The G: *animate* handshape is preferred for the description of someone approaching or passing the signer, or in verbs denoting two people meeting and leaving each other. The last example in (4-21) uses a construction that Supalla (1990) has referred to as a *serial verb of motion*[10]. The same motion event is described by two complex verbs of motion, the first using a two-handed G: *legs* to represent the manner of motion, and the second using the G: *animate* handshape to describe the path or direction. The use of such serial polycomponential verbs, with one handshape unit in the verb indicating the manner and another in the verb indicating path, clearly shows the choice of handshape cannot be separated from the conception of the location or motion event that is described. Engberg-Pedersen (1993) has argued that, as a result, it does not seem to be the case that the movement represents the motion situation and the choice of handshape exclusively represents the characteristics of the referent. Thus, the notion that these handshape units are classifiers is problematic, since these units have both meaning of a verbal kind and special co-occurrence constraints with associated nominals (Engberg-Pedersen, 1993). Of course, the particular co-occurrence constraints do seem reminiscent of verbal

[10] The issues surrounding identification of serial verb constructions and distinguishing them from compound verbs and other phenomena are complex (Foley & Olson, 1985). I will use Supalla's terminology here, but this does not necessarily mean that I accept his analysis of these constructions as examples of serial verbs.

classifiers in spoken languages, but the primary function of the handshape seems not to be one associated with classification, but representation.

Figure 4.5

Like the use of space and constructed action (Liddell & Metzger, 1998), it has been argued that the handshape unit is a type of *referent projection*, contributing to "the apprehension of a linguistic object" (i.e., the handshape unit has a referent-tracking role) (Engberg-Pedersen, 1993: 291). Although classifiers serve pronominal and referent-tracking functions in spoken languages, the visual-gestural resources of signed languages allow for reference-tracking uses of handshape units that are not possible in auditory-oral languages. Engberg-Pedersen (1993) pointed out that the handshape is visible and contributes to reference by being visible: the addressee can see what the handshape represents and thereby understand the reference. This is because there is a robust cognitive correspondence between the properties of these symbols and the properties of the referents they represent. It is thus an example of richly-grounded symbolism (Macken, Perry & Haas, 1993, 1995), which enables features of the signer's conceptualization of the referent's characteristics to be blended with real space. It seems quite clear that the handshape unit acts, in a sense, as a kind of surrogate or substitute for the referent. Just like a physically present referent, a signer may point towards an entity handshape held on the subordinate hand, or direct agreement verbs towards it. This is shown in Figure 4.5 above, where an ASL signer is directing the indicating verb ASK towards a G: *animate* handshape (Liddell, 1990). The handshape can be manipulated in space to represent the referent's path, manner and direction of movement, its location and relative orientation, with the particular choice of handshape determined both by the salient inherent or perceived characteristics of the referent (such as its size and shape) and by the kind of static or dynamic situation the signer wants to describe. Because of the cognitive correspondence between visible aspects of the handshape units and properties of the referent, arbitrary links between their form and function appear to be relatively infrequent across different signed languages, as I will show in the next section.

4.4.4 Classifiers or richly-grounded symbols?

An analysis of these handshape units which recognizes their richly grounded symbolism is important for understanding a number of aspects of their use and structure in signed languages[11].

Firstly, the use of polycomponential verbs and the choice of some handshape units appears to be very similar in all documented signed languages (Cogill, 1999). The G: *animate* and V: *animate* handshapes used in descriptions of human motion in Auslan, for example, are found in many other historically unrelated signed languages, such as ASL (Supalla, 1986), Danish Sign Language (Engberg-Pedersen, 1993), and Thai Sign Language (Collins-Ahlgren, 1990)[12]. The use of the B handshape for vehicle is also very widely attested (Brennan, 1992; Collins-Ahlgren, 1990; Corazza, 1990; Moody, 1983; Schembri, 1996; Wallin, 1996; Zwitserlood, 1996)[13]. We shall see additional evidence of these cross-linguistic similarities in the next chapter when new data from Auslan is compared with ASL and Taiwanese Sign Language. Moreover, even isolated deaf children from hearing families who create home sign systems in the absence of any adult language models appear to use complex verb forms which are remarkably similar to those in the signed languages of the major deaf communities (Morford, Singleton, & Goldin-Meadow, 1995; Singleton, Morford & Goldin-Meadow, 1993). These cross-linguistic similarities appear to be particularly true of verbs of handling and adjectival predicates. The use of handle and SASS handshapes appears, for all intents and purposes, to be identical in many of the signed languages so far described (Brennan, 1992; Collins-Ahlgren, 1990; Corazza, 1990; Moody, 1983; Schembri, 1996; Schick, 1990a; Wallin, 1996; Zwitserlood, 1996). Admittedly, most of the world's signed languages remain undocumented, so claims of this kind may be premature (Newport & Supalla, 2000). Nevertheless, even those crosslinguistic similarities that currently exist in the sign linguistics literature are very different from the highly idiosyncratic nature of classifier morphemes in spoken languages that may exhibit great cross-linguistic variation, even amongst related languages and dialects (Grinevald, 2000).

Secondly, the close links between form and meaning may also account for the similarity between these verb forms and the communicative use of the hands by non-signers (Cogill, 1999; McNeill, 1992). New evidence that supports this claim will be presented in the following chapter, but research already reported in the literature has indicated that hearing non-signers, when asked to use gesture as their only means of communication in experimental studies, may produce forms not unlike those described here. There does appear to be one

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[11] I do accept, however, that there is much about the use of these forms that cannot be explained by their iconicity (see Engberg-Pedersen, 1993).

[12] In both Danish Sign Language and Thai Sign Language, however, additional handshape units to describe human motion and location are also possible (Engberg-Pedersen, 1993; Collins-Ahlgren, 1990).

difference, however. A study of non-signing children showed that they used combinations of handshape and movement that tend to emphasize visual similarity to the referent, while combinations favored by native signing children appear to reflect the kinds of morphophonological constraints on such combinations found in signed languages (Morford, Singleton, & Goldin-Meadow, 1995). We have already seen that the use of mimetic movement and of loci in space and on the body in polycomponential verb signs has led to some dispute about the linguistic status of these units amongst sign linguists. Many (although perhaps not all) of these forms in signed languages, however, do appear to obey some of the same standards of well-formedness as signs from the core native lexicon, choosing from a limited set of feature values, and thus they tend to appear somewhat more abstract and categorical than the forms produced by non-signers. Kendon (1988) suggested that this is due to the fact that two processes are at work in signed languages, which he refers to as *image representation* and *sign formation* respectively. For Kendon (1988: 162-3), image representation refers to "the creation of a gestural representation of some concrete image that has been selected as symbolic of the concept to be referred to". Sign formation, however, is:

> ...the process by which such gestural representations then become transformed into expressions which are stable, shared by others, and which are structured in terms of both general formational constraints and the repertoire of contrastive locations, handshapes and movement patterns specific to the particular sign language.

This process is also discussed in Taub (2001) in her proposed *analogue-building model* of linguistic iconicity. She referred, however, to image representation as *image selection* (in which an image of the referent is chosen) and divides sign formation into *schematization* (in which the selected image is modified so that it is representable in the language) and *encoding* (in which appropriate forms are chosen to stand for the representable part of the image). There is insufficient space to discuss her proposal in depth here[14], but her model will undoubtedly prove very useful for our understanding of the interplay between sign and image in polycomponential verbs.

Moreover, the constraints of sign formation appear to not only influence the choice of available handshape units, but also the choice between using a polycomponential verb or a sign from the core native lexicon. Some of the earliest researchers recognized that handshape units appear to be substituted for lexical signs when the use of

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[13] Although it is by no means universal, as the well-established literature on ASL and new data from Taiwanese Sign Language in the next chapter will show.

[14] A more detailed discussion of Taub's (2001) work and its relevance to polycomponential verbs will be the subject of a future paper.

the lexical sign to describe the motion or location of a referent would result in combinations of hand configuration and movement that "...would destroy the structure of the sign" (Kegl & Wilbur, 1976: 387).

Thirdly, the importance of image representation also explains why creole signed languages, such as the recently emerged signed language in Nicaragua, make some use of polycomponential forms similar to those described here (Senghas, 1994). Classifier morphemes, however, appear to be almost unattested in spoken language creoles, even when such languages develop in regions surrounded by classifier languages or from contact between languages which contain classifiers (Aikhenvald, 2000). Instead, classifiers in spoken languages appear to be secondary grammatical phenomena that have evolved, through processes of grammaticalization, from more primary lexical categories, particularly nouns and verbs (Grinevald, 2000). There is evidence which suggests that in some languages, noun and numeral classifiers have evolved from nouns (such as the evolution of the nouns for "tree", "leaf" and "fruit" into classifiers that categorize objects by their shape, as either tree-like, i.e., long; leaf-like, i.e., flat; and fruit-like, i.e., round) and these classifiers may themselves eventually evolve into noun classes (Dixon, 1986), while verbal classifiers appear to evolve from noun incorporation or the reanalysis of serial verbs (Seiler, 1986). Polycomponential constructions appear, on the other hand, to have a much more central role in the origin and evolution of signed languages (Armstrong, Stokoe, & Wilcox, 1995; Senghas, 1994; Singleton, Morford & Goldin-Meadow, 1993).

The picture that emerges then from this comparison of polycomponential verbs in signed languages with classifier systems in spoken languages is that the handshape unit in these constructions has an origin, form, and function that appears to be distinct from what is found in classifiers. Although the selection of a particular handshape unit is partly motivated by the salient inherent or perceived characteristics of the referent, this does not appear to be the only factor involved in their use. Therefore, these forms cannot be said, strictly speaking, to have a primarily classificatory function.

4.5 Summary

As mentioned in the introduction, this chapter has aimed to provide an overview of recent descriptions of classifier morphemes. The chapter cannot do justice, however, to the wealth of spoken language literature on this topic, or to the abundance of new data coming from ongoing documentation of classifier systems. It has simply attempted to sketch some of the major issues in this area, and their implications for our understanding of systems of nominal categorization in signed languages. We can conclude that, like noun classes or measure terms, the use of handshape units in polycomponential verbs appear to represent a type of morphosyntactic subsystem which is motivated by similar semantic properties as the classifier morphemes found in some of the world's spoken languages. It also seems clear, however, that the handshape unit in these constructions exhibits a number of unique characteristics. Although I have outlined the main reasons that the analysis of handshape units in polycomponential verbs as classifiers is problematic, this topic is far from closed and requires much more investigation. More detailed data and more standard terminology is required in order to begin to address some of the issues raised here.

Chapter 5
The verbs of motion production study: Auslan, ASL, TSL and gesture compared

5.1 Introduction

In this chapter, I will describe and discuss the results from three studies relevant for an understanding of polycomponential verbs in signed languages. In this chapter, data is presented that has relevance for a further understanding of some the issues raised in the previous two chapters.

In the first section of this chapter, the methodology and results of the Auslan verbs of motion production study are presented. Partial results from this study have been reported in Schembri et al. (in press) and in Schembri & Adam (2000). In later sections of this chapter, the Auslan results will be compared with data from a small-scale study of Taiwanese Sign Language (henceforth *TSL*) and also with a study of gestures produced by hearing non-signers. It is possible to compare the results from these three studies because all the data was collected using the same *Verbs of Motion Production* (VMP) task from the Supalla et al. (in press) *Test Battery for American Sign Language Morphology and Syntax.*

The initial aim of the Auslan verbs of motion study was simply to collect data about the use of polycomponential verbs of motion in Auslan from a range of native signers in order to understand typical uses of handshape, movement, and location components that could be found in these constructions. The original purpose of the research was thus purely descriptive. In addition, some tentative cross-linguistic comparisons with ASL could also be made, based on the expected responses reported for the VMP task, and the descriptions available in the literature (McDonald, 1982; Schick, 1990; Supalla, 1982, 1986; Valli & Lucas, 1995).

Later, however, I was given the opportunity to analyze data collected using the same VMP task collected by Susan Duncan from four deaf Taiwanese signers. This enabled some further comparisons with an additional signed language, one apparently historically quite unrelated to both ASL and Auslan (Smith, 1989). The data presented in the next chapter reveals many parallels in the way all three signed languages used handshape (although some of the specific hand configurations used to represent referents are quite different in each signed language), movement, and location to represent motion of the objects shown in the stimulus film clips.

The cross-linguistic similarities this work suggested, together with the problematic nature of analyses of polycomponential verbs as multimorphemic classifier constructions outlined in the previous two chapters, prompted me to undertake an investigation into the representation of moving referents in hearing non-signers' gesture. If the work of Liddell and his colleagues on the role of gesture in signed language grammar had implications for polycomponential verbs (Liddell, 1998, 2000a, 2000b; Liddell & Metzger, 1998), then there ought also to be a number of similarities between the representation of motion events in both signed languages and in the gesture of non-signers. The results of this study are discussed in section 5.4.

5.2 Study 1: Polycomponential verbs of motion in Auslan

In this first section, I will describe the materials, procedure, participants and results from the use of the Supalla et al. (in press) VMP task with Auslan signers.

5.2.1 Materials

Although polycomponential verbs of motion and location play an important role in signed languages such as Auslan, the use of a range of different verbs of motion is relatively rare in spontaneous conversation. As a result, Supalla (1982) devised elicitation materials for the production of these forms in the children who were the focus of his study. The original materials, known as the *Verbs of motion production test* (VMP), included some 120 test items, each one a very short animated film showing objects (such as household objects, dolls, toy animals and toy vehicles) moving in specific ways. Each film shows a relatively simple event, most often involving the movement of a single object from one locus to another. The animated scenes were shown one at a time to the children in the Supalla (1982) study. They were then asked to describe, in ASL, the movement of the toy or object shown in each scene. The subject's responses were videotaped and analyzed.

The nature of the VMP task makes it appropriate as an elicitation tool for the study of verbs of motion and location in other signed languages. This is because the stimuli do not rely on any translation from spoken or written English, and present motion events that the signer can usually understand and describe[1]. In the study described here, data from the Auslan signers was collected using a shorter version of the Supalla's original VMP task. This task has only 80 coded items and 5 practice items, and is included as one of 12 tasks in the *Test Battery for American Sign Language Morphology and Syntax* (Supalla, Newport, Singleton, Supalla, Coulter, & Metlay, in press). Although normative data and information about test validity and reliability has not become available, sections of the ASL test had been used with over 100 American signers, including both adults and children, ranging from 3 to 75 years of age (Maller et al., 1999). Parts of the test had also been used in research on non-signers. Some of the data collected from signing and non-signing populations is described in the research literature (Goldin-Meadow, McNeill & Singleton, 1996; Maller et al., 1999; Metlay & Supalla, 1995; Morford, Singleton & Goldin-Meadow, 1995; Newport, 1990; Singleton, Goldin-Meadow & McNeill, 1995; Supalla, 1982).

The instructions for the VMP task were re-filmed in Auslan as part of a project aiming to produce an Auslan version of the ASL test battery (Schembri et al., in press). Following a visit to the United States of America in late 1996, I obtained a copy of the ASL test battery manuscript and videotape from the two principal authors in early 1997. The Supalla et al. (in press) manuscript provided us with all the background information necessary to begin our project, including information about the design, administration, and analysis of each task. Example coding sheets and picture materials for use with several of the subtests were also included. The videotape contained all film sequences used as task stimuli, as well as a complete set of instructions in ASL for each of the tasks. The instructions in the Supalla et al. (in press) material suggested that most of the tasks in the battery could be used with other signed languages, but recommended that certain modifications be made to some of the task materials. In the ASL version of the VMP task, for example, participants watch a set of instructions in ASL produced by a native signer, then a series of short animated films. The animated films would not need to be re-filmed, but new instructions would have to be produced for this particular task.

All adaptation and re-filming of task materials was carried out by myself working with a university lecturer who was a deaf native signer of Auslan. My deaf co-researcher agreed to be filmed presenting all the task instructions in Auslan (including the instructions for the VMP). All decisions about an appropriate translation into Auslan of the VMP instructions were made by my deaf co-researcher in consultation with myself.

5.2.2 Procedure

In this section, I discuss a number of methodological issues in the design of the Auslan test battery, including task order effects, duration of the task session, task setting and participants. These are relevant for the discussion of the results from the VMP, as this data was collected as part of the Auslan test battery project.

The original Supalla et al. (in press) ASL test battery was designed to be administered to individual adult participants over a two-hour period, with an intermission after the administration of the first six tasks and time for some spontaneous conversation between tasks. In order to eliminate the possibly unfavorable effects of fatigue, Supalla et al. (in press) suggested that the order in which the tasks are administered be varied. They point out that it is not desirable to completely randomize the task order, however, because production tasks must precede comprehension tasks to prevent participants' production of the target grammatical features being

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[1] The VMP task may be of less use with signers from non-Western cultures. The objects in the film include rulers, cotton buds, plumbing nuts, and masking tape, as well as toy furniture, animals and buildings of a style that may not be familiar to people outside North America.

influenced by the signed examples in the comprehension tasks. They thus suggest that the order of tasks in the battery by controlled by dividing the test battery into two separate series, A and B, which are then administered in either the A-B or B-A order to each participant (half the participants receiving order A-B, and the other half B-A).

Data collection with our subjects, however, did not follow this procedure. There were two reasons for this. Firstly, we felt that the administration of 12 tasks in a single session was excessive, and thus we opted to administer each of the two series A and B in separate sessions, often a week or more apart. We also provided participants with many short breaks between the different individual tasks. We felt that this made the need to administer the series in two different orders unnecessary. Secondly, after administering all 12 tasks to 12 participants, funding and time constraints meant that we were only able to administer some parts of the test battery to the remaining 13 participants. Of these 13 individuals, nine completed only the demographic questionnaire (QQ), the narrative production task (NP), the noun-verb production task (NVP), the noun-verb comprehension task (NVC), the sign order comprehension task (SOC), and VMP tasks. An additional three individuals completed only the QQ, NVP, NVC and VMP tasks. One other participant also completed the QQ, NP, the verb agreement task (VAP), NVP, and NVC tasks, but only half of the items on the VMP.

An additional methodological concern discussed by Supalla et al.(in press) is that task performance, especially of the first task, may be affected by the participant's possible discomfort with the presence of a video-camera and other aspects of the experimental setting. We attempted to overcome this by administering task 7, the QQ task, as a warm-up task with all subjects. The questions in task 7 involve asking about the participant's age, origin, family, and educational background, and work to put the individual at ease by discussing familiar information. The experimenter also attempted to engage the participant in five to ten minutes of spontaneous conversation before beginning administration of the test battery. In addition, the experimenter stressed that the elicitation tasks were not a test of the participant's signing skills, but were simply part of a process of collecting information in order to later develop tests for children and adults learning Auslan as a first or second language. Thus, the VMP task was always administered after a number of other tasks had been completed, by which time the participant's possible unfamiliarity with the procedure should have had a minimal effect on performance.

Supalla et al. (in press) also stressed the need to administer the battery of tests in a social context in which the participant feels it is normal to use a natural signed language, rather than an English-based sign system or contact variety. As a result, I organized for all tasks to be administered by a deaf native signer of Auslan. The experimenter was an individual with a high profile in the Australian deaf community, and was well known to almost all participants. Although deaf participants sometimes met with the deaf experimenter's hearing colleagues before or after the administration of the test battery, no hearing people were present during data collection sessions.

5.2.3 Participants

The materials were administered to a group of 25 deaf native signers of Auslan. Of the group, 13 were female and 12 were male. Twenty-four participants had deaf parents, and one had an older deaf sibling from whom she acquired Auslan from birth. Nine of the participants also had deaf grandparents, and all but one had deaf relatives other than their parents. The age of participants ranged from 16 to 58 years, with the mean age 34.6 years. The vast majority (23 participants) reported that they were born deaf. One participant said that she simply did not know whether she was born deaf or had become deaf at a very early age. Another said that he had been told by his family that he was born hearing, but became deaf at age seven due to an accident. As both participants had deaf parents who signed to them since birth, their responses are included in this study.

The participants could be categorized into three groups based on their regional origin: (1) native users of the Sydney variety of Auslan (thirteen participants grew up in the greater Sydney region in New South Wales); (2) native users of the Melbourne variety (nine participants grew up in Melbourne, Victoria); and (3) native users of some other variety (two participants originally came from Adelaide in South Australia and one grew up in Perth, Western Australia). Data was collected from 17 participants who resided in Sydney, and from 8 in Melbourne.

Overall, educational experiences were broadly similar, with most participants having had experience of instruction in both signed and spoken language. All but one of the participants had been educated with other deaf children, either in a segregated setting or in a special unit for deaf children attached to a hearing school. Of these participants, all reported that they used signed language to communicate with their fellow students, inside and/or outside the classroom. Three participants were exclusively educated in auditory-oral programs, while 17 other participants received at least part of their education using spoken English. Two had had some instruction using Cued Speech[2]. Only five reported that their entire education had been conducted in a setting which used signed language. This reflects general patterns of deaf education in Australia, where the use of signed language as a means of instruction has traditionally been seen only as a last resort (Johnston, 1989). For all but the three instructed exclusively in spoken English, however, signed language was used in some part of their education, most commonly in upper primary years and in secondary education. In many cases, those participants who had been partly or entirely educated in a signing program specifically reported that their teachers used an English-based sign system, rather than Auslan. For younger participants, this was most commonly Australasian Signed English.

Although almost all participants had received some speech training in childhood, all reported that Auslan was their preferred or primary means of communication. Twelve participants in the group reported that they sometimes used spoken English to communicate with hearing people who knew no signed language, while 13 participants said that they never used speech. Almost half of the participants were either university students at the time data was collected (5 participants), or had completed a university degree (6 participants). All individuals were paid for their participation.

5.2.4 The VMP task

In order to facilitate comparison with the description of ASL verbs of motion and location in Supalla et al. (in press), I will adopt their terminology to refer to the meaningful components of polycomponential verbs of motion and location in Auslan rather than use the terms I have described in Chapter 3. The use of this terminology is not intended, however, to signal an identical analysis of these components in Auslan.

Supalla (1982) designed the VMP task so that it elicits roughly an equal number of examples of several major types of polycomponential verb of motion, with the features of handshape, manner, path, direction, and location elicited in different combinations. This means that a given handshape is elicited by several task items, with these items differing from each other in the accompanying movement path and direction, manner of movement, orientation, and location. The aim is to elicit each component in a carefully controlled variety of meaningful contexts. The items are presented in random order.

Each of the 80 task items involves a single object, which Supalla originally referred to as the "central object" (CO), moving in specific ways. In one animation sequence, for example, an ashtray zigzags across a lawn. In another, a toy airplane hops in a straight line. In addition to this, 40 of the task items also involve another object (the "secondary object" or SO) that does not move. In one sequence, for example, a small doll jumps into a plumbing nut, and in another, a toy tractor moves backward and turns around to face a book.

A variety of toy people, animals, vehicles, and furniture, as well as other objects, such as pencils, a ruler, cups, books, washers, masking tape etc, are used as props in the VMP animation sequences. Supalla (1982) carefully selected these props on the basis of his description of classifier handshapes in polycomponential verbs of motion. The version of the VMP task included in the Supalla et al. (in press) materials is designed to elicit four distinct "semantic" classifier handshapes and six "SASS" classifier handshapes, as described in Tables 5.1

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2 Cued speech is a system of hand cues that are used alongside lip movements to make visible the phonemic

and 5.2 below. All of these would be examples of entity handshapes in my description of Auslan in Chapter 3, but I have not used the 'morphological' terminology here (i.e., G: *animate* handshape) that I use elsewhere in this dissertation to refer to the hand configurations. Instead, I have chosen to use purely 'phonetic' descriptions of the handshapes, so as to enable comparison between all three signed languages and the gesturers. Each handshape is elicited as the marker of the central object, and as the marker of the secondary object, with roughly an equal number of items of each type of meaningful unit.

Table 5.1 "SASS classifier" handshapes

Referent class	ASL target	CO	SO
Straight, vertical	Gvert 	4	3
Straight, horizontal	Ghoriz 	8	2
Flat, narrow	Hflat 	6	2
Flat, wide	Bflat 	6	6
Circular	gC 	8	5
Cylindrical	bC 	8	6
Total number of SASS handshapes:		40	24

contrasts of speech (Crystal, 1987).

Table 5.2: "Semantic classifier" handshapes

Referent class	ASL target	CO	SO
Animate	2legs 	18	5
Vehicle	3edge 	10	3
Airplane	ILY 	6	2
Tree	5+ 	6	6
Total number of semantic classifier handshapes:		40	16

The movement of the CO props in the animation sequences was selected "...on the basis of morpheme contrasts in movement, form, and direction" (Supalla, 1982: 69-70). Forty of the events in the task involve only the CO. These events were designed to elicit the manner of movement components shown in Table 5.3. All of these manner components may be combined simultaneously with the movement path.

Table 5.3

	Manner targets	
1.	*Linear*	4
2.	*Turn*	8
3.	*Random*	8
4.	*Pivot*	8
5.	*Bounce*	6
6.	*Fall*	6
	Total number of manner components:	40

The second group of 40 events involves both a CO and an SO. The manner of movement components in these forms are listed in Table 5.4. The SO is placed along the CO's path of movement, so that there is some contact between the SO and the CO. The contact may occur in either the initial, middle or final part of the CO's path of movement, as shown in Table 5.5. These events thus include two objects interacting, and are used to elicit locative components as well as manner of movement components (Supalla et al., in press).

Table 5.4

	Manner targets	
1.	*Linear*	12
2.	*Jump*	12
3.	*Turn*	8
4.	*Fall*	8
	Total number of manner components:	40

Table 5.5

	Locative targets	
1.	*Initial*	12
2.	*Middle*	16
3.	*Final*	12
	Total number of locative components:	40

In addition, 18 of the 80 events in the VMP task involve the CO moving in a *backward, uphill,* or *downhill* direction. The other 62 events simply involve movements forward.

Table 5.6

	Direction targets	
1.	*Backwards*	8
2.	*Uphill*	6
3.	*Downhill*	4
	Total number of direction components:	18

A complete description of all the animated film stimuli can be found in Appendix D.

5.2.5 Results

The following section presents a summary of the subjects' responses for each of the 80 stimuli, describing the handshapes used for both the CO and SO, the use of locative components, the manner of movement, and the direction of movement components. All handshapes mentioned in the text are shown in the Tables 5.7 to 5.16 below. These results were coded by myself, and 12% (results from three participants) were transcribed independently by a trained coder who was a hearing native signer, with 92.1% agreement overall.

Tables 5.7 to 5.16 present a summary of the results for the central object responses. Results for the secondary object handshapes are discussed in the text only.

5.2.5.1 Handshapes for central object (CO) in Auslan

Straight vertical central objects in Auslan

Handshape components that represented the first referent category of straight vertical objects were elicited by animated films of motion events involving the following objects: a broom, a floor lamp, a bone, and a wooden bar. The results are shown in Table 5.7 below.

In all cases, the main target handshape for ASL described by Supalla et al. (in press) was a Gvert handshape. In our Auslan data, more than half of all responses (approximately 62%) involved the use of the same Gvert handshape. Other responses involved the use of a Bvert handshape with the fingertips oriented downwards to describe the movement of the broom (approximately 15%); the use of an Hvert or Hvert+ handshape by a small number of signers for the bone and a wooden bar (4%) (perhaps because these objects were slightly wider than the others); and the use of the bC handshape for the floor lamp and bone (2%) (motivated possibly by the perception of the floor lamp and piece of bone as saliently cylindrical objects). Many signers responded to the film sequence showing a wooden bar rolling by producing a modified form of the lexical sign ROLL rather than a polycomponential verb of motion (10%). The remaining responses consisted of two verb sequences (forms similar to what Supalla, 1990, referred to as serial verb constructions, as mentioned in the previous chapter) involving a combination of a polycomponential verb (using either the Gvert or Bvert) and a lexical verb such as WALK or ROLL (4%); a verb in which the handshape changed from one to another of the above-mentioned handshapes as part of the movement, or in which the signer produced the verb first with one of the above handshapes and then repeated the same form with one of the other handshapes (2%); or derived verb forms, such as one verb that used a two-handed construction using the S handshapes derived from the lexical sign BROOM (1%). For one signer, the handshape combination was derived from the Australasian Signed English sign BROOM rather than the Auslan sign.

The use of the Bvert oriented downwards for the broom is an interesting case. It is clear that signers did not categorize this referent as a straight vertical entity, but focused instead on the base of the broom as a flat wide object. This may be because the base of the broom in the stimulus film twisted as it moved, as if the broom was walking. The choice of a Bvert enabled this to be represented directly –a total of 8 participants out of the 13 that used the Bvert also twisted their hand from side to side at the wrist as it moved.

Table 5.7: Straight vertical CO referents

(broom, floor lamp, bone, wooden bar)

Gvert 	62%
Bvert 	15%
Lexical sign: ROLL	10%
Hvert 	4%
Polycomponential verb of motion (PVM) + lexical sign	4%
bC 	2%
Handshape change	2%
Lexical handshape 	1%

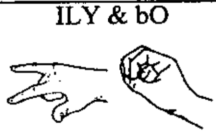
Straight horizontal central objects in Auslan

Elicitation of handshapes representing the class of straight horizontal objects involved the use of film sequences showing the movement of a pipe cleaner, dart, missile, paper plane, roll of paper, q-tip, log, and pencil. The results are shown in Table 5.8 below.

Approximately 73% of the responses from Auslan signers involved the use of the same ASL target—a Ghoriz handshape. Other handshapes included the use of the bC handshape specifically to describe the moving log (approximately 7.5%), the use of a Bflat (4.5%) or Hflat handshape (2%); a Y handshape for the paper plane (2.5%); and the use of the lexical sign FALL to describe the pipe-cleaner falling out of a toy tree (5.5%). The other responses consisted of verbs using the ILY or the bO handshape (2%); verbs in which the handshape changed from one to another of the handshapes mentioned above (1%); or a verb derived from a lexical sign, such as the use of the T handshape from the sign COTTON-BUD, or the R or 8 from one of two variants of the sign ROCKET (2%).

Table 5.8: Straight horizontal CO referents

(pipe cleaner, dart, missile, paper plane, roll of paper, q-tip, log, pencil)

Gvert/Ghoriz 	73%
bC 	7.5%
Lexical sign: FALL	5.5%
Bflat 	4.5%
Y 	2.5%
Hflat 	2%
Lexical handshape 	2%
ILY & bO 	2%
Handshape change	1%

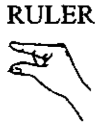
Flat narrow central objects in Auslan

The moving flat narrow objects shown in the film included a ruler, a wooden bar, the small tail wing of an airplane, a knife, a band-aid, and a thin paintbrush. The results are shown in Table 5.9 below.

Unlike the verbs used to describe the previous two referent categories, most responses from the Auslan signers did not use verbs incorporating the target Hflat handshape listed in the ASL materials. More than one third (approximately 40%) involved the use of a Ghoriz handshape, while only a quarter (25%) of the total responses used the target Hflat handshape. The next largest group were verbs that involved the Bflat handshape (21%). The latter was the most common handshape used in verbs describing the animation sequence showing a tail wing falling off an airplane and a wooden bar falling over (in the latter case, the movement was represented with a Bflat handshape in combination with the lower arm). To describe the sequence in which a ruler moves across a surface, the most common response involved a two-handed symmetrical gC> handshape apparently derived from the lexical sign RULER (over 7% of responses for this whole category). The remaining responses included signs such as MOVE (over 2.5%); serial verbs involving the combination of a construction using the Ghoriz or Hflat handshape and the lexical sign ROLL (less than 2%); or a polycomponential verb with some other handshape, such as a bC> (less than 2%). Overall, this pattern of responses tend to suggest that the size and shape distinctions between the Ghoriz, Hflat, and Bflat handshapes are not as highly grammaticized in Auslan as has been reported for ASL (Supalla, 1982, 1986)[3].

Table 5.9: Flat narrow CO referents

(ruler, wooden bar, tail wing, knife, band-aid, thin paintbrush)

Ghoriz 	40%
Hflat 	25%
Bflat 	21%
Lexical handshape: RULER 	7%
Lexical sign	2.5%
PVM + Lexical sign	>2%
bC> 	>2%

Flat wide central objects in Auslan

The film used to elicit handshapes representing flat wide objects showed a moving brick, lawnmower, bed, phonebook, thick paintbrush, and a towel. The results are shown in Table 5.10 below.

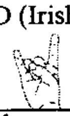
Almost two-thirds of all responses used the target Bflat handshape in the same way expected for ASL (over 65%). Major exceptions included the use of the Ghoriz handshape to describe the movement of the lawnmower and paintbrush (11% of all responses for this category); the bC handshape (especially to describe the moving bricks) (5.5%); and the use of two B handshapes held together derived from a lexical sign BOOK (5.5%) to

[3] Note that the H handshape is, however, used in the Auslan lexical signs for some of the stimulus objects (e.g., the signs KNIFE and BAND-AID).

represent the movement of the phonebook. The other responses were very mixed. These included the use of verbs with the Hflat (1.5%), or the bO> and bC> handshapes (over 1%); a verb of motion using the Irish H handshape derived from the sign BED (almost 3%); lexical signs such as FALL or BE-NEAR (1%); or verbs in which the handshape began as one of those listed above but changed to another (5.5%).

Table 5.10: Flat wide CO referents

(moving brick, lawnmower, bed, phonebook, thick paintbrush, towel)

Bflat/edge/vert 	65%
Ghoriz 	11%
bC 	5.5%
Lexical handshape: BOOK Lexical handshape:: BED (Irish H) 	5.5% 3%
Handshape change	5.5%
Hflat 	1.5%
bC>/bO> 	>1%
Lexical sign	>1%

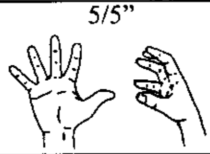
Circular central objects in Auslan

Circular objects shown on the film include a small ring, wreath, ashtray, metal washer, tape, movie reel, and egg. The results are shown in Table 5.11 below.

In the data from Auslan signers, only 20% of verbs involved the target ASL handshape of gC. Slightly over 22% involved a form of the bC handshape and almost 35% involved an F. These three handshapes were not, however, distributed evenly between each type of circular object. Small or narrow circular objects (such as the ring and the metal washer) were overwhelmingly represented with the F handshape, much less often with the gC and never with the bC handshapes. Slightly larger, wider circular objects or spherical objects (such as the ashtray, wreath, roll of tape, and egg) were almost never represented by an F, but usually by a gC or a form of the bC handshape. The remainder of the elicited responses were very mixed. A small number of signers used a bO handshape to represent the spherical shape of the egg (3%); others used a Bvert for the wreath or a Bflat for the ashtray (over 4.5%); and a 5 or 5" handshape was used by some signers for the wreath and movie reel (4.5%). Approximately 6% of the results involved the use of a lexical sign, such as ROLL or FALL, while another 4% used a verb with a two-handed combination of handshapes derived from a lexical sign, such as WHEEL (a 5 hand combined with a Ghoriz) or MOVIE-REEL (a 5 hand combined with a bC).

Table 5.11: Circular CO referents

(small ring, wreath, ashtray, metal washer, tape, movie reel, egg)

F 	35%
bC 	22%
gC 	20%
Lexical sign	6%
Bflat/vert 	4.5%
5/5" 	4.5%
Lexical handshape	4%
bO 	3%
PVM + Lexical sign/ Handshape change	1%

Cylindrical central objects in Auslan

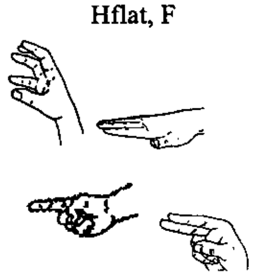
Animated sequences showing a moving toy cylinder, barrel, toilet, cup, fire hydrant, and a soup can were used for the elicitation of verbs describing the movement of cylindrical objects. The results are shown in Table 5.12 below.

Slightly over 62% of total responses in the Auslan data involved the target bC handshape listed in the ASL materials. Another 10% used a Gvert handshape (especially for the fire hydrant), while almost 5% involved a bO (especially for the barrel and cylinder). Smaller numbers of verbs incorporating other handshapes (such as a 5", Bflat, Ghoriz, Hflat, or an F) were produced by some participants (together these added up to 6% of the total responses for this category)[4]. Around 11% of all responses did not include a polycomponential verb of motion at all, but instead used modified forms of lexical signs such as ROLL, MOVE or FALL. The remaining responses included serial verbs involving the combination of a construction using the bC handshape and the lexical sign ROLL (approximately 2.5%); a verb form that used a handshape derived from a lexical sign, such as the sign TEA-CUP (2.5%); or a verb in which the handshape changed as part of the movement (1%).

[4] The use of the F and the O handshape was interesting. When describing a small toy cylinder, a small number of signers represented the referent using a two-handed F or O "tracing" size and shape specifier construction, and then showed the falling movement of the cylinder using a one-handed form of the same handshape (elsewhere in the data, the use of the F and O handshape appears to be reserved for circular objects rather than cylindrical ones).

Table 5.12: Cylindrical CO referents

(toy cylinder, barrel, toilet, cup, fire hydrant, soup can)

bC 	62%
Lexical sign	11%
Gvert 	10%
bO 	5%
Hkd5, Bflat, Ghoriz, Hflat, F 	4%
F 	2%
PMV + Lexical sign	2.5%
Lexical handshape	2.5%
Handshape change	1%

Animate central objects in Auslan

The single largest category in the VMP task are filmed sequences involving animate referents (or toys which represent animate beings), such as toy men, women, a baby, a robot, a chicken, a duck, a dog, a rabbit, a turtle, and a bee. The results are shown in Table 5.13 below.

Slightly over 46% of total responses to these sequences used verbs with the 2legs handshape[5], the main target handshape given for ASL. Another 25% involved the use of the Gperson handshape. This was also an acceptable response in ASL, according to the Supalla et al. (in press) materials, especially for human referents. There was considerable variation in the remaining responses. The most common verb to represent the movement of a

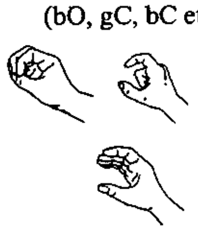
[5] Note that, unlike what was originally reported for ASL by Supalla (1982), the variant of the 2legs handshape with fingers held either slightly curved or fully bent was used in Auslan verbs describing the motion of both human and animal referents.

chicken, hen, and a duck used the same gO> handshape found in the lexical sign BIRD (over 8% of all responses). A smaller number used the hO> handshape from the sign DUCK specifically to describe the movement of the toy duck (1.5%), or the F> hand or 8 configuration from a sign most appropriately glossed as INSECT for the bee (1.5%). A Ghoriz handshape was sometimes used for some of the animal referents (5%), and a Bflat specifically for the moving turtle (2%). Other verbs used a bO, gC, or bC handshape (2%). Responses also included a substantial proportion of lexical signs (5%), such as WALK, ROLL, PASS, and FLY; or serial verb constructions which included these signs (4%) in combination with polycomponential verbs utilizing a Gperson or 2legs handshape.

The animate category included both human and non-human referents. The use of the two main handshapes (2legs and Gperson) was not, however, evenly distributed between the two subtypes of referent. The Gperson was more often used for human referents than non-human ones (of the responses using one of the two handshapes, almost 41% of those describing the motion of human beings incorporated this handshape compared with some 25% of responses depicting the motion of animal referents). The choice of 2legs or Gperson also seemed to partly reflect the type of motion being described. The 2legs handshape was clearly preferred when describing an animate referent falling, jumping, bouncing, or pivoting (almost 82% of all responses that used one of these two handshapes), while the Gvert was used slightly more often in signs representing the referent moving in a linear fashion, in a zigzag pattern, or turning toward or away from the signer (just over 59%).

Table 5.13: Animate CO referents

(toy men, women, baby, robot, chicken, duck, dog, rabbit, turtle, bee)

2legs 	>46%
Gperson 	25%
gO> (Lexical handshape: BIRD) 	>8%
Ghoriz 	5%
Lexical sign	5%
PVM + Lexical sign	3%
Bflat 	2%
Other handshapes (bO, gC, bC etc) 	>2%
hO> (Lexical handshape: DUCK) 	1.5%
Flat F (Lexical handshape: INSECT) 	1.5%

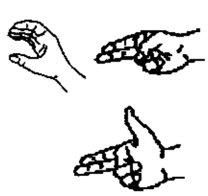
Vehicle central objects in Auslan

Another large category is animated films of vehicles, such as cars, trucks, tractors, motorcycles, trains, and boats. The results are shown in Table 5.14 below.

The majority of the verbs used to describe this class (72%) involved the use of the B handshape, oriented either with the palm downwards (Bflat) (22%) or with the little finger edge downwards (Bedge) (50%). The distribution of the B handshape with different orientations was not, however, evenly distributed between responses for different subtypes of vehicle. The palm downwards orientation never occurred in our data when the referent was a motorcycle, whereas it occurred in approximately equal numbers in signs describing the motion of a tricycle, a tractor, a locomotive, a truck, and a jeep. Some 8.5% of responses involved the 3edge handshape. This handshape represents the most acceptable response for ASL signers, according to Supalla et al., in press, but is relatively rare in the Auslan data. Some 9.5% used a Ghoriz, and 2% used an Hflat or bC (the bC was almost always oriented with palm downwards). A smaller number of responses (2%) involved verbs incorporating the handshape derived from lexical signs such as FALL and CRASH. Almost all the remaining responses (4.5%) involved the use of verbs incorporating a change from one handshape to another (most often a change from a B to a Ghoriz, or vice versa).

Table 5.14: Vehicle CO referents

(toy car, truck, tractor, tricycle, motorcycle, train, boat)

B  Bedge Bflat	72% (50%) (22%)
Ghoriz 	9.5%
3edge 	8.5%
Handshape change	4.5%
Lexical handshape/Lexical sign	3.5%
Hedge/bC etc. 	2%

Airplane central objects in Auslan

The final two categories produced responses from the Auslan signers that were comparatively uniform. The results are shown in Table 5.15 below.

To describe the movement of airplanes (including toy jets, biplanes, and gliders), almost 91% of responses involved the use of the Y handshape (the most common handshape in Auslan), whilst an unexpected 6% involved the ILY handshape (the handshape most widely used in ASL, according to Supalla et al., in press). Other responses involved the use of the Ghoriz handshape (3%).

Table 5.15: Airplane CO referents

(toy car, truck, tractor, tricycle, motorcycle, train, boat)

Y 	91%
ILY 	6%
Ghoriz 	3%

Tree central objects in Auslan

The results are shown in Table 5.16 below.

For trees of various kinds (including a toy cactus, evergreen, and palm tree), approximately 73% of responses involved the target ASL handshape 5+ (13%) and the Gvert or Gvert+ (60%). Other verbs incorporated a Bvert+ (almost 7%) or bC handshape (approximately 10%). Responses also included a small number of lexical responses, such as WALK, MOVE, and JUMP (3%); signs with a handshape change (3%); or forms derived from lexical signs, such as the verbs incorporating the handshape from a lexical sign TREE (2%).

Table 5.16: Tree CO referents

(toy cactus, evergreen, palm tree, deciduous tree)

Gvert/Gvert+ 	60%
5+ 	13%
bC 	10%
Bvert+	7%
Lexical sign	3%
Handshape change	3%
Lexical handshape: TREE	2%

5.2.5.2 Handshapes for secondary object (SO) in Auslan

In the following discussion, the SO results are presented in percentages for comparison with the CO data. The actual number of responses for some categories is, however, quite small (numbering around a total of 50 responses for the smallest categories, for example). No tables with illustrations are provided, as illustrations of all handshapes can be found in the tables for the CO data.

Straight vertical secondary objects in Auslan

Handshapes that represented the first referent category of straight vertical objects were elicited by animated sequences showing the following objects as the SO: a dart, a red pole, and a yellow pole. Perhaps because these SO referents were less diverse, the types of handshapes used were also less mixed than those in the CO responses. Slightly over 80% of the responses involved the use of the target Gvert handshape. More than 8% of all responses did not produce a verb of location to represent the SO (in most cases, a lexical sign was produced prior to the verb with the CO marker), while the remaining verbs involved the use of an F (4%), a Bvert (3%), a bO (3%), or a bC (1%) handshape.

Straight horizontal secondary objects in Auslan

Elicitation of components representing the class of straight horizontal objects involved the use of film sequences showing a wooden bar and a missile. The verbal responses produced by the participants mostly incorporated the target Ghoriz (72%). A small percentage used an Hflat (4%), whilst some signers produced two-handed tracing SASS constructions and then held the resulting F, bO, gC, or bC on the non-dominant hand to represent the SO (16%). Verbs using the handshapes derived from variants of the lexical sign ROCKET were used by a small number (4%), and some 6% produced no verb of location to represent the SO.

Flat narrow secondary objects in Auslan

The flat narrow SOs shown in the film were a swing bar and a ruler. Compared to the CO responses, the use of these referent objects was even less successful at eliciting the target Hflat handshape from the participant Auslan signers. Approximately 43% of the responses incorporated a Ghoriz, whilst almost 35% used a Bflat. Around 15% of total responses involved a verb sign utilizing the gC> hand configuration derived from the lexical sign RULER, while only 4% used the Hflat handshape. Some 3% of responses did not use a verb of location to depict the SO referent.

Flat wide secondary objects in Auslan

Flat wide SOs in the elicitation film were a box, a fireplace, a book, a bed, a brick and a table. Like the responses for the SO straight objects compared with those for the COs, the results here were also less mixed than those in the CO category. Almost 76% of responses used the target Bflat handshape. Other handshapes used were the bC (especially for the brick) (approximately 5%), the Irish H for the bed (almost 7%), the gC, Hflat, and Ghoriz (5% in total). Some 7% of responses did not represent the SO.

Circular secondary objects in Auslan

Circular SOs shown in the stimulus film were a plumbing nut, a loop, an ashtray, and a washer. Unlike the responses for circular COs, the majority of signers produced verbs with a bC handshape (57%), with the use of verbs containing the F and gC handshapes much lower (25% and 6.5% respectively). Around 4% used a bO handshape, and some 5% of responses utilized a Bflat derived from the subordinate hand of the lexical sign ASHTRAY.

Cylindrical secondary objects in Auslan

The elicitation film for cylindrical SOs showed a T-pipe, a toy silo, a roll of tape, a stump, a log, and a tin can. The pattern of responses was somewhat similar to that seen for cylindrical COs, with more than two-thirds using a verb with a bC handshape (72%). A significant number of verbs incorporating a Bvert were used (over 10%), however, reflecting the preference amongst the Auslan signers for representing the silo as a flat surface, rather than a cylindrical object. Almost 11% of responses used the F handshape (almost all of these to represent the small roll of tape).

Animate secondary objects in Auslan

The various examples of the animate secondary object category are elicited with the use of filmed sequences showing a toy man, frog, dog, zebra, and a doll. Like the animate COs, the responses in this category were very mixed. Approximately 19% of responses involved either no verb of location to represent the SO referent (10%), or saw the signer use their own body as the SO marker (9%). Most, however, used the 2legs handshape (37%), or the Gperson (14%). Some 15% used a B handshape, oriented downwards to represent the head of the frog (Bflat), or usually with the little finger edge down to represent the zebra (Bedge). Almost 6% used the Ghoriz. Approximately 4% of responses used verbs with a handshape derived from lexical signs, such as the F handshape from the lexical sign DOG, or the subordinate Bflat hand from the sign PERSON-LIE-DOWN.

Vehicle secondary objects in Auslan

Examples from the next category were elicited by animated films of a truck, tugboat, and a motorcycle. Like the results in the vehicle CO class, approximately 74% of all responses involved the use of a B handshape. Of these, some 14% used Bflat (used here to describe both the motorcycle and the truck), and 38% used Bedge. The remaining 22% used a B handshape derived from the lexical sign BOAT. Approximately 10% of responses involved the 3edge, and 14% used a Ghoriz. One signer produced a Y handshape to represent a toy tugboat from which a model airplane took off, but this appears to be due to assimilation (a Y handshape was also used on the dominant hand).

Airplane secondary objects in Auslan.

To describe the location of airplanes, some 64% of responses involved the use of the Y handshape, and 4% used the ILY. Almost 25% of responses, however, had a Bflat component, a hand configuration unattested in the CO data. It is not clear why this difference should have occurred. The remaining verb of location responses involved the use of Ghoriz.

Tree secondary objects in Auslan

For trees, the overall pattern of responses for the SOs was broadly similar to that for the CO referents. Some 54% used a Gvert, Gvert+ or a Ghoriz, and 15% involved a 5+ handshape. Around 7% used a Bvert+, 3% a bC, and 4% a bO hand configuration. Almost 10% of responses failed to include a verb of location representing the SO, whilst some 7% used a handshape derived from the lexical sign TREE.

5.2.5.3 Locative components of position

For those verbs of motion with both an SO and CO marker, the locative components of position refer to the spatial locus of the handshape representing an SO referent with respect to the movement path of the handshape representing a CO referent.

The VMP task requires three types of position components. The first component, *initial*, refers to the fact that the CO handshape must begin its movement path in contact with, or in close proximity to, the SO handshape. For example, after participants watched the animated film showing a wreath falling down from above a fireplace, it was expected that they would produce the CO handshape on or slightly above the SO handshape, and then move the CO handshape down away from the SO handshape to represent the referent falling.

The second meaningful use of position is the *middle* locative component. This refers to the requirement that the CO handshape comes into contact with, or close proximity to, the SO handshape midway through its movement path. An example of *middle* was expected, for example, when participants watched an animated sequence in which a toy tricycle approaches a toy mail truck, and then turns to avoid it.

The third position component, *final*, refers to the requirement that the CO handshape must end its movement path in contact with, or in close proximity to, the SO handshape. After participants saw the film showing a cup jumping onto the head of a frog, for example, it was expected that they would produce a sign in which the CO handshape moves from a location in the signing space onto the SO handshape.

The results are shown in Table 5.17. They clearly indicate that, in the vast majority of cases, the Auslan signers in our sample produced locative components of position as expected, in patterns identical to those required for ASL. For *initial*, the results were almost entirely as anticipated (94.5%). Only 5.5% of responses did not include the appropriate meaningful use of location. This represents the number of responses that did not actually include an SO marker.

The percentage of Auslan responses identical to that described for ASL was slightly lower for *middle* (93.9%) than for *initial* use of location. Again, most of these responses that did not use a *middle* (6.1%) were those that did not include any verb of location representing the SO. In a small number of cases, however, the signer represented the relative locations of the referents in a different manner. After watching the film which shows a bed moving around a prone man, for example, one signer used his body to represent the man rather than a verb of location using a SO handshape. He then produced a verb of motion in which the CO handshape moved around his own head. In a number of other responses, the signer produced both a CO and an SO handshape, but ended the movement path when the CO came into contact with the SO handshape, rather than continuing to move it through the signing space.

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The percentage of responses in our Auslan sample that matched the ASL targets was slightly lower for the *final* components (91.9%) than for both the *initial* and *middle* components. As with these two categories, the majority of the responses that differed from the expected ASL responses did not have a verb with an SO marker. In some cases, as with the *middle* components, signers indicated spatial relationships between the SO and CO referents in some other way. In one case, a participant produced a verb with a *middle* position rather than a *final* position. Most of these unexpected responses were due to the use of role shifting. After watching the animated film in which a cup jumps onto the head of a toy frog, ten of the participants used their own bodies to represent the SO referent, and moved the CO handshape onto their own head.

Table 5.17

	Locative targets		Responses matching ASL target (%)
1.	*Initial*	12	94.5
2.	*Middle*	16	93.9
3.	*Final*	12	91.9
	Total number of locative components:	40	93.4%

5.2.5.4 Manner of movement components

As shown in Table 5.2 and Table 5.3 above, there are a limited number of target movement components elicited by the VMP task. The results have been summarized in Table 5.18 below.

Table 5.18

	Manner targets		Responses matching ASL target (%)
1.	*Linear*	16	94.9
2.	*Turn*	16	89.5
3.	*Random*	8	86.3
4.	*Pivot*	8	67.9
5.	*Bounce/jump*	18	95.9
6.	*Fall*	14	98
	Total number of manner components:	80	88.7

The *linear* manner of movement refers to a simple straight movement of the hand between two loci in the signing space. Almost 95% of responses used the *linear* component. Approximately 3% involved the use of a *turn*, *random*, or *pivot*, despite the fact that stimulus film in each case showed an object moving in a straight line from one location to another. The remaining 2% of responses involved a lexical sign rather than a polycomponential verb of motion.

The *turn* manner of movement refers to a movement of the hand in a straight line from one locus to a second locus, followed by a turn and subsequent movement towards a third locus in the signing space. Close to 90% of the responses used the *turn* component, but approximately 8% used a *random* manner of movement, and some 2% used a *linear*. In both cases, the Auslan signers seem to have disregarded the precise movement type shown in the elicitation film, and produced forms that moved in an irregular manner, or in a simple straight line.

The *random* manner of movement refers to a path movement between two loci in the signing space, with a repeated side-to-side or zigzagging motion as the hand moves from one locus to the next. Over 85% of responses used this component, but around 1% involved the use of a *linear* or a lexical sign. The remainder used the *pivot*, which some signers appear to accept as a possible alternative to the *random* component in some cases.

The *pivot* manner of movement refers to changes in the orientation of the finger and/or palm orientation of the hand, especially due to a pivoting movement at the wrist. Supalla et al. (in press) use it to refer to both a local pivoting movement while the hand is held stationary in space, and a combination of this local movement with a path movement from one locus to another. The elicitation of this movement component was the least successful of all, with less than 68% of responses using a verb of motion with this manner of movement. Almost 25% of responses involved the use of the lexical sign ROLL. The reasons for this are not clear. The remaining 7% used *linear, random*, or *turn* components.

The *bounce/jump* movement component refers either to a single upward arcing movement (without any change in orientation of the hand) between two loci in the signing space (*jump*), or a repeated upwards arcing movement (*bounce*) between two loci. Approximately 96% of responses used this manner of movement component, with almost 3% using a *linear* movement, and the remainder using either a lexical sign or verbs of motion incorporating a *fall, random*, or *pivot*.

The *fall* manner of movement component refers to a single downwards path movement from one locus to another with an accompanying change in orientation of the hand. There appear to be a number of ways to realize this component. Some signers moved the hand downward in a looping movement as the hand orientation changed, while others moved the hand down in an arc. Others added a number of small bouncing movements as the hand came to rest, even though the various falling objects in the stimulus films never actually fall in this manner. All of these suggest the falling motion seen in the video stimulus. Sometimes a signer may simply use an orientation change alone without a path movement. In this case, the hand may move from an orientation in which the tip of the fingers or side of the hand is oriented vertically to one in which the fingertips or hand is oriented horizontally. This manner component was used in 98% of responses, with most of the remainder being uses of the lexical sign FALL.

Overall, the results produced a 88.7% agreement with the ASL manner of movement targets, with a range of 78% to 96%.

5.2.5.5 Direction of movement components

The results of for the direction of movement are summarized in Table 5.19 below.

Table 5.19

	Direction targets		%
1.	*Backwards*	8	64
2.	*Uphill*	6	84
3.	*Downhill*	4	40
	Total number of direction components:	18	62.7

Any movement in which the handshape appeared to be moving in a backwards direction was coded as a *backwards* direction of movement, while any upwards or downwards movement was coded as an *uphill* or *downhill* direction component. Nevertheless, only *uphill* direction appeared consistently in the data, with the *backwards* component occurring relatively less often, and *downhill* being particularly infrequent.

Note that only those cases in which the polycomponential verb of motion was produced with a direction of movement component are included in these figures. In a very small number of cases, a signer produced a separate lexical sign which encoded the direction of movement, such as the Auslan sign BACKWARDS. The use of a separate sign to signal direction of movement was not coded as a "correct" response. In most cases, however, no separate direction sign was produced, and the signer simply produced a polycomponential verb of motion with a forwards or horizontal direction of movement.

Overall, the match between the Auslan responses and the ASL targets was somewhat low at only 62.7% The range of responses amongst the participants was also quite varied. The lowest score was 39%, and the highest was 89% agreement with the ASL targets. It is not clear why the overall score was so low and the range was so large, as the direction of movement of the referent in the stimulus films was, for the most part, quite clear. It may be that this was a feature of the motion event that was not particularly salient given the brevity of each animated film (most were only 2-3 seconds long), or that limitations of memory and attention mean that it was dropped due to the competing needs to focus on the shape or class of the central object and its manner of movement, as well as the shape or class of the secondary object, and its spatial relationship with the central object. Alternatively, this low figure may be an artifact of the manner in which the VMP task was administered. The same small portable television was used to show the VMP stimulus video to all participants. The screen in the portable television was comparatively small, and the television was placed on the top of a trolley. All participants responded while sitting down, and had to look slightly upwards towards the television monitor. The direction of the referent's movement may have been somewhat less salient on this smaller screen and from this angle, and the comparatively low score for direction components may reflect this. Alternatively, the ASL targets may reflect expected patterns of usage in spontaneous conversation, and may not be matched by actual usage in the context of this task (all participants had to respond to 40 short films in a single sitting and thus fatigue or failure to fully attend to the task may have adversely affected their attention to detail). As Supalla et al. (in press) have not made their normative data available, it is impossible to ascertain if the ASL targets are idealized or reflect actual performance among ASL signers on this task.

5.2.6 Discussion

5.2.6.1 Variation in handshape components in Auslan

The pattern of results from the VMP task show how little we understand the possible ways native signers of Auslan may represent various classes of referents in polycomponential verbs of motion. For some referent objects, a significant amount of variation in the choice of handshape appears possible[6]. In a small number of cases, this variation may be an artifact of the task design. Many of the stimulus objects shown in the VMP video materials were small, plastic toys rather than real people and animals. In some cases, the appearance of toys was highly stylized. For the animate category, the use of such toys may have influenced the tendency to select handshapes based on the particular size and shape characteristics of the referent objects, rather than the use of the more categorical 2legs or Gperson handshape. The latter might be favored in the description of real human and other animate referents, but this possible difference needs further investigation.

In most cases, however, the use of a particular handshape may be influenced by factors other than the VMP task design and materials. Individual, social, and regional variation appeared to play some role, for example. The use of the ASL 3edge handshape was more common amongst those participants who have experienced extended contact with ASL. Such individuals live in both Sydney and Melbourne, however, and thus it is not clear why the use of this handshape appears more frequently in the data we collected from signers from Sydney than in Melbourne. There appears to be some complex interplay between idiolect and regional dialect at work here.

As mentioned in Chapter 4, the choice of handshape may also be influenced by the type of movement being described (Supalla, 1990; Engberg-Pedersen, 1993), the signer's choice of perspective on the event (Brennan, 1992; Supalla et al., in press), or the potential for modification of an existing lexical sign (Kegl & Wilbur, 1976;

[6] Liddell (2000c) argued that handshape is not independent of the rest of the verb, but that signers select a verb most appropriate to the meaning being expressed. The verb selected will include a particular handshape, but the signer selects the verb, and not the handshape. For the purposes of this dissertation, however, I shall analyse these signs as if each of the components (including the handshape) is selected independently. This provisional analysis is not, however, intended to signal that I agree with Supalla's (1982) claim that all such components represent examples of morphemes.

Sutton-Spence & Woll, 1999). As has been reported for other signed languages, we have seen in the Auslan data that the movement type appears to influence the choice between the 2legs or Gperson handshape, and this may also be true of the other handshape categories. In some cases (e.g., *pivot*), the form of movement also appears important in the selection of a lexical sign rather than polycomponential verb of motion and location. The interplay between these influences is currently not well understood and requires further investigation.

5.2.6.2 Auslan and ASL target handshapes compared

I will now turn to comparing the results from the Auslan VMP study with descriptions of polycomponential verbs of motion and location in ASL. I shall focus here on comparing the use of the handshape components in both signed languages, because the use of locative and movement components seems to be virtually identical in Auslan and ASL.

Unfortunately, any such comparison can only be tentative at this stage. Although I have used the VMP task from *Test Battery for American Sign Language Morphology and Syntax* (Supalla et al., in press) in my research with Auslan signers in order to facilitate cross-linguistic comparison, the kind of detailed description of results obtained from similar research with ASL signers has not as yet become available. Some of the data collected from signing and non-signing populations is described in the research literature (Goldin-Meadow, McNeill & Singleton, 1996; Maller et al., 1999; Metlay & Supalla, 1995; Morford, Singleton & Goldin-Meadow, 1995; Newport, 1990; Padden & Ramsay, 1998; Singleton, Goldin-Meadow & McNeill, 1995; Supalla, 1982), but the normative data that serves as the foundation of the test design has not yet been published[7].

In this section, I summarize the comparison of the data from my sample of Auslan native signers to the target ASL responses given in the *Test Battery for American Sign Language Morphology and Syntax* manuscript (Supalla et al., in press) and outlined in Table 5.1 and Table 5.2 above, including the numerous acceptable alternative handshape components that are listed in the VMP materials. It should be noted that Supalla et al. do not claim to provide an exhaustive list of acceptable alternative hand configurations in ASL, so this comparison should only be seen as a starting point for further investigation.

Overall, we find that the Auslan signers used the target ASL handshape on 63.2% of all occasions for CO referents and 58.6% for SO referents. These figures are the mean of the results shown in Table 5.20 and Table 5.21 below. The overall mean would thus be 60.9% agreement between all target ASL handshapes and Auslan responses. The range was quite large: from 94.7% agreement for the airplane CO category to 11.3% for the tree CO category.

[7] This normative data is referred to, but not discussed, in Goldin-Meadow, McNeill, & Singleton (1996).

Table 5.20 presents the results for SASS referents. For the category of straight vertical objects, Supalla et al. (in press) list the Gvert as the target handshape, but also suggest that the Bvert (especially for the broom), the bC (for the floor lamp) and an Hvert, Hhoriz or the lexical sign ROLL (for the wooden bar) are acceptable alternatives. The pattern of expected results for ASL is thus 86% identical to the Auslan responses. In the SASS secondary objects, there were no alternative "correct" responses listed, resulting in 80.6% agreement with ASL targets.

Table 5.20: SASS COs

Referent class	ASL targets	CO % matching Auslan responses	SO % matching Auslan responses	Most frequent Auslan response	% of Auslan responses
Straight, vertical	Gvert (Bvert, bC, Hvert, Ghoriz)	86	80.6	Gvert	69.8
Straight, horizontal	Ghoriz (Plane, bC)	83.5	74	Ghoriz	73.2
Flat, narrow	Hflat	68.7	32	Ghoriz	40.5
Flat, wide	Bflat	68.7	75.5	Bflat	70.3
Circular	gC	34.5	40.8	F	34.4
Cylindrical	bC	65	84	bC	66.3

For straight horizontal COs, aside from the use of the target Ghoriz, the bC (for the log and roll of paper), the bO> (for the dart), the ILY (for the paper plane) and the R handshape (for the rocket) are all acceptable alternatives in ASL. This is also similar to the results from the research with Auslan signers, although I also find that many of my Australian participants use the Bflat specifically for the paper plane and the roll of paper. For both straight vertical and horizontal objects, however, it is not clear from the Supalla et al. (in press) materials if the use of a handshape from a tracing SASS construction in a verb of location is as acceptable in ASL as it appears to be in Auslan (although a tracing construction using a bC is listed as possible for the floor lamp and the roll of paper). Nevertheless, the match between ASL and Auslan responses is 83.5% for CO and 74% for SO referents.

The precise pattern of results for flat narrow and flat wide objects seems to be somewhat different in the two signed languages. Expressing distinctions between thin, narrow, and wide referents by means of the G, H, and B handshapes does not seem to be as grammaticized in Auslan as is reported for ASL (Supalla, 1982, 1986). For the flat narrow category, the use of an Hflat handshape seems to be somewhat rarer in Auslan than is the case for ASL. It occurs in less than a quarter of responses for CO referents, and only in a very small percentage of SO responses. Although the Bvert, Bflat, and Ghoriz are given as acceptable alternatives for some ASL responses, together these three hand configurations account for almost two-thirds of the Auslan responses for flat narrow objects. Overall, the match between Auslan responses and ASL targets is only 68.7% for the CO responses and 32% for the SO responses, considerably lower than what we see for the previous two categories. For flat wide objects, around 65% of the responses use some form of the target B handshape. The Ghoriz and a number of other handshapes (such as the Hflat, bO>, and bC>) are also used by a small number of signers, but they are not listed in Supalla et al. (in press) as a possible alternative handshape for ASL. Nevertheless, the overall match for this category is 68.7% for CO and 75.5% for SO referents.

A sizable number of responses for flat narrow and flat wide objects also use a polycomponential verb of location incorporating a handshape identical to the one used in lexical signs, such as RULER, BOOK, and BED. In earlier work, Supalla (1982: 107) claimed that these kinds of "unconventional" usage "violate the rules of ASL". It is not clear, however, what kind of relationship exists between the handshapes used to refer to the motion of plants and trees and those found in the ASL lexical signs PLANE and TREE, as the handshapes are identical in these cases. This is also the same in Auslan, where the most common handshape component used to refer to the motion of planes is the same as the handshape found in the lexical sign PLANE. In the Supalla et al. (in press) materials, however, the authors seem to suggest that this usage is sometimes acceptable (verbs of motion using the R handshape when describing the movement of rockets, for example, are listed as grammatically acceptable). It is thus not clear if constructions of this kind would actually be possible in ASL, but they are used relatively frequently in the Auslan data.

For circular objects, the target ASL responses and the patterns in the Auslan data also appear to differ. The F handshape is not listed as an acceptable alternative in the VMP materials at all, yet occurs in around a third of Auslan responses (most commonly for small, narrow circular objects, such as the loop and the washer). The bC is also common (and is also listed as an acceptable alternative in ASL for the wreath, ashtray and egg), while the main ASL target handshape gC is used in only approximately 20% of responses. The hC is given in as alternative handshape for ASL (specifically to describe the movement of the ashtray), but did not appear at all in my Auslan data. Other handshapes in the Auslan data included bO, 5, 5", and Bvert. The match between all acceptable ASL responses and the Auslan data is thus a low 34.5% for CO and 40.8% for SO referents.

The target handshape for cylindrical objects listed in Supalla et al. (in press) is the bC, but the 2legs handshape is also possible when referring to the falling cylinder. Like ASL, the vast majority of Auslan responses used the bC (and 2legs also occurred), but Ghoriz, Gvert, and bO were also used. Tracing SASS constructions using an F were common in the SO responses. Overall, the Auslan signers score a 65% for CO and 84% for SO responses match with the target ASL responses.

Overall, the mean across all six SASS CO referent categories was 67.7% agreement between the Auslan responses and ASL targets. For SASS SO referents, it was 64.5% agreement with ASL targets. This results in an overall mean for the SASS hand configurations of 66.1% agreement.

Table 5.21 below presents the results for semantic central objects. The 2legs handshape is the ASL target for the animate category, but Gperson and Ghoriz (especially for referring to the motion of the bee and turtle) are listed as alternatives. The 2legs and Gperson were, as in ASL, the most common hand configurations used by the Auslan signers, but it is not clear if the various other types of handshapes (such as those used for the hen, chicken, duck, and the bee) are possible in ASL. Many of these hand configurations appear to have been derived from lexical signs, while others appear to reflect some Auslan signers' preference for handshapes that reflect some aspect of the referent's size and shape. It is thus less clear in these cases that the choice of handshape is based solely on semantic characteristics, such as animacy. In particular, unlike previous claims for ASL (Supalla, 1982) and the TSL data discussed in the following section, there appears to be no single hand configuration for animal referents in Auslan. Nevertheless, the match between ASL target handshapes for animate referents and the Auslan data was 76.9% for CO and 44% for SO referents.

The ASL target for the vehicle category is the 3edge handshape, but the Bflat and Bedge are also possible (the Bedge is listed specifically for the tractor, tricycle, locomotive, motorcycle, and rescue truck; the Bflat for the pick-up truck, rescue truck, and jeep). Verbs of motion using either the Bedge or Bflat handshapes were by far the most common response in the Auslan data, but the Ghoriz was also common for smaller vehicles. A small number of Auslan signers also used the ASL 3edge handshape (although none used it exclusively). This produced an overall match of 42.4% for CO and 40% for SO referents.

Table 5.21: Semantic COs

Referent class	ASL targets	CO % matching Auslan responses	SO % matching Auslan responses	Most frequent Auslan response	% Auslan responses
Animate	2legs	76.9	44	2legs	44.5
Vehicle	3edge	42.4	40	Bedge	47.5
Airplane	ILY	94.7	90	Y	88.7
Tree	5+	11.3	25.3	Gvert	60.2

The demographic characteristics of those signers who used the ASL 3edge handshape are revealing. All examples of verbs using the ASL target, except for one from Melbourne, were found in data collected from signers who lived in the Sydney region. The signers who used this form tended to be younger (most were under the age of 35 years when the data was collected) and many had visited the North America as exchange students during their school years, had lived and worked there as an adult, or had long-term relationships with an American partner. In these cases, the borrowing appears to have occurred as a result of extensive language contact between users of the two languages. Not all of the signers who used the 3edge handshape fit this profile, however. Some of them had never studied or worked in North America. Indeed, informal observation of the use of this handshape in the Sydney deaf community suggests that it is used by some signers who have not had any extended contact with ASL users and who appear to be unaware of its status as a recent borrowing. It thus appears that the use of the ASL 3edge has spread out into the wider Sydney deaf community (and seems particularly common among some groups of younger signers)[8], although this usage may have begun with those who have had some prolonged contact with ASL, or with ASL signers now living in Sydney. The Australian Theatre of the Deaf, for example, is based in Sydney and has attracted a number of professional deaf actors from the United States of America, some of whom have remained in Australia, or have lived in the country for an extended period. The precise reasons for this borrowing of the 3edge handshape into Auslan are unknown, and this result of language contact between Auslan and ASL would benefit from further investigation.

The target ASL ILY handshape for the aircraft category is used by only a small percentage of the Auslan signers, with the Y handshape being used by the vast majority. It is possible that the ILY handshape is also a recent borrowing from ASL, but this question requires more research. It is equally possible that it exists alongside the Y handshape as an acceptable native variant. The Y hand configuration is not listed as an acceptable variant in the Supalla et al. (in press) test materials, but it is discussed in Supalla (1986), along with other regional ASL variants (see the illustration in Figure 5.1). It may be that both forms are acceptable variants in both signed languages, but the most widely used handshape in each community is different. If we include the Y handshape as an acceptable alternative in ASL, the results then show a very impressive 94.7% agreement for CO referents, and 90% for SO referents.

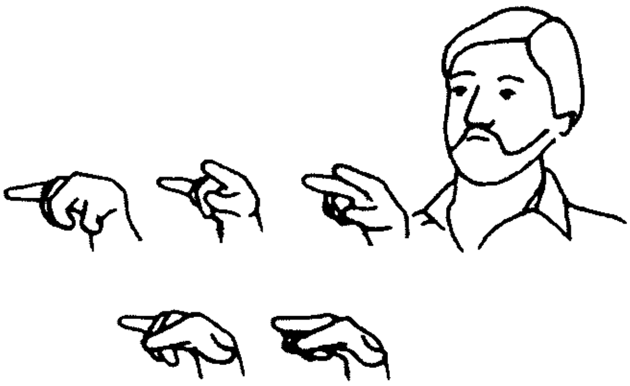

Figure 5.1

The latter may also be true for the handshapes used to represent the Tree category, although only the target ASL 5+ handshape is listed in Supalla et al. (in press) test battery materials. In Auslan, there is a strong preference for the Gvert or Gvert+ handshape, but the 5+ is used by a small number of signers in my data. Some signers claim that the 5+ handshape is, like the 3edge and ILY handshape, also a borrowing from ASL, but this claim has not yet been investigated. The 5+ handshape exists in BSL, for example, so its origin is not clear. Moreover, the 5+ handshape seems to be preferred when signers wish to show people or objects falling from a tree's branches (it is used in almost 50% of these occasions, while almost all of the remaining 50% of responses use a Ghoriz to represent a branch). It is not apparent from the Supalla et al. materials if the other handshapes used in my data (such as Bvert+) are also possible in ASL. Overall, the results indicate a very low 11.3% agreement for CO and 25.3% for SO referents.

Overall, the mean for all four semantic CO referents was 56.3% agreement between the Auslan responses and ASL targets. For semantic SO referents, it was 49.8% agreement with ASL targets. This results in an overall mean for the semantic handshapes of 53% agreement.

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[8] I have also seen it used by some (mostly younger, i.e., under 40 years of age) signers living outside Sydney,

Based on this data, it appears that the division between semantic and SASS handshapes is not as clear for Auslan as has been claimed for ASL. The most common handshapes used to refer to vehicles (B) and trees (Gvert) overlap with those used to describe the motion and location of flat wide objects and straight vertical objects respectively. The orientation of the B handshape (i.e., whether Bflat or Bedge is used) to describe the movement of vehicles, for example, seems partly motivated by the shape characteristics of the referent.

The tentative comparison between ASL and Auslan sketched here highlights the need for more detailed description of the possible variation in the choice of handshape used in ASL verbs of motion and location, as well as a necessity for ongoing work in this area on Auslan. Aside from work by Supalla and his colleagues (Supalla, 1986; Supalla et al., in press), there has been surprisingly little documentation of variation in this aspect of ASL productive morphology. Further cross-linguistic comparison between ASL and Auslan (and other signed languages) requires the sharing of materials, replication of research methods, and more detailed accounts of the use of these forms in each language.

5.3 Study 2: Polycomponential verbs of motion in TSL

Data was also obtained from a similar study carried out with a small number of Taiwanese Sign Language (TSL) signers. Based on descriptions of similar verbs in TSL by Smith (1989), I have assumed that the responses described below include examples of polycomponential verbs. The basis for this claim stems from the observation that the four deaf signers in the study appear to use combinations and re-combinations of handshape, locative and movement components that appear similar to what we see in the Auslan data and to what is described in the ASL literature. The methodology and results for this study are presented below and a comparison between Auslan, ASL and TSL is discussed in section 5.4.

5.3.1 Methodology: material, procedure, and participants

This study was conducted by the hearing American psychologist Susan Duncan and a hearing Taiwanese colleague who was a fluent user of TSL. The data was collected from four deaf signers in Taipei using a longer version of the VMP task, one containing 100 test items. For each participant, the entire VMP task was administered in a single sitting by Duncan and her hearing Taiwanese research assistant. All four participants were males who were considered to be fluent users of TSL. Two participants were native or near-native signers. One had deaf parents, while the other had a deaf sibling. The remaining two participants came from hearing families. Two of the participants were from the northern part of Taiwan island, while two were from the southern region.

particularly in Brisbane.

5.3.2 Results

The following section presents a summary of the subjects' responses for each of the 80 stimuli, describing the handshapes used for both the CO and SO, the use of locative components, and the manner of movement components. The TSL data is also compared to the data collected from Auslan signers. For this reason, I have often used percentages when describing the TSL data, but it is important to remember that the actual number of responses is much lower than what has been described for Auslan above.

These results were coded by myself, and 25% were transcribed independently by a deaf native signer, with 95.3% agreement overall.

5.3.2.1 Handshape components for central object (CO) in TSL

Straight vertical central objects in TSL

Overall, the TSL responses shown in Table 5.22 were broadly similar to those found in the Auslan data. Of 16 possible responses, 10 (62.5%) involved the use of the Gvert or Gvert+ handshape to refer to the floor lamp, bone, and wooden bar, while 3 (approximately 19%) used the Bvert handshape oriented fingers downwards to refer to the movement of the broom. These were also the two most frequently used handshapes in the Auslan responses. The use of a sign similar to the Auslan sign ROLL followed by a polycomponential verb with the H handshape was used by one signer for the wooden bar; and another signer used a similar verb sequence using the Bvert followed by the Gvert handshape to refer to the broom. One response used a two-handed construction (this consisted of a bO> handshape repeatedly opening while held on the fingertip of a Gvert handshape), which may be derived from a TSL lexical sign for LAMP.

Table 5.22: Straight vertical CO referents

(broom, floor lamp, bone, wooden bar)

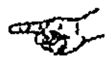
Gvert/Gvert+ 	62.5%
Bvert 	18.75%
PVM + Lexical sign	6.25%
Handshape change	6.25%
Lexical handshape?	6.25%

Straight horizontal central objects in TSL

The TSL signers used many of the same handshapes found in the Auslan data, and two quite different hand configurations (the I!Y and !). As can be seen in Table 5.23, fifteen (approximately 47%) of the responses from TSL signers involved the use of the Ghoriz handshape. Other handshape components included the use of the bC handshape specifically to describe the moving log (3 responses, or approximately 9.5%), the use of a Bflat (3 responses) for the pipe cleaner or Hflat handshape for the pencil (1 response); an I!Y handshape for the paper plane (3 responses); and the use of the ! handshape to refer to the rockets (2 responses). In the I!Y handshape, the thumb, middle finger, and pinky are extended to represent the wings and fuselage of the plane. This hand configuration has not been reported in Auslan, nor in ASL (Supalla, 1986). In the ! handshape, the middle finger alone is extended. Although this does not occur in our sample of Auslan data, the use of this particular hand configuration to refer to missiles and other straight horizontal objects has been observed in the Australian deaf community. It also occurred in other data collected from this group of signers to refer to a rocket (Schembri et al., in press). The other responses consisted of verbs using the 5> (2 responses), or the Yperson, 5" or the bO handshape (1 response each).

Table 5.23: Straight horizontal CO referents

(pipe cleaner, dart, missile, paper plane, roll of paper, q-tip, log, pencil)

Ghoriz 	47%
bC 	9.5%
Bflat 	9.5%
I!Y 	9.5%
! 	6.5%
5> 	6.5%
Hflat 	3%
Yperson 	3%
bO 	3%
5" 	3%

Flat narrow central objects in TSL

Unlike the verbs used to describe the previous two referent categories, most responses from the TSL signers (as in the Auslan data) did not use verbs incorporating the target Hflat handshape listed in the ASL materials (see

Table 5.24). More than one third (9 responses or approximately 37.5%) involved the use of a Bflat handshape, while only a third (8 responses or 33%) of the total responses used the target Hflat handshape. The next largest group were verbs that involved the Ghoriz or Gvert handshape (5 responses or approximately 21%). The Bflat was the most common handshape used in verbs describing the animation sequence showing a tail wing falling off an airplane and a wooden bar falling over, while the Hflat was used by most signers for the knife, band-aid and paintbrush. The remaining responses included a verb sequence first using the Hflat handshape and then changing to the Ghoriz (1 response), and the use of a double-handed gC handshape (1 response) to describe the movement of the ruler.

Table 5.24: Flat narrow CO referents

(ruler, wooden bar, tail wing, knife, band-aid, thin paintbrush)

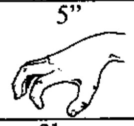
Bflat 	37.5%
Hflat 	33%
Ghoriz 	21%
gC 	4.25%
Handshape change	4.25%

Flat wide central objects in TSL

Overall, the responses were very similar to the Auslan data (see Table 5.25). Almost one-half of all responses used the Bflat handshape (11 responses, or approximately 46%). Major exceptions included the use of the bC handshape (especially to describe the moving bricks) (5 responses, or almost 21% of all responses); the use of two B handshapes held together derived from a lexical sign BOOK (around 8%) to represent the movement of the phonebook; a verb of motion using the Irish H handshape derived from a representation of a four-poster bed (around 8%); and the use of a 5" oriented palm downwards for the lawnmower (approximately 8%). The remaining two responses were one use of the 3Legs (for the lawnmower) and one in which the handshape began as a Bflat but changed to a Ghoriz (for the paintbrush), each making up just over 4% of the total.

Table 5.25: Flat wide CO referents

(moving brick, lawnmower, bed, phonebook, thick paintbrush, towel)

Bflat 	46%
bC 	21%
Lexical handshape: BOOK	>8%
Irish H 	>8%
5" 	>8%
3legs 	>4%
Handshape change	>4%

Circular central objects in TSL

In the data from TSL signers shown in Table 5.26, almost 44% (14 responses) of verbs involved the gC handshape (this represents a greater use of this handshape than is found in the Auslan data). The remaining responses were mixed. Over 9% (3 responses) involved the use of the gO handshape (especially for the loop and metal washer) and a similar percentage used the 5" (3 responses) to refer to the egg. Two signers used a double-handed 5" held together to represent the spherical shape of the egg (6%). Another two used an F for the metal washer (6%), and 2 used a B~ oriented palm upwards to show the movement of the ashtray (6%). The remainder of the elicited responses used a Bflat, a bO, a bC, an F<, or a sequence of a gC or F verb with a sign that resembled the Auslan sign ROLL.

Table 5.26: Circular CO referents

(small ring, wreath, ashtray, metal washer, tape, movie reel, egg)

gC 	44%
1h/ 2h 5" 	15%
gO 	9%
PVM + Lexical sign	8%
F 	6%
B~ 	6%
bC 	3%
F< 	3%
Bflat 	3%
bO 	3%

Cylindrical central objects in TSL

As can be seen in Table 5.27, approximately 60% (19) of all responses in the TSL data involved the target bC handshape (a response almost identical to what was found in the Auslan data). Another 28% used a form of the 5". This sometimes resembled a lax form of the bC handshape, and so it was not always clear if this should count as a separate hand configuration, or merely as a variant of the bC. The remaining responses were very few in number: one signer used an Aperson handshape for the falling cylinder, and another used a 2legs handshape to describe the jumping barrel. One signer used a B~ for the toilet, while another produced a two-handed form in which a bO represented the toilet bowl and a Bflat was placed on top for the lid.

Table 5.27: Cylindrical CO referents

(toy cylinder, barrel, toilet, cup, fire hydrant, soup can)

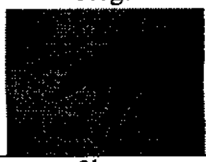
bC 	60%
5" 	28%
Aperson 	3%
2legs 	3%
B~ 	3%
bO + Bflat 	3%

Animate central objects in TSL

Table 5.28 illustrates that the two most important handshapes for representing the motion of human and animal referents in TSL were quite different from anything found in Auslan (or in ASL). Almost 32% (23) of total responses to these sequences used verbs with the Yperson handshape (used mainly for humans). Another 27% (19 responses) involved the use of the 3Legs handshape (most often for animal referents). There was considerable variation in the remaining responses. Around 10% (7 responses) used the 2legs handshape also found in Auslan and ASL, and just over 4% (3 responses) used the handshape from the lexical sign BIRD (to refer to the chicken and hen). Another 7% (5 responses) used an Aperson handshape (not found in the Auslan or ASL data) mainly to represent human referents. The remaining responses were very mixed, with signers using a 5", a bC>, a bO, a 5>, and a Ghoriz. A small number of responses involved the use of a verb sequence using the Yperson or 3Legs handshape with each other, or in combination with a sign resembling the Auslan sign ROLL.

Table 5.28: Animate CO referents

(toy men, women, baby, robot, chicken, duck, dog, rabbit, turtle, bee)

Yperson 	32%
3legs 	27%
2legs 	10%
Aperson 	7%
gO> 	4%
Ghoriz 	3%
bO 	3%
5" 	3%
bC> 	3%
5> 	3%
PVM + PVM	2.5%
PVM + Lexical sign	2.5%

Vehicle central objects in TSL

As can be seen in Table 5.29, exactly 50% (n = 20) of all responses used a bC>, while only 25% (n = 10) used a Bedge. Thus, the most common handshape used here is a configuration not found in Auslan or ASL. This was also true of another handshape used by the TSL signers: the gC oriented palm downwards was often used to represent the motion of bicycles and motorbikes (n = 6). One of the most common Auslan handshapes used to describe the movement of vehicles, the Bflat with the palm oriented downwards, does not appear in the TSL data at all. The only other handshape found in the TSL data was the B~ used by all four signers to describe the motion of the tugboat (another hand configuration that does not occur in the Auslan data).

Table 5.29: Vehicle CO referents

(toy car, truck, tractor, tricycle, motorcycle, train, boat)

bC> 	50%
Bedge 	25%
gC 	15%
B~ 	10%

Airplane central objects in TSL

The results for the airplane category were extremely homogenous (shown in Table 5.30). Exactly 92% (n = 22) of all responses used the I!Y handshape (the same handshape found in the TSL lexical sign AIRPLANE), while only 8% (n = 2) used a Vthumb hand configuration (the V handshape produced with the fingers forward and palm down, and with the thumb held between the two fingers). Both of these handshapes were not seen in either the Auslan or ASL data. The Vthumb handshape was only used by one participant, and its status and meaning are unclear. It did not appear to be derived from any lexical sign, and its use did not seem to be motivated by any of the shape characteristics of the planes shown in the stimulus film.

Table 5.30: Airplane CO referents

(toy car, truck, tractor, tricycle, motorcycle, train, boat)

I!Y 	92%
Vthumb	8%

Tree central objects in TSL

As for all the other semantic COs, the results for this category also included a handshape unique to the TSL data. Table 5.31 below shows that the 8Tree handshape was found in almost 80% (n = 19) of all responses (this handshape appears to be the same used in the TSL lexical signs TREE and VEGETABLE). It was used for all types of movement. A smaller number of responses used either the bC handshape (n = 2) or the Gvert (n = 2), with one response involving a sequence of verbs using first the 8Tree and then the Bvert handshapes.

Table 5.31: Tree CO referents

(toy cactus, evergreen, palm tree, leafy tree)

8Tree 	80%
Gvert 	8.5%
bC 	8.5%
PMV + PMV	3%

5.3.2.2 Handshape components for secondary object (SO) in TSL

Straight vertical secondary objects in TSL

Like the straight vertical COs, half (50%) of all responses involved the use of the Gvert handshape (n = 6), with smaller numbers of the bO handshape (n = 2) and 8Tree handshapes (n = 2). The latter may have occurred because the red pole and yellow poles shown in the stimulus film were mistaken for types of tree. One signer used an F to stand for a pole, while another signer failed to represent the secondary object by means of a handshape.

Straight horizontal secondary objects in TSL

The responses were evenly divided between the use of a Ghoriz (n = 2) or a ! handshape (n = 2) for the rocket. Two signers used a gC> for the wooden bar while the two other participants failed to represent the secondary object.

Flat narrow secondary objects in TSL

Three responses used an Hflat handshape, and three used a gC>. One signer used a Bflat to refer to the ruler, and another used a Ghoriz for the swing bar.

Flat wide secondary objects in TSL

Almost 30% of responses involved the use of a Bflat handshape (n = 7), used especially to describe the location of the box and table. All signers used a bC> for the brick (n = 4), and a bC was also used by most signers for the book and also for box and fireplace (n = 5). All four signers used an IrishH handshape for the bed. There was one use each of the gC and Ghoriz, with two signers not representing the secondary object with any handshape.

Circular secondary objects in TSL

Around 35% used the bC handshape (n = 7), while another 30% used the gC (n = 6). Four responses involved the use of an F (mostly for the metal washer), while there was one response each using the gO and bO handshapes. One signer did not respond using a hand configuration to represent the secondary object.

Cylindrical secondary objects in TSL

Almost 71% of all responses used a bC handshape (n = 17). Two signers used a Bvert to represent the silo, and three signers used an F or F< for the roll of tape (through which a rolled up tube of paper passes). One signer used a gC handshape for the tape roll, while another used a 5> for the stump.

Animate secondary objects in TSL

Almost half of all responses involved the use of a Yperson handshape (n = 9), while another five signers used a 3Legs to refer to the frog, dog, or zebra. Three signers represented the frog's head with a bO>. There was one instance of the 2legs handshape, another of a verb sequence involving first the 3Legs followed by the Yperson, and one use of an ILY handshape (the participant explained that this was a variant of the 3Legs configuration and represented an animal on its hind legs).

Vehicle secondary objects in TSL

Unlike the central object responses for vehicles, the use of a Bedge (n = 7) was more common here than the use of the bC> (n = 3). The gC oriented downwards was used by two signers.

Airplane secondary objects in TSL

A total of seven responses used the I!Y handshape, and one signer used a Bflat to represent the stationary plane.

Tree secondary objects in TSL

Over 87% of all responses (n = 21) used the 8Tree handshape, but one signer used the ASL 5+ handshape and another used a Gvert. To describe a person falling from a tree, one signer used a variant of the 8Tree handshape in which the middle and ring finger were held flat.

5.3.2.3 Locative components of position

The TSL results are summarized in Table 5.32. They clearly indicate that, in the vast majority of cases, the TSL signers in the sample produced locative components of position as expected, in patterns identical to those described above for Auslan and ASL. Indeed, the total score for the TSL responses was 92.9% agreement with the ASL targets, compared to 93.4% for Auslan. As with the Auslan data, there was a tendency to include *initial* contact between the two handshapes most often, and *final* contact the least often. Thus, it seems clear that all three signed languages use the spatial relationships that are possible between handshape components in an almost identical manner.

Table 5.32

	Locative targets		TSL responses matching ASL target (%)
1.	*Initial*	12	95.8
2.	*Middle*	16	95.3
3.	*Final*	12	87.5
	Total number of locative components:	40	92.9%

5.3.2.4 Manner of movement components

The TSL results are summarized in Table 5.34. If we compare Table 5.34 to the Auslan results in Table 5.18, the use of movement components in both signed languages appears to be very similar. The TSL percentages for the *linear*, *random*, *bounce/jump* and *fall* manners of movement very much resemble both the Auslan results (the Auslan percentages are 94.9%, 86.3%, 95.9 and 98% respectively) and the ASL targets suggested for the VMP by Supalla et al. (in press). The use of the *turn* manner of movement seems to be a little less consistent amongst the TSL signers than is found in the Auslan data (78% versus 89.5%), and the use of *pivot* somewhat higher (75% compared to 67.9%). In the former case, the TSL signers showed a slight tendency to use the *random* manner of movement more often in response to a turning stimulus. In the latter case, the Auslan signers seem significantly more likely to use a lexical sign ROLL to refer to pivoting stimuli. The overall result for the TSL data is, however, an 87% match with the ASL targets, compared to 88.7% for the Auslan signers. Given that TSL has no historical connection with either Auslan or ASL, and that ASL and Auslan only have a remote genetic relationship, the similarity of the overall results for the three languages is striking.

Table 5.34

	Manner targets		Responses matching ASL target (%)
1.	*Linear*	16	96.8%
2.	*Turn*	16	78%
3.	*Random*	8	84%
4.	*Pivot*	8	75%
5.	*Bounce/jump*	18	91.7%
6.	*Fall*	14	96.4%
	Total number of manner components:	80	87%

5.3.2.5 Direction of movement components

The use of the direction of movement components for the TSL data is shown in Table 5.35. The results are similar to the responses from the Auslan signers (Table 5.19). As with the Auslan responses, the use of *uphill* appears to be the most consistent, although considerably lower than the Auslan percentage at 84%. This may be the result of the lower number of participants in the TSL study, as one subject's performance was particularly poor and this lowered the mean result considerably. The results for *backwards* and *downhill* are, however, almost identical (the Auslan results were 64% and 40% respectively). The overall score of 58.7% is very similar (62.7%). The slightly lower score for the TSL signers may reflect the inclusion of non-native signers, or perhaps may be an artifact of differences in task administration (the Auslan signers responded to only 80 task items in two separate sessions, while the TSL participants responded to the entire VMP in a single sitting). The relatively low results from both the Australian and Taiwanese participants suggests that signers who use both Auslan and TSL may be less consistent in their representation of direction of movement than their American cousins, or it may mean that the ASL target scores are set unrealistically high. Alternatively, these low scores may be the result of the particular approach taken by both groups to the administration of this task, as suggested above.

Table 5.35

	Direction targets		Responses matching ASL target (%)
1.	*Backwards*	8	65.6
2.	*Uphill*	6	66.7
3.	*Downhill*	4	43.8
	Total number of direction components:	18	58.7%

5.3.3 Discussion

5.3.3.1 The Taiwanese data

Overall, the results from the TSL data provide an interesting set of data for crosslinguistic comparison. It is important to remember, however, that this data has a number of shortcomings. First, it is only from four deaf signers, of whom only two were native signers. Second, a hearing experimenter collected this data from the deaf informants. It is not clear how, or if, the data may have been different if a deaf native signer had been used. Certainly the range of handshape components that are used here conform to those presented in previous descriptions of the language (Smith, 1989). Third, after the signer's initial response to one of the stimulus clips, the hearing elicitor also often asked questions of the informants, especially to see if they accepted an alternative response produced by another informant. Sometimes in response to these questions, the signer would produce alternative polycomponential verbs of location and motion to describe a particular motion event seen in the stimulus film. I have not included these alternative responses here, as it would have produced results that could not be compared with the data from the Auslan signers, from whom only an initial response was elicited. I have thus only coded the participant's initial, unsolicited responses to the VMP stimuli. These are directly comparable with the Auslan data, as the elicitor used in the Australian study never sought grammaticality judgments from these participants[9].

5.3.3.2 Auslan, ASL and TSL target handshapes compared

I will now turn to comparing the results from the TSL VMP study with descriptions of polycomponential verbs of motion and location in both ASL and Auslan. I shall focus here on comparing the use of the handshape components in these three signed languages, because the use of locative and movement components seems to be extremely similar in Auslan, ASL and TSL.

9 I plan in future work to seek out grammaticality judgements from deaf native signers about the Auslan data discussed here, but this has not been carried out for this study.

Table 5.36 outlines the percentage agreement with ASL targets for each CO and SO category in TSL and Auslan, but I will not discuss each in detail here. Overall, we find that the TSL signers used the target ASL handshape on 39.4% of all occasions for CO referents and 32.4% for SO referents. The overall mean would thus be 35.9% agreement between all target ASL handshapes and TSL responses, compared to an Auslan mean of 60.9% agreement. The range is, however, extremely large, with a 93.7% match for the straight vertical CO category, and a zero match for airplane and tree CO and tree SO referents.

Thus, there is much less similarity between the ASL and TSL responses than what is seen between ASL and Auslan. Indeed, for some categories there is no overlap whatsoever. The greatest difference between ASL and TSL appears to be in the semantic handshapes. The result for the TSL data is a mean of 68% for SASS CO and 52.2% for SASS SO referents, producing a SASS mean of 60.1%. This is similar to the Auslan mean result of 66.1%. For semantic CO and SO referents, however, the mean results are 10.9% and 12.7% respectively, producing an overall mean of 11.8%. This is much lower than the equivalent Auslan result of 53%.

Table 5.36 ASL, Auslan, and TSL compared: Overall SASS results

Referent class	ASL targets	CO % matching Auslan responses	SO % matching Auslan responses	CO % matching TSL responses	SO % matching TSL responses
STRAIGHT, VERTICAL	Gvert (Bvert, bC, Hvert, Ghoriz)	86	80.6	93.7	50
STRAIGHT, HORIZONTAL	Ghoriz (Plane, bC)	83.5	74	56.2	50
FLAT, NARROW	Hflat	68.7	32	91.7	37.5
FLAT, WIDE	Bflat	68.7	75.5	54.2	29.2
CIRCULAR	gC	34.5	40.8	53.1	55
CYLINDRICAL	bC	65	84	59.4	91.7
ANIMATE	2legs	76.9	44	11.1	5
VEHICLE	3edge	42.4	40	32.5	33.3
AIRPLANE	ILY	94.7	90	0	12.5
TREE	5+	11.3	25.3	0	0%

Overall, we can see in Table 5.37 below that the SASS handshapes appear to be similar across all three languages, whilst the semantic handshapes differ. For the SASS category, the most common TSL responses and the ASL targets appear to be identical for each referent class, while the most common Auslan responses for flat narrow objects and circular objects are different from those in the TSL data and the ASL targets. Note too that, although the most important handshape for the straight vertical, straight horizontal, flat wide, and cylindrical referents are the same in Auslan and TSL, the percentage figures are substantially lower in the TSL data. It is only for the cylindrical object subcategory that we find the most important handshape component in more than fifty percent of the TSL responses.

For the semantic handshapes, however, we find greater divergence between the three signed languages in terms of the hand configurations used. For all four categories of semantic handshapes, the most frequent hand configurations in the TSL data are not only different from Auslan and ASL, but do not appear at all in previous descriptions of these languages. These have not been reported as handshapes in ASL polycomponential verbs of motion or location (McDonald, 1982; Schick, 1987; Supalla, 1982; 1986) and do not appear at all in the Auslan data. The Yperson handshape for animate referents has been reported for Hong Kong Sign Language (Tang, 2000) and Thai Sign Language (Collins-Ahlgren, 1990), but the handshapes used by the TSL signers for vehicles, trees, and planes do not appear in these descriptions of these other signed languages from east and south east Asia.

Table 5.37 ASL, Auslan, and TSL compared: Most frequent responses

Referent class	*ASL target*	*Most frequent Auslan response*	*% Auslan responses*	*Most frequent TSL response*	*% TSL responses*
STRAIGHT, VERTICAL	Gvert	Gvert	69.8	Gvert	45.7
STRAIGHT, HORIZONTAL	Ghoriz	Ghoriz	73.2	Ghoriz	44.7
FLAT, NARROW	Hflat	Ghoriz	40.5	Hflat	34.4
FLAT, WIDE	Bflat	Bflat	70.3	Bflat	39
CIRCULAR	gC	bC	34.4	gC	39.2
CYLINDRICAL	bC	bC	66.3	bC	64.3
ANIMATE	2legs	2legs	44.5	Yperson	34.8
VEHICLE	3edge	Bedge	47.5	bC>	44.2
AIRPLANE	ILY	Y	88.7	I!Y	90.6
TREE	5+	G	60.2	8Tree	90.9

Overall, we see that the semantic hand configurations used in all three signed languages are the most significant source of difference, while the use of SASS handshape, location and movement components is extremely similar. The implications of this similarity in the use of location and movement in all three signed languages for our understanding of polycomponential verbs of motion will be discussed below. In the final section of this chapter, however, I shall now present the results of the VMP study with hearing non-signers.

5.4 Study 3: Representing motion events in gesture

In the following section, the VMP video material was used to elicit gestural representations of objects in motion from a group of hearing adults who knew no signed language. Studies of both adult and child hearing non-signers using the Supalla et al. (in press) VMP materials have been previously reported in the literature (Morford, Singleton & Goldin-Meadow, 1995; Singleton, Goldin-Meadow & McNeill, 1995). In the Morford, Singleton & Goldin-Meadow (1995) study, hearing child non-signers were compared with deaf children who were native signers of ASL or who were users of a home sign system. In the Singleton, Goldin-Meadow & McNeill (1995) study, gesture was elicited from hearing adult non-signers under two conditions. First, the participants watched the VMP video and were asked to describe what they had seen in spoken English, and the researchers analyzed the representation of objects in motion in the participants' co-verbal gesture. Second, the same participants were asked to watch the VMP video again, and represent the same information in gesture only, without the accompaniment of speech. In this section, however, I take a new approach, comparing hearing adult non-signers with deaf adult native signers and analyzing the data collected from both groups using the same coding system.

5.4.1 Methodology: material, procedure, and participants

This study was carried out with ten hearing Australian adults, all of whom were non-signers. The data was collected at Renwick College in Sydney using a shorter version of the VMP task, one containing only the first 40 test items. The author administered the entire set of 40 items from the VMP task in a single sitting. Participants watched the stimulus video and were asked to represent what they had seen in gesture, without the use of spoken English. Nine participants were employees of the Royal Institute for Deaf and Blind Children (RIDBC) in Sydney and were recruited via electronic mail messages in the workplace. One participant was the partner of an RIDBC employee. None of the participants had any knowledge of a signed language, and none had attended any Auslan classes. Most worked in the Vision Education department at the RIDBC which is involved with the education of children who are blind or visually impaired, and thus they had no contact with signing deaf children or adults as part of their work. Moreover, none of them had any signing deaf family or friends. Nine of the participants were female, with only one male participant. The mean age of the group was 42.3 years old, with participants ranging in age from 32 to 53 years old. All participants were native speakers of Australian English, and all except one had some form of undergraduate or postgraduate university qualification.

5.4.2 Results

The following section presents a summary of the participants' responses for each of the 40 stimuli, describing the handshapes used for both the CO and SO, the use of locative gestures, and the manner of movement gestures. The gesture data is also compared to the data collected for the first 40 stimulus items (i.e., not the overall results for the 80 items described above) from Auslan and TSL signers in Tables 5.38 to 5.47.

These results were coded by myself, and 10% were transcribed independently by a deaf native signer, with 90.5% agreement overall.

5.4.2.1 Handshape components for central object (CO) in gesture

The sections below present the results for the CO referents in detail, with a table summarizing results for the gesturers and the signers. For the SO responses, the responses are very few, so only a brief overview of the data is given.

Straight vertical central objects in gesture

Of the 40 stimulus items, only one video clip showed a straight vertical CO, so the total number of responses (n=10) for this category is very small. The results are presented in Table 5.38 below. The object shown in the clip was a broom, so 4 participants included in their response a gesture using a 2 handed S handshape with the hands held one above the other to represent a sweeping motion. These respondents then used the same hand arrangement to represent the random motion of the broom. Another 4 participants represented the broom using a Gvert handshape with the fingertip pointing directly downwards. One responded using an Hvert hand configuration and another with the whole forearm and the hand held in a Bvert handshape.

Overall, the type of hand configurations used by the gesturers is similar to what we see in the Auslan data. If we ignore differences in orientation, 90% of the handshapes used in the gesture responses were the same as what we see in the signed language data. Both the Auslan signers and gesturers made use of 4 different hand configurations in total, while the TSL signers used only 2 types of hand configuration. Interestingly, two native Auslan signers used a verb of motion form derived from the sign BROOM in a manner not unlike what we see in the non-signers here. Two Auslan signers also used a Gvert handshape (although oriented with the fingertip upwards and not downwards like the non-signers). The most common response in both the Auslan and TSL data was, however, some use of the Bvert handshape (60% and 75% respectively), although it was never used together with the forearm as we see in the gesture data.

Table 5.38: Straight vertical CO referents

(broom)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Bvert	15 (60%)	Bvert	3 (75%)	2h S 'sweep' gesture 	4 (40%0
Gvert	5 (20%)	Bvert+ Gvert	1 (25%)	Gvert 	4 (40%)
Lexical: BROOM	2 (8%)			Hvert 	1 (10%)
Bvert> Gvert	2 (8%)			B+ 	1 (10%0
Lexical SE: BROOM	1 (4%)				

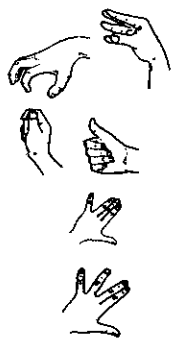
Straight horizontal central objects in gesture

The first 40 stimulus items shown included five video clips with referents in the straight horizontal objects category (a pipe-cleaner, dart, toy missile, paper plane, and roll of paper). The hand configurations for the range of objects were very diverse, as can be seen in Table 5.39 below. Of the 50 responses, 19 (38%) involved the use of a Ghoriz handshape (especially for the pipe-cleaner and dart). This was the most common response, followed by the Bflat handshape (especially for the missile and paper plane) used in 8 (16%) responses. The Hflat (for the paper plane) was used in 4 responses (8%). The following handshapes occurred in 3 (6%) responses each (with the most likely stimulus object following in parentheses): gO> (for the dart), F (for the roll of paper), bO (for the roll of paper), and bO> (for the missile). The remaining handshapes included the 5" (for the roll of paper), a 5>

(for the paper plane), a T (for the missile), and an Athumb (an A hand configuration with thumb extended) for the roll of paper. In some cases, it was difficult to understand if there was any visual motivation for the choice of these hand configurations. In other cases, attempts to reproduce some aspect of the shape of the referent object resulted in the use of handshapes not seen in the signed language data so far described. These included the use of a B handshape with the pinky and thumb pressed into the palm behind the other fingers in an apparent attempt to represent the curved roll of paper (the B1/5>); a handshape resembling the Hflat but with all the other fingers spread for the paper plane (the H1/4/5); and a mime involving the whole body with the arms held together above the head to form a kind of missile shape.

Table 5.39: Straight horizontal CO referents

(pipe cleaner, dart, missile, paper plane, roll of paper)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Ghoriz	90 (75%)	Ghoriz	8 (40%)	Ghoriz 	19 (38%)
FA: 2legs	11 (>9%)	Bflat	3 (15%)	Bflat 	8 (16%)
Bflat	9 (7.5%)	!!Y	3 (15%)	Hflat 	4 (8%)
Y	5 (>4%)	!	2 (10%)	gO> 	3 (6%)
bO>, Hflat	2 each (<2% each)	Yperson , bO>, 5", 5>	1 each (5% each)	F 	3 (6%)
bO, R, ILY, Lexical: ROCKET	1 each (<1% each)			bO 	3 (6%)
Ghoriz>Y Ghoriz>B flat	1 each (<1% each)			bO> 	3 (6%)
				5", 5>, T, Athumb, B1/5>, H1/4/5, mime 	1 each (2% each)

Compared with the type of handshapes used in the equivalent Auslan and TSL responses, the variety of hand configurations and other articulators used by the gesturers (n = 14) is greater than both TSL (n = 8) and Auslan (n = 10), but some of the choices were similar. In fact, fully 78% of the hand configurations used by the gesturers also occurred in the signed language data. The most common configuration was the same in all three groups. Many of the other handshapes were also used by both groups of deaf signers, although some of the gesturer's choices (such as the F, T, Athumb, and the B1/5> and H1/4/5 described above) never appeared.

Flat narrow central objects in gesture

The items shown to the participants included three video clips with referents in this category (a ruler, a wooden bar, and a tail wing of a toy plane). Almost half of the responses (n = 14) involved the use of a Bflat or B+ handshape (47%), with a further 6 (20%) using a Ghoriz hand configuration (see Table 5.40). All responses to the wooden bar clip used a Bflat or B+ while the Ghoriz was most common for the tail wing. Four responses used a bC (13%) while 3 involved the gC handshape (10%). Most of these involved the use of two-handed symmetrical handshapes used to describe the motion of the ruler (using the same handshape as had been used to trace the shape of the referent). Each of the following hand configurations involved a single response: a two-handed symmetrical bO> (for the ruler) as if handling a flat object, an Hflat (for the tail wing) and a G handshape pointing gesture (used to indicate the path of the tail wing falling off the back of the plane).

The overall pattern in the gesture results was very similar to what was found for the Auslan and TSL signers. The number of hand configurations used by the gesturers (n = 7) was similar to what was seen in the Auslan data (n = 8), while the figure for TSL was quite low (n = 3). Overall, some 93% of the gesture responses were also seen in the signed language data. In both the gesturers and the signers, the most common response involved some use of the Bflat handshape. In both gesturers and signers, the use of the Ghoriz handshape was the next most common response. Also in both groups, results for the ruler were different from those for the wooden bar and tail wing. Nine out of the 25 responses in the Auslan data used a two-handed gC or bC> handshape based on a sign which traced the rectangular shape of the ruler, and one of the four TSL signers did likewise.

The use of the Hflat handshape was quite common in the Auslan data, but did not appear in response to these stimuli in the TSL data and occurs in only one response in the gesture study. Overall, the types of handshapes in the Auslan data and gesturers are also similar, although there appears to be a little less variety in the TSL responses.

Table 5.40: Flat narrow CO referents

(ruler, wooden bar, tail wing)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Bflat	25 (>33%)	Bflat	8 (66.7%)	Bflat 	14 (47%)
Hflat	20 (>26%)	Ghoriz	3 (25%)	Ghoriz 	6 (20%)
gC	11 (<15%)	gC	1 (8.3%)	bC 	4 (13%)
Ghoriz	11 (<15%)			gC 	3 (10%)
bC>	3 (4%)			bO> 	1 (>3%)
Bflat > Ghorix	1 (>1%)			Hflat 	1 (>3%)
Lex: MOVE Lex: FORWARD 2legs	1 each (>1% each) 1 (>1%)			Point	1 (>3%)

Flat wide central objects in gesture

The 40 stimulus items included four video clips with referents in the flat wide object category (a towel, bed, lawnmower, and phonebook). As shown in Table 5.41, the most frequent response involved a Bflat hand configuration (n = 14, or 35%), followed by some use of the S handshape (n = 8, or 20%). In 3 of the S responses, the hand was held with fingers away and palm down and used as a kind of representation of the whole entity; in the remaining 5, the hand configuration represented the holding of some object (such as the towel or lawnmower) that was used to signal its motion. A two-handed B based on the initial hand arrangement in a gesture similar to the sign BOOK occurred in 6 of the responses (15%) in which the motion of a book was represented, and some use of the gC was found in 3 (7.5%).

The following involved a single response each: a T handshape used to represent holding the towel; a 5 palm downwards with the fingers wriggling; and a B held palm downwards with a 5 handshape palm downwards held on top, with the fingers dangling over the edge of the B (the latter two seemed to be an attempt to represent the surface and tassels of the towel); a bC oriented palm downwards: a Ghoriz and Hflat palm downwards for the lawnmower; and two B handshapes arranged into a shape similar to the two-handed manual alphabet sign for the letter 'Z' apparently in an attempt to represent the shape of a bed.

Table 5.41: Flat wide CO referents

(moving brick, lawnmower, bed, phonebook)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Bflat	70 (70%)	Bflat	10 (62.5%)	Bflat 	14 (35%)
Ghoriz	11 (11%)	Irish H	2 (12.5%)	S 	8 (20%)
Lexical: BOOK	8 (8%)	5"	2 (12.5%)	'Book' gesture 	6 (15%)
Irish H	4 (4%)	3legs, bC	1 each (6.25% each)	gC 	3 (7.5%)
bC	3 (3%)			bC, Ghoriz, Hflat, T, Z, 5, 5+Bflat 	1 each (2.5% each)
Bflat> Ghoriz	2 (2%)				
NVR	2 (2%)				

Overall, the range of hand configuration types and combinations used by the non-signers (n = 11) is considerably higher than that found in the Auslan (n = 5) and TSL (n = 5) data. In 55% of the gesture responses, the choice of handshapes in the data sets from signers and gesturers are the same. In both groups, the Bflat or Bvert handshape is used most frequently (70% of the Auslan data and over 62% of the TSL data). Like the gesture data, the bC and Ghoriz are used by a small number of signers, as is the hand arrangement found in the sign BOOK. Nevertheless, some of the handshape combinations in the gesture responses to represent the shape characteristics of the towel and bed are notably absent from the signed language data.

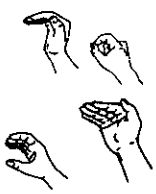
Circular central objects in gesture

The first 40 stimulus items included five video clips with referents in this category (a loop, wreath, ashtray, and metal washer). The most frequent handshape that appears in the gesture data is the F (n = 29) which, as can be seen in Table 5.42, appears in 58% of responses (most commonly used for the metal washer and loop). The next most frequent (n = 7, or 14 %) are some use of the gC, and the bC (n = 5, or 10%) to represent the ashtray. There were also 3 responses each for the bO and 5" (6% each). The latter was used by some gesturers to represent the wreath. One gesturer used the gO and another a B~ for the wreath. Lastly, one gesturer surrounded a bC with a B> in an awkward two-handed arrangement to represent the circular shape of the ashtray.

Overall, the types of handshapes used by the gesturers (n = 8) were comparable to what was found in the Auslan (n = 9) and TSL data (n = 8). The general pattern in handshape use was also remarkably similar in both Auslan and the gesture data, with 96% of gesture hand configurations also appearing in the signed language data. In both Auslan and gesture data, the largest number of responses involved the F handshape (53%). The gC and bC were also second and third respectively in frequency for both groups. There were also similarities in the use of the bO, 5", and B handshape. In TSL, the F handshape appeared less often, and the gC is the most common (n = 12, or 75%), followed by gO (n = 3), F (n = 2) and B~ (n = 2).

Table 5.42: Circular CO referents

(small ring, wreath, ashtray, metal washer)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
F	66 (53%)	gC	9 (45%)	F 	29 (58%)
gC	23 (18%)	gO	3 (15%)	gC 	7 (14%)
bC	21 (17%)	F	2 (10%)	bC 	5 (10%)
Bflat	4 (>3%)	B~	2 (10%)	5" 	3 (6%)
5", 2legs	3 each (>2% each)	bC, bO, Bflat, 5"	1 each (5% each)	bO 	3 (6%)
Point, bO	2 each (<1% each			B~, gO, bC+B> 	1 each (2% each)
gC> Ghoriz	1 (<1%)				

Cylindrical central objects in gesture

The stimulus items shown to the participants included four video clips with referents in the cylindrical objects category (a cylinder, barrel, toilet, and cup). The responses in this group were quite varied, with a number of different hand configurations obtaining similar levels of frequency (see Table 5.43 below). The most common handshape was some form of the bC (n = 9, or 22.5%) either a one-handed or two-handed form, followed by a gC (n = 8, or 20%), and gestural representations of a cup using an F or gO> handshape as if holding the handle of a teacup (n = 6, or 15%). The first two forms were distributed evenly between the responses for each referent, but the handling form was used only in representations of the cup. Five responses involved a bO (for the barrel and cylinder), 4 used an F (mostly for the cylinder), and 3 used an S hand configuration. A Ghoriz was used in two responses. Both the Bflat and T configurations appeared in only one response each, and one participant wrapped a bC handshape around a bO to represent the barrel.

Table 5.43: Cylindrical CO referents

(toy cylinder, barrel, toilet, cup)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
bC	68 (68%)	bC	8 (50%)	bC 	9 (22.5%)
Ghoriz	8 (8%)	5"	4 (25%)	gC 	8 (20%)
bO	7 (7%)	Aperson, 2legs, B~, B>+bO	1 each (6.25% each)	F/gO>  	6 (15%)
F	4 (4%)			bO 	5 (12.5%)
2legs	3 (3%)			F 	4 (10%)
5", Bflat	2 each (2% each)			S 	3 (7.5%)
Hflat, Lexical: TEA-CUP, lexical: MOVE	1 each (1% each)			Ghoriz 	2 (5%)
bC > Ghoriz, bO+B> Ghoriz	1 each (1% each)			Bflat, T, bC+bO 	1 each (2.5% each)
NVR	1 (1%)				

Overall, the range of handshapes and handshape combinations used by the Auslan signers (n = 11) seemed similar to what is seen in the gesturer data (N = 10), although the TSL data was a little more homogeneous (n =

6). Of the gesture responses, 87.5% involved hand configurations which also appeared in the signed language data. Once again, the most frequent response for both the gesturers and the signers was identical. Responses using a bC in the Auslan data amounted to 68% of the total, while the figure was lower for the TSL data (n = 8, or 50%), but both were clearly the most favored handshape by the two groups. The gC did not appear in the Auslan or TSL data for this category, however, and only signer used the handshape derived from the sign for TEACUP in a manner similar to what is found in the gesture study. The same was true for the use of the S and T handshapes, as well as the bC and bO combination used by one gesturer. The second most frequent response in the TSL data was a 5" (not used by any gesturer), while for the Auslan data it was the bO.

Animate central objects in gesture

The first 40 stimulus items shown to the participants included a total of nine video clips with referents in this category (with clips of a girl doll, baby doll, porcupine, chick, man, duck, hen, dog, and creature). The results for this category are quite diverse, as illustrated in Table 5.44 below, partly reflecting the relatively greater number and variety of referents. The largest single set of responses, however, involved the use of the 2legs handshape. Some 36% (n = 32) of all responses made some use of this hand configuration, with another 16% (n = 14) using an upright G handshape similar to Gperson.

A number of examples in the data seemed to represent attempts by the gesturers to use hand configurations or combinations that resembled salient features of the referent. Six responses involved a use of the S+, perhaps to represent the head and torso of the referent. For the duck, chick, and hen, handshapes that resemble a beaked entity were used, so 6 responses included either a bO>, hO>, or a gO>. Another 6 responses attempted some depiction of a winged entity: 4 responses used a B> handshape that bent repeatedly at the knuckles as it moved from one locus to another (rather like a flapping wing); one response began with this handshape and changed to a bO when the hand reached its destination; and another response used a 5" held palm down to represent the path movement but combined this with a mimetic gesture in which the participant's arms moved in a repeated up and down manner as if flying. The porcupine also elicited some interesting examples: 5 gesturers represented the body of the referent with an S or 5" oriented palm downwards, and four of these also placed a vertical 5" on the back of the other hand to represent the porcupine's spines. In some cases, the resulting combination was somewhat awkward to move in the required manner. In other cases, some of the novel handshapes gesturers came up with also seemed awkward. One gesturer used a B1/5 handshape (Bvert with thumb and pinky extended) to refer to the baby and girl doll and another used a vertical H1/4/5 (Hvert with thumb, ring finger, and pinky extended) to represent a man, but both later seemed to abandon these in favor of the 2legs configuration.

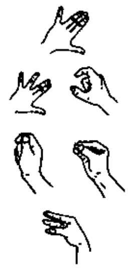
The motivation for some choices of hand configuration was not always so clear, however. Six responses used a Bflat hand configuration to represent the movement of human referents. Three used a bC oriented palm downwards, and 2 used some form of gC handshape. Other handshapes also appeared on one or two occasions in the data: the T, bO>, and 5>.

Compared with the range of handshapes used in the equivalent Auslan (n = 12) and TSL responses (n = 9), the variety of hand configurations and handshape combinations used by the gesturers is greater (n = 17), but 79% of the handshape choices in the gesture and signed language data were identical. This was especially true for the Auslan data, where the 2legs (41%) and Gperson (19.1%) handshapes were the most frequent choices of handshape, just as they were in the gesture condition. The use of beaklike hand configurations (gO>, hO>, bO>) were also the most common choices to describe the motion of hens, chicks, and ducks in Auslan, again not unlike what occurs in the gesture data. In other ways, however, the signer and gesturer responses were dissimilar. There were no examples of two-handed asymmetrical combinations to represent the porcupine in the signed language responses, for example, and no use of repeatedly bending B handshapes to represent flying creatures.

The use of 2legs and beaklike handshapes were also seen to a certain extent in the TSL data, but in some ways, the responses from the Taiwanese signers were unlike both the Australian deaf signers and hearing non-signers. The use of the 2legs handshape seems to be conventional gestural representation of humans in Australia, North America and Europe that has been adopted by signed language users. The Yperson handshape to refer to the motion of human referents, on the other hand, does not appear in any of the Australian data, but it has been reported in other east and south east Asian signed languages, such as Thai Sign Language and Hong Kong Sign Language (Collins-Ahlgren, 1990; Tang, 2000). Either the use of this hand configuration is some kind of areal feature in these languages, or it may reflect patterns of conventional gesture among hearing people in that part of the world, although the latter does not appear to be the case, at least in Hong Kong (Feliz Sze, personal communication, December, 2001).

Table 5.44: Animate CO referents

(toy man, porcupine, baby doll, robot, chicken, duck, dog, creature)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
2legs	93 (> 41%)	3legs	12 (33.3%)	2legs 	32 (36%)
Gperson	43 (19.1)	Yperson	6 (16.7%)	Gperson 	14 (16%)
gO>	33 (14.7%	2legs	4 (>11)	gO>, hO>, bO> 	6 (7%)
Lexical: WALK, PASS, ROLL	18 (8%)	Aperson	4 (>11%)	Bflat 	6 (7%)
Serial verb	12 (>5.3%)	gO>	3 (8.3%)	S+ 	6 (7%)
Ghoriz	10 (>4.4%)	bC>	2 (5.5%)	S+5", 5"+5" 	5 (5%)
hO>	5 (>2.2%)	5"	2 (5.5%)	B> flapping/arms flapping 	4 (<4.5%)
NVR	4 (>1.7%)	5>	1 (<3%)	bC 	3 (>3%)
bO>	3 (>1.3%)	hO>	1 (<3%)	B1/5, H1/4/5, gC, T, bO>, 5> 	2 (>2% each)
Irish H, gC, 5"	1 each	NVR	1 (<3%)		
Gperson> 2legs	1				

Vehicle central objects in gesture

The first 40 stimulus items included three video clips with referents in the vehicle category (a tractor, tricycle, and locomotive). Although only a small number (total = 30 responses), the responses in this group were quite varied (see Table 5.45), with no single hand configuration predominant. The most common response in almost 17% of all responses (n = 5) involved the use of two-handed S handshapes held in front of the gesturer's body mimetically to represent driving a car. Gesturers would move this handshape in straight manner, or turn the hands to represent a turning vehicle. In 13% (n = 4) of responses, participants used a bC handshape, either oriented palm downwards, or as part of asymmetrical double-handed hand configuration. In another 13% (n = 4), gesturers used a Ghoriz. Three responses occurred (10%) for each of the following: the S handshape oriented palm downwards, the Hflat and the Bflat. Two gesturers (almost 7%) responded using a 5" oriented palm downwards, while another two participants used a gC oriented palm downwards. There was one response each for the following: a T handshape, an S placed on top of a 5" oriented on its side (perhaps to represent wheels), and a Ghoriz which changed midway through the gesturing to a Bflat.

The gesture data is quite different from what we see in Auslan and TSL. The variety of hand configurations used by Auslan (n = 4) and TSL (n = 3) signers is considerably lower than what we see in the gesture responses (n = 10). Only 31% of the gesture responses used handshapes that also occurred in the signed language data. Around 80% of the equivalent responses in Auslan used either the Bedge or Bflat handshape, while 50% of the TSL data used a bC> and approximately 33% used a Bedge. No signers from either group used a driving gesture to represent the motion of vehicles in these contexts. Some of the handshape choices made by signers and gesturers overlapped, however. The Bflat did occur in the gesture data, although it was not as common as the driving gesture, or the use of bC or Ghoriz. Some use of the Ghoriz was seen in the Auslan data, and the gC oriented with the palm downwards occurred in both the gesture and TSL samples.

Table 5.45: Vehicle CO referents

(tractor, tricycle, train)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Bedge	33 (44%)	bC>	6 (50%)	2h S 'drive' gesture 	5 (17%)
Bflat	28 (37.4%)	Bedge	4 (33.3%)	bC 	4 (13%)
Ghoriz	7 (9.3%)	gC	2 (16.7%)	Ghoriz 	4 (13%)
Bedge> Ghoriz	2 (2.7%)			S 	3 (10%)
Bedge> Bflat	2 (2.7%)			Hflat 	3 (10%)
3edge	2 (2.7%)			Bflat 	3 (10%)
				5" 	2 (7%)
				GC 	2 (7%)
				T, S+5", handshape change  	1 each (<3.5% each)

Airplane central objects in gesture

The first 40 stimulus items included three video clips with referents in the airplane category (a toy airplane and two different types of small toy biplanes). Despite being the small amount of data (total = 20 responses), the responses in this group were (like the vehicle CO category above) quite diverse. As can be see in Table 5.46, no single hand configuration was predominant. Around 27% of the responses used a Bflat handshape (n = 8), and exactly 20% involved the use of a Ghoriz (n = 6). Almost 17% used the B1/5 handshape. One participant used an Hflat to represent all airplanes, while a second always used an H1/4/5, and a third opted for a Y handshape (10% each). In response to the stimulus film showing a toy plane flying through a T-pipe, one gesturer changed from a B1/5 to a B as their hand moved through their subordinate hand. One other participant represented the flying motion of a plane simply by tracing its path using a G pointing handshape.

The diversity of handshapes used by the gesturers (n = 7) is in stark contrast to what we see in the Auslan (n = 3) and TSL (n = 2) responses for the equivalent items. Only 30% of the gesture responses used the same hand configurations seen in the signed language data. Over 93% of all Auslan responses used the Y handshape, while over 83% in the TSL data used an I!Y. Some of the hand configurations created by the novice gesturers, such as H1/4/5 and B1/5, never occur in the signed language data.

Table 5.46: Airplane CO referents

(airplane, biplane)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Y	70 (93.3%)	I!Y	10 (83.3%)	Bflat 	8 (27%)
Y > Ghoriz	2 (2.7%)	Vthumb	2 (16.7%)	Ghoriz 	6 (20%)
ILY	2 (2.7%)			B1/5 	5 (17%)
Ghoriz	1 (1.3%)			Hflat 	3 (10%)
				H1/4/5 	3 (10%)
				Y 	3 (10%)
				B1/5>Bflat  	1 (<3.5%)
				Point	1 (<3.5%)

Tree central objects in gesture

The first 40 stimulus items included three video clips with referents in the tree category (showing a toy evergreen and a deciduous tree). Again, the results are very mixed given that the total number was only 30 responses, as can be seen in Table 5.47. The most frequent response was the use of a 5+. This occurred in over 24% (n = 7) of all responses. The next most common hand configuration at approximately 18% was the use of a bC as part of either a one-handed or double-handed sign. The Bvert appeared in 4 responses. One participant used a two-handed construction in which she produced a triangular shape with her hands by leaning two Bverts against each other (similar to the Auslan sign ROOF). She used this /B\ gesture for all three responses involving trees. Another participant held her two forearms together and bent two B handshapes apart at the wrists as if to represent the trunk and spreading branches of a tree. This \B/ gesture appeared in all of her responses, although she simplified it in one response by using only one arm and hand. Another participant produced a similar gesture, but held her hands in S handshapes. She too abandoned this two-handed arrangement and used a simpler S+ in later responses. One gesturer used a Gvert on two occasions. There was one response using a gC, and one using a vertical T handshape.

Again, despite 66.5% identical choices of handshape (such as the 5+, bC and Gvert), the gesture responses for the tree category differ from the signed language data. The latter tended to be less varied than the gesture responses, with fewer hand configurations used by Auslan (n = 7) and TSL (n = 2) signers than the non-signers (n = 10). Over 53% of the Auslan responses used a Gvert or Gvert+, 16% used a bC, and over 13% involved a 5+. The remaining responses almost always involved some kind of lexical sign, such as MOVE, JUMP, or WALK, or a handshape derived from the lexical sign TREE. The TSL data was even more homogeneous, with only two hand configurations used: either the 8Tree (n = 10 or approximately 83%) or the bC (n = 2 or around 17%). None of the signers used anything like the two-handed gestures used by some participants in the gesture study. There was an additional difference: often the gesturers would wriggle their fingers (as if to represent the moving leaves or branches of a tree in the wind) when they produced a 5+ configuration, something not seen in the Auslan data.

Table 5.47: Tree CO referents

(toy evergreen tree, toy deciduous tree)

Auslan (n & %)		TSL (n & %)		Gesture (n & %)	
Gvert/+	40 (53.3%)	8Tree	10 (83.3%)	5+ 	7 (24%)
bC	12 (16%)	bC	2 (16.7%)	bC 	5 (18%)
5+	10 (13.3%)			Bvert 	4 (14%)
2legs	4 (5.3%)			/B\ 	3 (10%)
Bvert	2 (2.6%)			\B/ 	3 (10%)
NVR	3 (4%)			\S/, S+  	3 (10%)
Lexical: MOVE	1 (1.3%)			Gvert 	2 (7%)
gC	1 (1.3%)			gC, T 	1 each (<3.5% each)
5"	1 (1.3%)				
bC > Gvert	1 (1.3%)				

5.4.2.2 Handshape components for secondary object (SO) in gesture

Straight vertical secondary objects in gesture

There were no straight vertical SOs in the first forty stimulus items.

Straight horizontal secondary objects in gesture

The first 40 stimulus items included two video clips with referents in the straight horizontal SO category (a wooden rod and a missile). In three responses out of a total of 20, participants did not include a handshape to represent the SO referent. The most common handshape used in the remaining responses was a Bflat. This occurred in 50% of the data (n = 10). Two participants used a Ghoriz (almost 10% of all responses). There was one response using each of the following: a S+, gC, T, and an E hand configuration (shown in Figure 5.2).

E handshape Lhoriz hO

Figure 5.2 Additional handshapes

In the Auslan data, some 72% of responses used a Ghoriz. This handshape was also used by 50% of the responses from the TSL signers. This was similar to what we see in the CO data. The use of a Bflat by the gesturers here suggests that their selection of a hand configuration in this case appeared to be less influenced by the size and shape characteristics of the referents. Signers thus seemed more able to select a hand configuration that reflected the straightness and relative thinness of the referent.

Flat narrow secondary objects in gesture

The 40 stimulus items included one video clip with referents in the flat narrow SO category (a swing bar). Two respondents omitted the use of a SO hand configuration. The most common response in the remaining data was the use of a gC oriented on its side to represent the shape of the swing bar (n = 3, or 30%). There was one response using each of the following: Ghoriz, a Bflat, an L oriented horizontally (shown in Figure 5.2), a B>, and a bC.

In the Auslan data, some 56% of responses used a Bflat while 24% involved a Ghoriz. Half of the TSL data used an Hflat. One respondent using Auslan and one using TSL used a gC in a similar way to the signers, but overall the responses were somewhat less varied in the signers than in the gesturers.

Flat wide secondary objects in gesture

Of the first 40 stimulus items, there were three stimulus films with referents in the flat wide SO category (a box, a fireplace, and a book). Over one third of responses from the gesturers (n = 11) did not involve a subordinate handshape to represent the SO referent. In 9 of these, a tracing construction was used in a separate sign to show the location of the SO. Six of these used a G handshape to sketch the shape of the referent, while 3 used a B handshape. One used a two-handed Bflat like the initial part of the sign BOOK, while another participant did not represent the SO at all. The most common hand configuration used when the gesturer included a handshape for the SO was the Bflat (n = 10) which was used in half of the remaining responses. Three responses used an S oriented with the palm downwards, and 2 used a bC. There was one response each for the following: bO, F, B>, and gC.

The gesture data is far less homogeneous than what we see in the sign language studies. Of the TSL responses, over 83% involved a Bflat (n = 5) or a bC (n = 5). In the Auslan data, some 83% involved the use of Bflat. In both sets of signed language data, the number of cases where signers did not include a CO handshape only accounted for around 8% of responses.

Circular secondary objects in gesture

The 40 stimulus items included three video clips with referents in the circular SO category (a plumbing nut, loop and ashtray). Eight responses involved the use of a gC, either as a one-handed or double-handed gesture (almost 27%). Around 17% involved a bC, another 17% used an F, and the same number used a bO. Two gesturers used a Bflat and one used an hO (shown in Figure 5.2). Three participants failed to encode the SO in their gesture, but represented it separately by means of a G handshape tracing a circular shape.

The signed language data was again less heterogeneous. In Auslan, some two thirds (just over 65%) used a bC and another 10% involved a gC, while over 83% of the TSL responses involved either a bC (slightly over 41%) or a gC (slightly over 41%).

Cylindrical secondary objects in gesture

Three film clips with referents in the cylindrical SO category appeared in the first 40 stimulus items (showing a T-pipe, a silo and a roll of tape). In this case, the F handshape was the most common response, at 30% (n = 9), closely followed by the bC at almost 27%. Four responses involved the use of a Bvert (for the side wall of the silo), and 2 used a bO. One participant curled their whole arm into a circular shape for the T-pipe and the tape roll, and another used a 5" oriented with the palm downwards for the roll of tape. Four participants failed to produce a gesture that incorporated the SO, and represented it with a separate G handshape tracing gesture.

The gestural responses were again more varied than the signed language data, although there are some similarities. In Auslan, the most common response was the bC handshape at more around 53%, followed by the Bvert (for the silo) at 17%, and some form of the gC at 15%. For TSL, some 33% of responses used the bC, followed by some form of the gC at 25%, and the Bvert (for the silo) at 17%. Both the gesturers and signers attempted to encode cylindrical objects using a roundish handshape or hand arrangement, but both responded to the silo with a B handshape. This may be because the cylindrical nature of the toy silo in the film clip is less salient. The signers in contrast, however, never failed to encode the SO, and never used their arms to represent any of the cylindrical objects shown in the clips.

Animate secondary objects in gesture

The 40 stimulus items included two video clips with referents in the animate SO category (a toy man and a toy frog). One participant failed to represent the SO on one occasion, and one participant represented the frog by simply holding a G handshape pointing at its location. The most common response was the use of the 2legs hand configuration, but this was only used in 20% of responses. The use of Bflat occurred in 10% of responses. Another 10% percent of responses involved the use of a B~ oriented palm downwards, and a further 10% used a bC oriented palm down. The following each were used in one response each for the toy man: a gC, a bO>, and Ghoriz. The toy man was lying prone on the floor in the video clip, so one participant simply mimed lying down with their own body. For the frog, one gesturer used an S handshape oriented palm down, and another used a bO>. In the stimulus film, a toy tea-cup jumps onto the top of the frog's head, so one participant just moved their hand onto the top of their own head to represent this.

In the Auslan responses, some signers also failed to represent the CO, but when they did so, they most often used the 2legs (64%) for the man. For the frog, however, the most frequent response was the use of the signer's own head (36%), followed by a Bflat (24%). In the TSL data, all signers used a Yperson for the man, and three out of four used a bO> for the frog's head. Although the gesture is more varied than the sign language data, it is also true that the Auslan responses were themselves considerably more varied than the TSL data.

Vehicle secondary objects in gesture

Only one stimulus film clip showed a vehicle (a toy truck). Two gesturers failed to represent the SO, and two did not produce two-handed gestures with the SO encoded on the subordinate hand. Of these latter two, the first simply produced a separate tracing sign using the G handshape to represent the truck, while another used the driving gesture described above. Of the remaining four, two used a Bflat (20%), and two used an S oriented with the palm downwards (20%). There was one response each using a T and using a bC oriented palm downwards.

The signed language responses were much more homogeneous for this stimulus item than the gesture data, with Auslan using signers using only one of two handshapes: the Bedge or Bflat (80%) or the Ghoriz (20%). This was also true of the TSL data, with three participants using the bC> and one using the Bedge.

Airplane secondary objects in gesture

Only one stimulus film clip showed an airplane (a Lego airplane). In this clip, the tail wing falls off the back of the airplane, so one participant simply pointed to their own back to indicate from where the wing fell. Of the remaining responses, the most frequent hand configuration was the Bflat (40%), followed by the Ghoriz (20%). There was one response each for the following: an H1/4/5, a B1/5 and a Y.

In the TSL data, three participants (75%) used the I!Y, and one used a Bflat. In the Auslan data, most signers used a Bflat (48%) followed by the Y (36%). The Ghoriz was the only other handshape used, as two other participants did not encode the SO. Overall, the gesture data was thus somewhat more heterogeneous than the signed language responses.

Tree secondary objects in gesture

Three film clips with referents in the tree SO category appeared in the first 40 stimulus items (showing a toy palm tree, deciduous tree, and a cactus tree). Four participants did not encode the SO at all, two represented it by a separate G handshape tracing gesture, and one did so by means of a two-handed 5+ gesture (the two 5+ configurations where held vertically and in contact with each other, and the hands bent back slightly at the wrist to create a tree-like shape). Of the remaining responses, the most frequent was some use of the 5+ configuration (23%), followed by a B+ (17%). Three participants used a Bvert, and two used an upright S. There was one response for each of the following: a bO, a Gvert, a 2 held with the fingers pointing upwards, an E, and a modified form of the 5+ in which the ring and pinky finger were held horizontally as a platform from which the hand representing the CO fell (this was for the clip in which a pipe-cleaner falls from a cactus tree).

The TSL responses for the equivalent items all used an 8Tree handshape, but the Auslan responses were much more varied. The most common response was the use of the Gvert or G+ at 47%, but the Bvert or B+ and 5+ also were used in approximately 13% of responses each. Nevertheless, some of the hand configurations, such as the S, bO, 2 and E were not seen in the Auslan data at all.

5.4.2.3 Handshape results: discussion

Table 5.48 outlines the percentage agreement with ASL targets for each CO and SO category in gesture. This is compared with the mean for both categories in TSL and Auslan, based on the responses from the equivalent task items (i.e., the first 40 responses only). I will not discuss each of the responses in detail here. Overall, we find that the non-signers used the target ASL handshape on 27.6% of all occasions for CO referents and 21.5% for SO referents. The overall mean would thus be 23.5% agreement between all target ASL handshapes and gesture responses, compared to an Auslan mean of 61.4% agreement with ASL targets. The range is, however, considerable, with a 47.5% match for the flat wide CO category (higher than the percentage of agreement between ASL targets and TSL responses), and a 10% match for vehicle and airplane CO and straight horizontal, flat narrow and airplane SO referents. The greatest difference between ASL and gesture appears to be in the semantic handshapes. The result for the TSL data is a mean of 30.9% for SASS CO and SO referents. For semantic CO and SO referents, however, the mean result is only 20%.

Thus, it is clear that the responses from the non-signers were much less like the ASL targets overall than the Auslan and TSL responses. This, however, does not really tell us much about the gestural responses. It is quite possible that, like some of the TSL responses, the gesturers choose to use entirely different hand configurations than the ones expected in ASL. Was there evidence that the gesturers' use of handshapes, albeit different from those used in ASL, form a system unto themselves? Did the gesture data show any consistent evidence that the non-signers had a shared lexicon of handshape components? Certainly, hand configurations did recur in the same form and with the same meaning in different contexts, but was it as systematic as what we see in a signed language? Our answer to this question can be answered in part by examining two main differences that emerge from this study in the use of hand configurations by signers and by non-signers. First, the non-signers tend to use a larger range of handshapes, although the difference is not great. Second, the data from the signers reveals a somewhat more systematic preference for particular handshapes.

Table 5.48: Handshape results for Auslan, TSL and gesture

Referent class	ASL targets	% matching Auslan responses	% matching TSL responses	CO % matching gesture responses	SO % matching gesture responses	Total % matching gesture responses
Straight, vertical	Gvert	72%	100%	20%	N/A	10%
	(Bvert, bC, Hvert, Ghoriz)					
Straight, horizontal	Ghoriz	77.1%	42.9%	38%	10%	24%
	(Plane, bC)					
Flat, narrow	Hflat	68%	81.2%	40%	10%	25%
Flat, wide	Bflat	76.5%	46.9%	47.5%	33.3%	40.5%
Circular	gC	36%	56.2%	18%	30%	24%
Cylindrical	bC	76%	67.9%	22.5%	40%	31.3%
Animate	2legs	61%	9%	46.7%	20%	33.4%
Vehicle	3edge	41%	31.2%	10%	20%	15%
Airplane	ILY	93%	6.2%	10%	10%	10%
Tree	5+	13.3%	0%	23.3%	20%	21.7%
Mean		*61.4%*	*44.2*	27.6	*19.3%*	*23.5%*

The overall total number of hand configurations used for CO referents by the ten participants in the gesture study (n = 98) was larger than what we see in the Auslan (n = 73) and TSL data (n = 48). This would give an overall mean of 9.8 handshapes per category for the gesturers, 7.3 for the Auslan signers, and 4.8 for the users of TSL. This seems to suggest that there is somewhat more individual and idiosyncratic variation in the responses from the non-signers than in the Auslan and TSL data, but this difference might be greater if we were to have an equal number of participants in the signing and gesturing groups. This possibility is suggested if we look at the mean number of handshapes used per participant for the gesture and Auslan data (9.8 versus 2.9 respectively). This is what one might expect if the handshape components of polycomponential verbs are represented as meaningful units in the signer's mental lexicon, with particular forms specified for particular meanings. Previous research with non-signers and home signers has suggested that the number of forms used for a single meaning and the number of meanings represented by a single form decreases over time (Morford, Singleton & Goldin-Meadow, 1995). Overall, however, the differences in this sample are not as great as one might expect. Clearly, more data is needed.

Table 5.49: Most frequent handshape responses for Auslan, TSL and gesture

Referent class	Most frequent Auslan response	%	Most frequent TSL response	% TSL responses	Most frequent gesture response	% gesture responses
STRAIGHT, VERTICAL	Bvert	60	Bvert	75	2h S	40
STRAIGHT, HORIZONTAL	Ghoriz	75	Ghoriz	40	Ghoriz	38
FLAT, NARROW	Bflat	33	Bflat	66	Bflat	47
FLAT, WIDE	Bflat	70	Bflat	62.5	Bflat	35
CIRCULAR	F	66	gC	45	F	58
CYLINDRICAL	bC	68	bC	50	bC	22.5
ANIMATE	2legs	41	3legs	33.3	2legs	36
VEHICLE	Bedge/Bflat	81.3	bC>	50	2h S	17
AIRPLANE	Y	93.3	I!Y	83.3	Bflat	27
TREE	Gvert	53.3	8Tree	83.3	5+	24
Mean:		*64.1*		*58.8*		*34.5*

Despite the overall differences, it is interesting that in some subcategories of SASS CO referents, the number of different hand configurations used by Auslan signers and the non-signers was very similar. For straight vertical objects, both groups used 4 different handshapes; for the flat narrow objects, the figures were 7 different handshapes in the gesture data and 8 in the Auslan responses; for circular objects, the gesturers used 8 and the signers used 9; and for the cylindrical objects, Auslan signers used 11 different hand configurations, while 10 occurred in the gesturer responses. Overall, the mean percentage of gesture responses that included hand configurations also seen in the signed language data was 70.6%. Of course, in many cases the handshapes chosen by the non-signers and the Auslan signers were quite different, but this is also true when one compares the Auslan data with the TSL data.

If we look at the most common responses for each category in Table 5.49, another difference seems to emerge. In both Auslan and TSL, the most frequently used handshape made up a larger proportion of the total responses than in the gesture data. The non-signers used the most common handshape in 34.4% of their responses on average (range: 17%-58%). In TSL, the equivalent figure was considerably higher at 58.8% (range 40%-83.3%), whilst in Auslan it was higher still at 64% (range 33%-93.3%). This suggests that the responses of the signers appeared to be somewhat more systematic than what we see in the gesture data, and that there was less idiosyncrasy in the choice of hand configurations.

In summary, there is evidence here that the hearing non-signer's gestures did not contain the same degree of systematicity found in the Auslan or TSL data, although the differences are not great and clearly much more data is needed.

5.4.2.4 Locative components of position in gesture

The gesture results for the locative components of position are summarized in Table 10. They clearly indicate that, in over two-thirds of cases, the gesturers in the sample produced locative components of position as expected, in patterns not dissimilar to those described above for ASL, Auslan, and TSL. Indeed, the total score for the gesturers was 72% (range 35%-90%; S.D. = 6.51) compared to 90% (range 85%-95%; S.D. = 2.12) and 91.6% (range 60%-100%; S.D. = 2.30) agreement with the ASL targets in TSL and Auslan respectively. There was a tendency amongst the non-signers to include *initial* contact between the two handshapes most often, and *middle* contact the least often, whereas the signers included *final* contact least often and *initial* contact most frequently. There was also much more variation among individual non-signers compared to the signers, as the standard deviation (i.e., S.D. = 6.51) and range of correct responses (35%-90%) indicate. Nevertheless, it seems clear that fluent signers and many novice gesturers use the spatial relationships that are possible between handshape components in a very similar manner.

Table 5.50

	Location components	Auslan %	TSL %	Gesture %
1.	*Initial*	92.8%	95%	78%
2.	*Middle*	91.5%	90.6%	68.8%
3.	*Final*	90.9%	85.7%	71.4%
	Total	91.6%	90%	72%

5.4.2.5 Manner of movement components in gesture

The gesture results are summarized in Table 5.51. If we compare these results to those seen in TSL and the Auslan results, the use of movement components in both signed languages and gesture appears to be strikingly similar. The overall result for the gesturers is 68% (range 52.5%-80%; S.D. = 13.30) agreement with the ASL targets. For the TSL data, it is an 88.1% (range 87.5%-90%; S.D. = 4.87) match with the ASL targets, compared to 92% (range 82.5%-100%; S.D. = 3.64) for the Auslan signers. The score for the gesturers is clearly considerably lower and the individual variation within the group much greater as shown by the standard deviation and range of responses, but the mean score is clearly surprisingly high if we were to accept an analysis of the manner of movement component as movement root morphemes in complex multi-morphemic constructions.

The score in fact might be higher than 68% if we took a more generous view of the non-signers attempts to represent the motion of referents in gesture. It is important to realize that the criteria given by Supalla et al. (in press) for recognizing a manner of movement target are a little vague (see 5.2.5.5 above). In some cases, the gesturers produced responses that were difficult to classify. For the *turn* manner of movement, for example, the participant was required to move their hand in a single right angle turn during the execution of the movement. Some gesturers, however, appeared to add an additional turn when none was required (i.e. the referent in the stimulus film only turned once), or produced a movement that was not clearly a right angle turn. In 31 out of 70 responses, the gesturers produced a single turn that matched what they had seen in the stimulus film. In an additional 12 responses, however, the gesturers did not execute a clear right angle turn, added what appeared to be another *turn* to the movement, or produced an awkward movement that could not be clearly seen on the videotape. In one of the *linear* responses, the gesturer began the movement with something resembling a *random* manner, and then switched to a *linear* movement. It is difficult to know how to treat these responses. In some cases, it may simply result from a lack of fluency in using gesture as the primary means of communication. The motor skills required for this kind of communication may not have been sufficiently well developed in some of the participants. I have decided to apply the manner of movement criteria rather strictly, however, and have thus only listed in Table 5.51 examples that clearly matched the descriptions of the targets given in the Supalla et al. materials. The number of additional responses that may have been included if the criteria were more generous are listed in Table 5.51 with a question mark.

Table 5.51

	Direction targets	Number of target components	Auslan	TSL	Total gesture responses	Number of gesture responses matching ASL target	%
1.	*Linear*	8	92%	93.8%	80	61 1?	76.3%
2.	*Turn*	7	94.3%	82.1%	70	31 12?	44.3%
3.	*Random*	5	84%	85%	50	29 12?	58%
4.	*Pivot*	2	76%	62.5%	20	7 4?	35%
5.	*Bounce/jump*	13	93.2%	88.5	130	102 8?	78.5%
6.	*Fall*	5	100%	100%	50	42 4?	84%
	Total number of manner components:	40	92%	88.1%	400	272	68%

5.4.2.6 Direction of movement component in gesture

The use of the direction of movement units for the gesture data is shown in Table 5.52. The overall results at 40% (range 14.3%-57.1%; S.D. = 3.89) are lower than the responses from the Auslan signers at 64.6% (range 28.6%-100%; S.D. = 2.77) and the TSL signers at 50% (range 42.9%-57.1%; S.D. = 3.54). As with the signed language responses, the *uphill* unit appears to be the most consistently used. Although the figure of a 73.3% match with the ASL targets is lower than the Auslan percentage (82.7%), it is higher than that found in the TSL data (66.7%). The results for the *downhill* units at 40% are, however, higher in the gesture data than in the Auslan data (32%). The TSL data is quite different here, with a zero response rate for this direction of movement. Note, however, that the actual number of responses for this item for the signers and non-signers is quite small. On the other hand, the signers performed differently with the *backwards* direction of movement unit. Even if the scoring is generous, and includes a movement sideways as an attempt to produce a sign moving backwards, the gesturers still only manage a total of 16.7%. Movements that were clearly backwards only appeared in 6.7% of the responses were it was required, compared to an Auslan score of 57.3% and a TSL score of 50%.

Table 5.52

	Direction targets	n	Auslan	TSL	Gesture responses matching ASL target (%)
1.	*Backwards (Sideways)*	3	57.3%	50%	6.7% (10%)
2.	*Uphill*	3	82.7%	66.7%	73.3%
3.	*Downhill*	1	32%	0%	40%
	Total number of direction components:	7	64.6%	50%	40%

5.4.3 Discussion

Before I discuss the data from these three studies, it is important to make the shortcomings of these investigations clear. Overall, the VMP task successfully elicited the expected polycomponential verbs of motion and location from deaf signers of both Auslan and TSL, as well as motion and location gestures from the hearing non-signers. One important weakness of the studies reported here, however, relates to the quasi-experimental nature of the research. Due to the manner in which the VMP was administered, the elicitor and the participants were not genuinely involved in the exchange of information. In study 1 on Auslan, the same deaf native signer was used in the administration of all tasks. As such, he had prior knowledge of the stimulus and had seen it many times. This may have affected the signers' responses. The participants were probably aware of the artificial nature of the study, and thus may not have presented their signed descriptions in as clear and complete a fashion as possible. This was also true of both study 2 on TSL and study 3 with the non-signers. In the case of the Auslan data, time and financial constraints meant that it was simply not possible to find an additional 25 deaf native signers unfamiliar with the task to whom the participants could address their responses. Nevertheless, the pattern of responses from both the Auslan and TSL signers does seem to match the kind of uses of polycomponential verbs of motion and location previously described in the literature (Johnston, 1989; Schembri, 1996; Smith, 1990). The quasi-experimental nature of the VMP task, however, means that this research needs to be complemented by the study of additional data collected in naturalistic contexts.

Despite these shortcomings, the data described in this chapter has important implications for our understanding of polycomponential verbs of motion and location in signed languages. The most important finding from the three studies is undoubtedly the surprising degree of similarity in the responses from all three groups. Given that this chapter compared data from two historically unrelated signed languages with a study of gesturers, the parallels are indeed striking.

In the data comparing polycomponential verbs of motion and location in Auslan and TSL, we have seen that some of the handshape components used in both languages (such as the use of the Ghoriz, Bflat and bC hand configurations for straight objects, flat wide objects and cylindrical objects respectively) are identical. In fact, overall there was 44.2% agreement between all target ASL handshapes and TSL responses. For Auslan, the equivalent figure was 61.4% agreement. The use of movement components and locative components of position are also very similar. The use of locative components matched ASL targets in 91.6% of cases in the Auslan data, and 90% in the TSL data. The figures for manner of movement components were similar, with 92% agreement for Auslan and 88.1% for TSL. Given that these polycomponential verbs have been described as complex, polysynthetic constructions by numerous researchers working in the homogeneous model (as we saw in Chapter 3), one would not expect this degree of similarity. Certainly, it would not be anticipated when comparing two equivalent spoken languages from unrelated families, such as Navajo and English. Similar findings have been reported in a cross-linguistic study of indicating verbs in 15 different signed languages (Newport & Supalla, 2000), and in the use of non-manual features for interrogatives and negation (Zeshan, 2000b). It thus seems these signed languages show more typological similarity to each other, at least in their use of indicating verbs, non-manual features and polycomponential verbs of motion and location, than do an equivalent range of unrelated spoken languages.

Why should this be the case? Supalla and Webb (1995) have suggested three possible explanations. First, it may be that we simply have not yet studied a sufficient number and variety of signed languages, and the typological differences we find between Navajo and English may exist in signed languages we have yet to document. This lack of descriptive work on many of the world's signed languages is certainly a weakness in the field. To date, the most well described signed languages are the signed languages of North America (ASL, Quebec Sign Language) and the European Community (BSL, Danish Sign Language, Italian Sign Language etc). Many of these signed languages are historically related, or have been in contact with one another for a considerable period, and thus the similarities so far discovered should not perhaps surprise us.

This is not, however, the case with the two signed languages described in this chapter. As mentioned elsewhere, there is no evidence that Auslan and TSL are historically related in any way. It is clear that Auslan is related historically to BSL (some have argued that BSL and Auslan are in fact dialects of the same signed language, see Johnston, 2000; McKee & Kennedy, 2000). TSL, in contrast, is thought to be part of the Japanese Sign Language family (Smith, 1989). BSL and Japanese Sign Languages appear to be signed languages that have developed completely independently in the deaf communities in these two countries. Moreover, BSL, Auslan, Japanese Sign Language and TSL have not existed in any sociolinguistic situation in which extensive language contact has been possible. Despite these genetic and areal differences, we have seen that Auslan and TSL use very similar visual-gestural mechanisms to represent motion events. While it may be true that other as yet undescribed signed languages may differ typologically much more than do Auslan and TSL, there is still a need to explain why these two unrelated signed languages are so similar.

A second possibility discussed by Supalla and Webb (1995) is that all signed languages studied so far are comparatively young languages. Communities of signing deaf people have only recently formed in many parts of the world as a result of social changes such as urbanization and the introduction of public education for deaf children. Schools for the deaf were established in Australia in the middle of the nineteenth century, and in the last decade of the same century in Taiwan. As Newport and Supalla (2000) explained, younger languages (i.e., creole languages) have been argued to have more structural properties in common than is generally found in older, unrelated languages (Bickerton, 1990). The claim that signed languages such as ASL and BSL are in fact relatively recently emerged creole languages has been made by a number of researchers (Deuchar, 1984; Fischer, 1978, 1996; Ladd & Edwards, 1982). This may also be true of Auslan and TSL, and thus the similarities we see may be the result of recent creolization. If all signed languages described thus far are in fact relatively young languages, it may be that they will diverge more from one another as they develop longer histories of use.

The third possibility is that the visual-gestural modality may result in more similarity in structure and typology than does the auditory-vocal modality. In spoken languages, a limited range of speech sounds are used to form morphemes, and the relationship between these sounds and their meaning is, for the most part, arbitrary. Although there are effects of iconicity on the grammatical organization of languages in the auditory-vocal modality (Haiman, 1985), there is also a great variety of apparently arbitrary systems of grammaticalization (Newport & Supalla, 2000). Some spoken languages rely on linear word order, some use tonal contrasts, and others use differences in morphological patterning for the same grammatical functions. In contrast, languages in the visual-gestural medium appear to exploit the available resources in similar ways. All signed languages documented thus far appear to use spatial contrasts for signaling who or what corresponds to semantic roles such as agent and patient, polycomponential verbs for expressing motion events, and non-manual features for distinguishing polarity and mood. This may be because there is inherently a great deal more iconicity available in the visual-gestural modality than in the auditory-vocal medium (Woll, 1990). Referents exist in space, so it may be quite natural for loci in space to be used to represent referents. The hands also exist in space, and may take on a range of configurations. It is perhaps not surprising that some of these hand configurations will come to be associated with referents of particular shapes. These types of links between form and meaning may thus predispose signed languages to develop structurally in specific ways, as Newport and Supalla (2000: 112) explained:

> These seeds of structure in the visual-gestural mode–our human tendencies to use motion and space in particular ways to express conceptual and grammatical contrasts–may thus tend to propel sign languages more commonly towards one or a few of the several ways in which linguistic systems may be formed. On this view, each individual sign language is fully comparable, in complexity and typology, to spoken languages, each falling well within the expected range of linguistic structure; but the range of variation across distinct sign languages may be different, and more focused on particular types of organizational structure, than that for spoken languages. If this is correct...the relationship between spoken and signed languages may be somewhat different than our field had initially anticipated.

Moreover, these structural predispositions may also explain some of the similarities between the signed language data and the gesture responses described in 5.4 above. This is not the first time such parallels between signed language and gesture have been reported in the literature (Brennan, 1993; Dufour, 1983, cited in Casey & Kluender, 1998; McNeill, 1992; Singleton, Morford & Goldin-Meadow, 1993; Webb, 1996). Webb (1996), for example, has found that the gesticulation that accompanies speech has more similarities with signed languages than previously believed. She collected a large corpus of gestures from hearing English speakers, including a lecturer in philosophy and a television talk show host. Based on her analysis of their co-verbal gesture, each speaker appeared to have a lexicon of conventionalised gestures. Some of these recurring gestures were used by both speakers independently in similar ways. Some could be broken down into discrete components, each having independent meanings (e.g., gestures towards the forehead to indicate mental states, and a circular motion to represent repeated action). These components were combined and recombined in meaningful ways, like the meaningful components of signs. The television talk show host used the 'precision grip' gesture in which the thumb and index finger are held together to produce a handshape similar to the F hand configuration used in signed languages. This gesture was used whenever the speaker was attempting to clarify a point in the discussion, or make her meaning more precise. When she asked her audience to clearly think through the implications of a point she had raised, she produced the precision grip gesture at her forehead, as if to suggest that clarity of thought was necessary. Similarities between French gestures and patterns of meaningful movement in signed languages have also been noted by Brennan (1993).

Just as cross-linguistic research is revealing surprising similarities amongst unrelated signed languages (Newport & Supalla, 2000), we are now discovering that the relationship between signed languages and gesture may be different than our field had initially anticipated. Until recently, many researchers in signed language linguistics had focused their attentions on evidence that seemed to suggest that signed languages were qualitatively different from nonlinguistic behavior (Corina et al., 1992; Petitto, 1987; Singleton, Goldin-Meadow & McNeill, 1995). The work of Corina et al. (1992) is an important example. Their work on the signed language communication of a deaf signer with lesions in the left hemisphere appeared to indicate that this subject had a marked signed language aphasia, but a preserved ability to communicate in gesture and pantomime. The data they present is, however, somewhat problematic since it only demonstrated an inability to produce target lexical signs. The signer's production and comprehension of polycomponential verbs were not investigated. In fact, some of the signs considered to be examples of non-linguistic pantomimes by the authors appear similar to the types of utterances considered by other writers to be examples of polycomponential verbs of handling or visual-geometric description.

Increasingly, however, the assumption that signed languages and gesture are in all respects qualitatively different has come into question (Armstrong, Stokoe & Wilcox, 1995; Casey, 1996, 1998, 2000; Casey & Kluender, 1998; Cogill, 1999; Corina, 1999; Emmorey, 1999; Emmorey & Herzig, 2000; Liddell, 1998, 2000a, 2000b; Liddell & Metzger, 1998; Macken, Perry, & Haas, 1993, 1995). The data described in this chapter suggest instead that significant interpenetration and interaction exists between linguistic and nonlinguistic uses of the visual-gestural modality. In the case of some individual responses, the Auslan, TSL and gesture data do not appear as different as one might expect if the signed language data were to be considered exclusively linguistic phenomena and the gesture data non-linguistic. If we look, for example, at the hand configurations used by the gesturers, we see many parallels in the responses from the deaf signers and hearing non-signers. Overall, the gesturers produced responses that resembled the appropriate use of ASL handshapes in 23.5% of responses. For the use of movement and location, the percentages were higher. The non-signers produced gestural forms that resemble the ASL use of movement and location in around 70% of cases. This data raise doubts about the claim that these structures are complex multimorphemic constructions similar to what is found in polysynthetic spoken languages. As Newport and Supalla (2000) pointed out, no hearing participants brought into a laboratory and asked to communicate with each other by using sounds unrelated to their spoken languages will spontaneously produce even the beginnings of a language like Navajo or West Greenlandic. We do see, however, that non-signers begin to make systematic use of handshape, movement and location components to represent the motion of referents in a way that is similar to signed languages. This provides some support for the claim that polycomponential verbs of motion and location in signed languages, like the use of indicating verbs, represent a blend of categorical linguistic and analogic gestural elements.

Similar results from non-signers are discussed in Singleton, Goldin-Meadow and McNeill (1995). In this study, they compared hearing people's use of co-verbal gesture in spoken descriptions of the motion events in the VMP with descriptions of the same events using gesture alone. These authors claimed that we what see in the gesture alone condition is communicative behavior influenced by the same set of basic principles that organize human linguistic behavior. These general organizing principles are referred to as the *resilient properties* of language by these authors, and not as properties of gesture. Unlike the discussion presented here, they do not suggest that the similarities between gesture and sign are due to fusion of linguistic and gestural elements in signed languages. Their hypothesis proposed instead that what we see in signed languages is a grammaticized version of gestures that are normally produced by all human beings. In the absence of a fully-grammaticized signed language, humans will draw on a fundamental set of properties common to all linguistic systems to begin to create one. These so-called resilient properties include the use of symbols (e.g., signs, gestures or words) that are organized both by symbol-internal formational rules (i.e., morphology) and by rules across symbols (i.e., syntax). In this chapter, we have seen how symbol-internal rules emerged in the non-signers' use of gesture. The non-signers have clearly not, however, created a fully-fledged signed language in a single bound, but there are a great number of similarities (especially when only the range and type of handshape, movement and location components in polycomponential verbs and gestural representations of motion events are compared). These properties appear in the gestural modality, Singleton, Goldin-Meadow and McNeill (1995) claim, because the hearing people in their study were forced to intentionally construct gestural symbols for communication, and not when to simply produce gestures unwittingly, as in gesticulation.

However, the data from Webb (1996) discussed above show that these resilient properties are not found in language and language-like gesture alone. Webb's (1996) work showed that some of these language-like properties also occur in gesticulation, not just when gesture is decoupled from speech and used as an independent means of communication. These findings, together with the work of Liddell (2000a, 2000b), suggest that there may not be a 'cataclysmic break' between gesticulation and sign, as claimed by Singleton, Goldin-Meadow and McNeill (1995).

It seems clear that, based on their data, Singleton, Goldin-Meadow and McNeill (1995) did not suggest that we abandon the homogeneous model of polycomponential verbs as multi-morphemic constructions as I am attempting to do here. Although the data in this chapter highlight the points of similarity between gesture and sign, more than this is required to illustrate the inadequacy of the homogenous model. Singleton, Goldin-Meadow and McNeill's (1995) explanation may in part reflect the fact that they appear to have accepted the grammatical models of polycomponential verbs proposed by Supalla (1982, 1986, 1990) and others. The multimorphemic analysis of polycomponential verbs was, however, shown to be problematic in Chapter 3. None of the grammatical proposals have thus far been able to provide any phonological or morphological representation for the use of spatial loci and analogue movement in such forms, nor list all the location and movement morphemes involved. Together with the data presented in this chapter, these two aspects of the problem appear to provide support for the heterogeneous analysis of these signs in which polycomponential verbs are seen as blends of linguistic and gestural elements.

If we accept this proposal, we then must decide which components of polycomponential signs are linguistic, and which are gestural. This question clearly requires more investigation, but the evidence presented here (along with the work of Liddell 2000a, 2000c) points the way. In this data, the component that differs the most between Auslan and TSL, and between the signed language data and the gesture data, is the handshape component. This is particularly true of the semantic handshape category. This latter subset of handshape components was the most different between the two signed languages, particularly those used for the animate, tree and airplane categories. Representing referents by means of handshape was also the area in which signed languages appear most different from gesture. Although there was considerable overlap in the types of hand configuration selected by signers and gesturers (the use of the 2legs handshape by both groups, for example), there appears to be evidence of a lexicon of handshapes shared across all signers of a particular signed language. This seems to be less true of the non-signers, although some patterning definitely exists in the hand configuration choices. The use of some handshapes in this data is reminiscent of what has been documented in studies of gesture (McNeill, 1992, 2000). Therefore, there may be some limited lexicon of hand configurations loosely associated with particular meanings in the hearing English-speaking Australian community, but they do not appear to be used as systematically as the handshape components in Auslan or TSL.

Thus, although there is evidence of a lexicon of handshape components in Auslan and TSL, it seems that there is a relationship between these handshape components and gestural conventions used in the non-signing community (i.e., some of the hand configurations used by the signers resembled the hand configurations used by the non-signers), and between meaningful handshapes and lexical signs. It may be that there is a lexicalization or grammaticalization continuum (see Engberg-Pedersen, 1993, for a discussion of this), with semi-lexicalized/ semi-grammaticalized gestural representations of referents at one end, and fully lexicalized/grammaticalized signed representations at the other. The meaningful handshapes in polycomponential verbs might each appear at different points along this continuum, depending on the particular handshape's form and meaning. Thus, for example, there is very little variation in the responses for the tree category in TSL, and little in the airplane category for TSL and Auslan. In these cases, this may be because the hand configuration used in these categories is the same as the one used in the lexical signs TREE and AIRPLANE. Other meaningful handshapes, such as Gperson and 2legs in Auslan or the Yperson in TSL, also appear to be closer to the lexicalized end of the continuum. We have already seen how the use of Gperson and 2legs appears to depend on the type of motion event being described. The Gperson handshape is preferred for representing human referents moving in a linear fashion, in a zigzag pattern, or turning toward or away from the signer, while the 2legs handshape tends to be used when describing an animate referent falling, jumping, bouncing, or pivoting. In both cases, these idiosyncratic patterns appear to be related to reflect in lexical signs such as MEET (which uses the Gperson) and FALL (which uses the 2legs). Other handshapes, however, appear to be more general in meaning and less idiosyncratic in behavior. The Ghoriz, for example, is used to describe the motion of animate and inanimate referents, and seems able to combine with a greater number and variety of movement components. The use of this handshape by both signers and gesturers is quite similar. It may be closer to the semi-lexicalized, gestural end of the continuum.

We have already discussed the use of spatial loci in signed languages, and the increasing consensus that we should not treat locative components as morphemes. Evidence from the analysis of indicating verbs (Liddell, 2000a, 2000b) and from psycholinguistic studies of polycomponential verbs (Emmorey & Herzig, 2000) does appear to support the claim that the handshape component is a linguistically definable entity, whereas the use of locative components in such constructions is not.

It is not clear, however, if there is sufficient evidence for a lexicon of movement components. It is not clear if patterns such as the *linear* and *turn* movement need to be specified in the lexicon at all, since they simply involve moving the hand between loci in space (i.e., no particular manner of movement need be specified). It may be that other movement patterns, such as *bounce/jump* or *fall*, are the result of mental space blends of the kind discussed in Liddell (2000b) in which features of the referent's movement are reproduced on the basis of conceptual representations rather than as morphemes listed in a mental lexicon. In this study, gesturers produced movement patterns that resembled those found in polycomponential verbs of motion and location in approximately 70% of cases. Moreover, the relationship between the movement components such as *linear*, *turn*, *bounce/jump*, and *fall* and their meanings is more or less transparent. Although the signers still clearly outperformed the non-signers, Cogill (1999) has suggested that such difference may be due to practice effects. As native or fluent signers, the deaf participants may simply have had more practice at being able to mimetically imitate the movement contours of objects in motion, and these more finely developed motor skills enable them to do this more successfully than the non-signers. Thus, it is not clear if these movement templates need to be listed in the mental lexicon as morphemes.

Alternatively, as we saw in Chapter 3, Liddell (2000c) has suggested that at least some handshape components and movement components may be listed in the mental lexicon together. In the same chapter, we have already discussed the mutual interdependence of handshape and movement in polycomponential signs and this seems to add some support for Liddell's (2000c) proposal. It may be that some handshape components are listed in the mental lexicon and specified for the types of movements they may combine with, while others are not so specified and are free to combine with a range of movement components. Unfortunately, the data presented here do not yet allow us to choose between the suggestion that all movement components are visual analogues or that some are an unanalyzable part of lexical units. The status of movement components in polycomponential verbs of motion and location thus requires more investigation.

5.5 Summary

In this chapter, I have presented the data from three studies using the *Verbs of Motion Production* task from the Supalla et al. (in press) *Test Battery for American Sign Language Morphology and Syntax*. The first study with 25 deaf signers from Australia provides some of the first detailed descriptive data on the use of polycomponential verbs of motion and location in Auslan. This Auslan data was then compared with the results from the second study that investigated polycomponential verbs in Taiwanese Sign Language using the VMP task. Results indicate that the differences between these two languages seem to be confined to the use of handshape components, while movement and locative components in both languages appear to be very similar. The data from both studies were then compared to the results from an investigation into the gestural representation of the motion events in the VMP stimulus material by hearing non-signers. Like the cross-linguistic comparison between Auslan and TSL, the results again showed that signers and gesturers differed most in their use of handshape to represent referents, while their representation of movement and location appeared to be similar. This data provide some evidence for the claim that polycomponential verbs in signed languages may be best analysed as blends of linguistic and gestural elements.

Chapter 6
Implications and conclusion

6.1 Overview

In Chapter 1, the dissertation began with a brief overview of signed language research in Australia, and provided a summary of some of the challenges that face signed language researchers. This chapter also outlined the four main aims of this dissertation: (1) to provide an initial description of polycomponential verbs of motion and location in Auslan; (2) to re-examine the claim that these constructions include classifier morphemes; (3) to undertake some cross-linguistic comparison of polycomponential verbs of motion and location in three unrelated signed languages; and (4) to compare these findings with a study of gesture in non-signers in order to investigate the claim that these forms are blends of linguistic and gestural features rather than polymorphemic constructions as previously claimed.

Chapter 2 presented a brief introduction to some of the key issues in the relationship between language and gesture, between signed language phonology and morphology, and sketched two competing models of signed language structure, which were referred to as the *homogeneous* and *heterogeneous* models respectively.

Chapter 3 provided an overview of previous work on verbs in signed languages, and reviewed the homogeneous models of polycomponential verbs in signed languages, with a particular focus on the work of Supalla (1982, 1986, 1990). Weaknesses in Supalla's proposal that polycomponential verbs are productive multi-morphemic classifier constructions were described, and the initial stages of an alternative model were sketched.

Chapter 4 explored the nature of classifier systems in spoken languages and compared them with polycomponential verbs in signed languages. It was shown that the analysis of the handshape component in polycomponential verbs as a classifier morpheme is highly problematic.

Chapter 5 presented the results of an empirical study comparing polycomponential verbs of motion in Auslan, ASL and TSL with the representation of motion events in gesture. The data demonstrated that there was considerable overlap in how these events were represented in signed languages and gesture.

In this concluding chapter, I will review the aims of the dissertation and show how the evidence I have presented here begins to provide some evidence for the claim that polycomponential verbs are not polysynthetic multi-morphemic classifier constructions, but are best described as verbal constructions that are a complex blend of linguistic and paralinguistic features.

6.2 Polycomponential verbs of motion and location in Auslan

Chapter 5 of this dissertation provided the first empirical study of the use of polycomponential verbs of motion and location in Auslan. It showed that native signers appeared to favor particular handshapes to represent referents of particular classes, as has been reported for other signed languages (Collins-Ahlgren, 1990; Engberg-Pedersen, 1993; Supalla, 1982). For straight vertical and horizontal objects, signers clearly preferred the use of the Gvert and Ghoriz hand configurations respectively. The Ghoriz was also preferred in the representation of flat narrow objects, although the Hflat was used by some signers for some referents. The Bflat was used by most participants to symbolize flat wide entities, while signers tend to use the bC for cylindrical objects. Small circular entities were represented used an F, while the gC appeared to be preferred for medium sized circular objects. The motion of animate referents was depicted using either a 2legs or a Gperson, while the majority of participants used a Bedge for vehicles. Airplanes were represented using a Y handshape, and trees most often by a Gvert. These results confirm previous observations about the use of handshape in polycomponential verbs of motion and location (Johnston, 1989; Schembri, 1996).

There was, however, a considerable amount of variation in the handshape types selected by the participants. For some animate referents, for example, neither a 2legs or Gperson were used by the participants. Depending on the particular size and shape characteristics of the specific type of animate (i.e. whether it was a turtle, a dog, a chicken etc) a Bflat, Ghoriz, or gO> might have been preferred. In other cases, the reasons for variation in the choice of handshape types were not clear. In the case of flat narrow objects, it is not known why in some cases signers used the target Hflat handshape, but others used a Ghoriz or even Bflat. For one particular object (the ruler), signers seemed to prefer to use a handshape derived from the lexical sign RULER rather than a whole entity handshape. Thus, the use of specific handshapes for specific referent classes did not appear to be as highly constrained in Auslan as had been reported for other signed languages, such as ASL (Supalla, 1982)[1]. This variation in handshape selection requires much more investigation.

There was much less variation in other aspects of the polycomponential verbs of motion data. Auslan signers appeared to use movement types quite consistently, depicting linear, turning, bouncing, pivoting, random, and falling motion by means of particular iconic movement patterns that reflected aspects of the motion event more

[1] It is possible there are other constraints at work in the polycomponential verb system in Auslan that are comparable to those described for ASL, but that this investigation has not revealed them.

or less directly. They also made analogue use of space in the representation of motion events that involved initial, medial or final contact or interaction between two referents. Their use of particular direction of movement components was, however, not as consistent, with only two-thirds of all responses incorporating a downhill, uphill, or backwards direction when it was required.

Overall, the data presented in this dissertation is compatible with Supalla's (1982) claim that polycomponential verbs of motion and location can be analyzed into discrete components. As discussed in Chapter 3, this is insufficient evidence, however, for the claim that all these units represent examples of morphemes (as shown in 3.6.2.5), or indeed that all the components act as independent meaningful units in all contexts (as shown in 3.7.3.4).. The movement type that Supalla et al. (in press) refer to as the *linear* morpheme, for example, is used for representing the motion of a referent in a straight line. Yet this "morpheme" is realized formationally as a movement of the hand in a straight line. Thus, this meaningful component cannot be said to exhibit the duality of patterning considered a defining characteristic of morphemes (as mentioned in Chapter 2). The relationship between the form and its meaning appears to be transparent[2]. As a result, Cogill (1999) has claimed that the movement in a straight line means "motion in a straight line" because the form of this movement *is* motion in a straight line. If this is the case, the meaningful unit does not represent a referent in the same way as a morpheme. A morpheme is generally understood as the smallest meaningful unit in a language, but must itself be analyzable into smaller meaningless components. Instead the movement component in polycomponential verbs of motion could be understood by the addressee because the meaning is intimately related to the form. This close relationship between form and meaning and lack of double articulation is also true of locative components of position, and direction of movement components. The precise nature of the relationship between the form and the meaning of these components, and how their meanings are understood by signers and gesturers, awaits further research.

Thus, if the analysis of movement and locative components in polycomponential verbs as morphemes is problematic, this raises doubts about the claim that these signs are multi-morphemic constructions. It may be that polycomponential verbs of motion and location are best analyzed, like indicating verbs, as examples of incompletely specified s-morphs (Liddell, 2000c). Perhaps, in at least some cases, only the handshape may be

[2] Note that this is a different degree of transparency then one sees in many aspects of signed language lexical items. Signed language lexicons are replete with transparent items (Johnston, 1989). Two transparent signs from different signed languages may, however, be identical in form but have different meanings, or have the same meaning but different forms (Klima & Bellugi, 1979). In the case of the linear manner of movement component, we see here the same form with the same meaning in three unrelated signed languages and in the gesture of non-signers. I have not yet seen a description of a polycomponential verb of motion system in any signed language in which a linear movement is not used to represent the linear motion of a referent (it is, however, perfectly possible that a linear movement in a non-polycomponential sign may have some other kind of meaning).

specified in the lexicon. This might then be combined with gestural elements (such as analogue uses of movement and spatial loci) to represent the motion and location of referents. This suggestion remains highly speculative, however, and requires much more investigation.

6.3 Polycomponential verbs as classifier constructions

Chapter 4 provided an overview of some recent work on classifier systems in spoken languages. Since signed language researchers first suggested that the handshape in polycomponential verbs is an example of a classifier morpheme in the 1970s, there have been many developments in the study of classifier systems in spoken languages. In particular, there have been a some recent attempts to clarify terminology in this area and to draw up a typology of classifier systems. This chapter also reviewed work on signed languages, and discussed the claim that polycomponential verbs incorporate classifier morphemes.

Drawing on work by Grinevald (1996, 2000), it was suggested that classifier morphemes may be defined by the following four criteria: (a) classifiers are overt morphemes; (b) they constitute a morphosyntactic sub-system; (c) they are semantically motivated systems of classification that do not classify all nouns; and (d) they are subject to discourse-pragmatic conditions of use.

Research on signed languages has suggested that meaningful uses of handshape may be analyzed as an overt morpheme, so it fulfils the first of Grinevald's (1996) criteria. Some writers have claimed, however, that the handshape component of polycomponential verbs has a number of spatial and analogue properties (Emmorey & Herzig, 2000; Liddell, 2000b) that make it unlike anything seen in classifier systems in spoken languages. Moreover, the relationship between the handshape in polycomponential constructions and the lexicon in signed languages is still unclear, and Liddell (2000c) has proposed that at least some polycomponential verbs may form part of a lexical, rather than a morphosyntactic, subsystem. This makes the application of Grinevald's (1996) second criterion to signed languages somewhat problematic. In addition, it is not clear if the meaningful handshape has a classificatory role. The third criterion in Grinevald's definition suggested that classifier morphemes reflect semantically motivated systems of classification, but it is not clear if these hand configurations serve to classify referents. This is particularly true of the handshape component in handling verbs and in stative verbs of visual-geometric description.

Thus the analysis of the handshape component in polycomponential verbs as a classifier morpheme seems in doubt, but cross-linguistic and cross-modal comparative work in this area requires more data and more standardized terminology if it is to move forward.

6.4 Polycomponential verbs in Auslan, ASL and TSL

Previous claims that polycomponential verbs are multimorphemic constructions are called into question by the cross-linguistic analysis of these signs in Auslan, ASL and TSL. The data presented in Chapter 5 appears to support the claim that these signs are blends of linguistic features (the handshape component and some movement components) and gestural elements (analogue uses of movement and spatial loci). The results of the comparative study show that it is the handshape that differs most between these three languages from separate signed language families (although, as we saw in Chapter 5, the Auslan signers nevertheless scored 60.9% on the handshape component of the VMP task). There are, however, highly similar uses of movement and locative components in Auslan, ASL and TSL. This degree of similarity would not be expected if one were to compare three unrelated spoken languages[3], and may reflect the fact that some uses of movement and spatial loci in polycomponential verbs are analogue and gestural rather than morphemic in nature. Signed language typology and cross-linguistic comparisons have only recently begun (Zeshan, 2000b), however, so much work remains to be done in this area to see if all signed languages use polycomponential verbs in a similar manner.

6.5 Polycomponential verbs and gesture

The multimorphemic analysis of polycomponential verbs is further thrown into doubt by research into the representation of motion events in gesture. The results from the study discussed in Chapter 5 indicate that there is considerable similarity between the hand configurations used by hearing non-signers to represent the motion of referents in gesture and the handshape components of polycomponential verbs in the Auslan, ASL and TSL data. Although the gesturers were able to mimic the appropriate use of target ASL handshapes in only 23.5% of responses, it is clear that most of the handshapes used by the gesturers were the same as those that appeared in the Auslan and TSL data. Overall, the mean percentage of gesture responses that included hand configurations also seen in the signed language data was 70.6%. For the use of movement and location, the results were similar. The non-signers approximated the correct ASL use of movement and location in these signs with around 70% accuracy.

More work needs to be carried out into gestural representations of motion events, using additional stimulus materials and larger numbers of participants. It is not clear from this data if the gesturers were producing novel combinations of handshape, location, and movement or whether some shared conventions exist. Cross-cultural comparisons need to be carried out, particularly with non-signers from non-Western countries.

6.6 Implications: a paradigm shift in signed language linguistics?

The findings of this dissertation have serious implications for the widely-accepted homogeneous model of signed language structure. Like Liddell's (2000a) work on indicating verbs, the data described here provide some support for a model of signed language grammar that incorporates both linguistic and gestural elements. On-going work is, however, required in this area in order to provide more evidence for this proposal, particularly in relation to the further analysis of the data presented in Chapter 5 and the collection of additional data from deaf signers and hearing non-signers.

Despite the need for more research, a growing number of signed language linguists are already beginning to work with heterogeneous models of signed language structure that attempt to deal with the apparent fusion of linguistic and gestural elements in the languages used in signing communities. This is because support for this view is coming not only from new analyses of signed language grammar (Liddell, 1998, 2000a, 2000b) and grammaticalization (Zeshan, 2000a), but from the study of signed language pidginization and creolization (Morford & Kegl, 2000), historical change (Wilcox et al., 2000), signed language acquisition (Slobin et al., 2000), psycholinguistics (Emmorey & Herzig, 2000), neurolinguistics (Corina, 1999), and new theories about the origins of human language (Armstrong, Stokoe & Wilcox, 1995). Such a growing consensus suggests a paradigm shift is underway in signed language research (Rée, 1999), with new developments in sign linguistics at the vanguard of a much broader shift in the study of human communication generally (Duncan, 1999). This re-evaluation appears to involve a re-definition of what language is, and how it is used. Some signed language researchers at the forefront of this paradigm shift, like a growing number of scholars of language generally, are beginning to acknowledge the difficulty in drawing a sharp boundary between language and paralanguage, and between the arbitrary and the iconic. The data presented in this dissertation indicate that there is a need for all serious scholars of language to rethink assumptions about notions such as transparency, grammaticalization, discreteness, analogy and duality of patterning as features that separate linguistic from non-linguistic communication. As suggested by Hockett (1987), perhaps more will be learnt about human language by studying the communicative package as a whole, and by avoiding the exclusive focus on its the abstract referential and symbol manipulation properties that have so preoccupied the field since the Chomskyan revolution in the late 1950s.

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3 Phonaesthemes across spoken languages can appear to be motivated by similar forms of sound symbolism (Crystal, 1987), but the degree of similarity across these three unrelated signed languages is much more impressive.

Appendix A
Background to Auslan

A.1 Introduction

This appendix presents some background information about Auslan and the context in which research for this dissertation has been conducted. As so little has previously been documented about the language, I will present here a brief overview of the history of Auslan and relationship to other signed languages, and the varieties of signed language used in the Australian deaf community.

A.2 Auslan

Auslan is the visual-gestural language used by many members of the deaf[1] community in Australia. The term *Auslan* was coined by Johnston around 1981 (Johnston, personal communication, July, 2001) and appeared for the first time in print some time later (Johnston, 1984). This abbreviation for Australian Sign Language was created because the acronym *ASL* was widely used in the signed language linguistics literature to refer specifically to American Sign Language. The word *Auslan* was based on the alternative term *Ameslan* used by some writers for American Sign Language (Fant, 1972), and is a blend of the initial letters in the phrase *Aus*tralian *S*ign *Lan*guage. This name has since gained widespread acceptance both in and outside of the Australian deaf community, and is one of the few examples in the literature where a natural signed language is referred to by something other than an acronym, such as ASL or BSL (Andersson, 2001).

Structurally, Auslan appears to be very similar to other primary signed languages described in the literature (Johnston, 1989). Like these languages, some of these structural features appear analogous to those found in spoken languages, while others appear to be unique to languages in the visual-gestural modality.

As a visual-gestural language, Auslan employs a completely different medium from spoken languages: the hand, face, head, and upper body are used rather than the vocal tract, and the message is perceived by the eye

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1 Following Woodward (1972), it has become customary among those writing in English on the topic of deafness to use "Deaf" (with an upper case "d") to refer to deaf people who participate in and identify with the signing deaf community, and "deaf" (with a lower case "d") to refer to those deaf people who do not. The use of this convention has not, however, become a universal practice in the sign linguistics literature, and it is not always clear how it should be applied. Should deaf children born to hearing parents who are not yet enculturated into the deaf community, for example, be referred to as "deaf" or "Deaf"? And what of isolated deaf individuals who are not part of a deaf community, yet nevertheless use some form of signed communication? Like Engberg-Pedersen (1993), I feel that I am neither competent nor entitled to decide who belongs in which category, so I will not follow this practice here. In any case, it should be apparent that the focus of my work is very much on the language of the signing deaf community, and not on communication used by non-signing deaf people.

rather than the ear[2]. Despite this modality difference, however, the phonological principles in signed and spoken languages appear to be similar. Auslan lexical signs are analyzable into smaller, sublexical units which can be minimally contrasted (Johnston, 1989; Schembri, 1996), and phonological processes such as deletion and assimilation also appear to regularly occur in signed discourse.

Although a detailed description of word classes in the language awaits further research, Auslan appears to have similar basic lexical categories as spoken languages, with signs acting as nouns, verbs, conjunctions, interjections and so forth (Johnston, 1998). It may be described as a morphologically complex language, with modifications to signs working in similar ways to the derivational and inflectional processes found in many spoken languages (Johnston, 1991b; Schembri, 1996), although this morphology generally appears to involve simultaneous modification of the formational features of a sign, reduplication and compounding rather than sequential affixation. Morphological processes may also entail the use of spatial mechanisms, a grammatical characteristic unique to signed languages. Nominals may be associated with loci in the signing space around the signer's body, for example, and verbal signs may be moved between these loci to indicate differing agent and patient roles (Johnston, 1991b).

Syntactically, Auslan has been described as a topic-prominent language, with relatively flexible word order (Johnston, 1989). Although research is yet to establish if the language has a basic word order, different word orders appear to reflect distinctions in both semantic role and information structure. Marked word orders are often prosodically signaled by changes in the non-manual features (facial expression and movements of the head and upper body) which accompany the signs. Non-manual features are often also the only marker used to distinguish different sentence types (Johnston, 1996a).

Semantically, the types of relationships between lexical items in Auslan are similar to that found in all languages, displaying patterns of hyponymy, synonymy, antonymy, and metaphor (Johnston, 1998; Schembri, 1996). Unlike the vast majority of words in spoken languages, however, many lexical items in Auslan and other signed languages (as well as much of the morphosyntactic patterning of such languages) exhibit a variety of links between form and meaning (Brennan, 1990; Engberg-Pedersen, 1993; Johnston, 1989, Johnston & Schembri, 1999; Schembri, 1994). As is shown in the main chapters of this dissertation, this is especially true of the polycomponential verbs of motion and location which are the focus of this study.

2 I recognize, however, that there is plenty of evidence that, in addition to auditory input, hearing people use speech-reading in face to face communication, particularly for improving the intelligibility of speech in noisy situations (Campbell, 1999).

A.3 Auslan and the deaf community

The precise number of signing deaf people in Australia is unknown. Published estimates vary from as low as 7,000 (Power, 1987) to as high as 30,000 individuals (Deaf Society of NSW, 1989). Research by Hyde and Power (1991) has suggested a figure of approximately 15,000 signing deaf people. The Hyde and Power study has been considered by many to be the most reliable (Ozolins & Bridge, 1999), due to their use of a thoroughgoing peer-referral process[3]. In a later Census of Population and Housing (Australian Bureau of Statistics, 1998), however, only some 4,425 individuals claim to use a signed language in the home. Furthermore, in a study comparing the demographics of deafness in twenty countries around the world, Schein (1987) noted the Australian figure is 35.1 per 100,000 of population, which he reported as the lowest of all 20 countries he surveyed. This would suggest a current figure of approximately 6,500 signing deaf people in Australia (based on a total population of 19 million), again much lower than suggested by Hyde and Power (1991). Ozolins and Bridge (1999) pointed out, however, that Schein (1987) based his figures on data from the 1933 census, the last time statistics on disability were included in a national survey. Given improvements in public health since that time, however, it is not clear why the incidence of deafness in the population would now be greater than it was in the early twentieth century, although the rubella epidemics of the 1950s may possibly have played a role.

Regardless of the uncertainty about total numbers of signing deaf people, it seems clear that Auslan is the native language (i.e., the language acquired from birth) of only a minority of deaf signers, often estimated at between 5-10% of the deaf community (Johnston, 1989). The latest research shows that only a small fraction of signers are raised in households with at least one parent or sibling who use a signed language. A recent study of the deaf community in New South Wales found that only 32 of all the 706 deaf adults who responded to the survey questions (equal to 4.7% of the total) came from families where Auslan was used in the home (Deaf Society of NSW, 1998)[4]. It may be that a similar percentage (i.e., approximately 5-10%) of the parents of native signers (the vast majority of whom are probably also deaf) are themselves native signers (i.e., having come from families where Auslan was used in the home). Given genetic patterns of transmission, however, this figure may

3 According to data from the 1991 Census of Population and Housing (Australian Bureau of Statistics, 1998), the figures from the Hyde and Power (1991) study would have seen Auslan ranked twenty-fourth on the list of most widely used community languages in Australia at the time (after Korean and before Khmer).

4 This percentage may be higher in other parts of the country. In particular, South Australia and Victoria are anecdotally reported to have a higher proportion of families with two or more generations of deafness.

actually be higher[5]. Nevertheless, this suggests that only 1-3% of signing deaf children have significant exposure to native signers as adult language models (Coulter & Anderson, 1993).

Regardless of whether the parents are themselves native signers, those deaf children who are born to signing deaf parents appear to acquire signed languages in the same way as hearing children acquire spoken language from their parents and other family members. Research on ASL and other signed languages has shown that deaf children exposed to such languages from birth appear to move through the same stages of language development at the same ages as their hearing, speaking peers (Newport & Meier, 1985; Petitto, 1994).

For most adults in the deaf community, however, Auslan is acquired either as a (possibly delayed) first language at some time during their school years, or as a second language in later life (Johnston, 1989). In a small number of cases, deaf people learn Auslan as a late-acquired first language, after partial or unsuccessful exposure to English. In the past, near-native and non-native signers have usually acquired the language in centralized schools for the deaf or in specialized units attached to a regular school, often learning it from other deaf children who have deaf parents, older deaf children, or deaf ancillary staff. Increasingly, however, educational policies of mainstreaming children with special needs mean that many other deaf adults have learnt the language through social exposure to signing deaf people only after school. As Auslan has only recently become the language of instruction in some programs for deaf children (Gifford, 1997; Jackson & Stark, 1994; Stevens, Smit, Thomas & Wilson, 1995; Warden, 1997), those deaf adults who learnt the language at school probably have overwhelmingly acquired it in residential school dormitories or in the playground rather than through formal instruction (Johnston, 1989). Indeed, prior to the establishment of bilingual programs for deaf children in Australia (where Auslan and English are both used in the classroom), the use of Auslan was almost entirely confined to deaf people's homes, social events, and deaf clubs (Johnston, 1989). Since its recognition by the Australian government in the 1980s, however, the language has begun to break out of the deaf community "ghetto" and is now being used in an ever-widening array of social, educational, and employment situations (Branson & Miller, 1991; Lo Bianco, 1987).

A.4 Auslan, ASL, BSL, and NZSL

In this dissertation, polycomponential verbs of motion and location in Auslan are compared with those described in ASL and with data collected from signers of TSL. Auslan has no known historical links with TSL. Due to the large amount of shared vocabulary and historical connections, TSL is usually grouped into the same signed

5 Of the 24 deaf native signers with deaf parents who participated in the *Verbs of Motion Production* study described in Chapter 5, for example, nine reported that they also had deaf grandparents.

language family as Japanese Sign Language and Korean Sign Language (Smith & Ting 1979). TSL appears to be unrelated to the various signed languages used in Hong Kong and mainland China, and it is also unrelated to ASL (Smith, 1989).

Auslan is clearly part of the same sign language family as BSL, and New Zealand Sign Language (NZSL). The BSL sign language family may also be distantly related to ASL (Groce, 1985), but this remains speculation based on known historical links with Great Britain and some lexical similarities. Because of the comparison with ASL in Chapter 5, I shall thus briefly outline here some of the previous studies which have examined the relationship between the four signed languages used in these English-speaking nations.

Signers from the Australian, British and New Zealand deaf communities anecdotally report a high level of mutual intelligibility with each other, but very low levels with signers from the North American deaf community. To date, however, there have been no empirical studies that have attempted to establish the nature and degree of mutual intelligibility between signers of Auslan, BSL, and NZSL. Comparative research has so far been limited to small scale studies based on the use of lists of English glosses and dictionaries of the three languages (Johnston, 2000; McKee & Kennedy, 2000; Toms-Bernal, 1997; Woll, 1987). Conclusions about the degree of lexical similarity between the languages have varied depending on a number of factors: the size and nature of the word list or sample under investigation, the number of native signers from each signed language involved in the research, as well as the differing quality of the lexicographical work that produced the dictionaries consulted by the researchers.

The reliance on English word lists and dictionaries also means that the results of this comparative research on Auslan, BSL, and NZSL has been based exclusively on comparisons of monomorphemic lexical items, ignoring polycomponential constructions and grammatical patterning in the three languages. Similarities in the types of language contact phenomena (such as fingerspelling and mouthing) that result from all three languages existing within a larger, English-speaking community have also not been the focus of any research[6]. These reservations aside, studies by Johnston (2000), Woll (1987) and by McKee and Kennedy (2000) have shown that there appears to be a high degree of lexical similarity between Auslan, BSL, and NZSL. Woll (1987), for example, reported a similarity score of 90% for the 257 core lexical items in her study between Auslan and BSL. Woll's (1987) scores for similarity between the three signed languages are shown in Table A.1 below.

6 Anecdotal reports suggest, however, that NZSL signers make significantly less use of fingerspelling than appears to be true of signers from the Australian and British deaf communities (Rachel McKee, personal communication).

Table A.1

	Auslan	NZSL
BSL	90%	82%
Auslan		90%

McKee and Kennedy (2000) used Woodward's (1978) modified Swadesh list of 100 core concepts to compare signs listed in dictionaries of Auslan, BSL, and NZSL. Their results for identical and related signs in the three languages are shown in Table A.2.

Table A.2

	Auslan	NZSL
BSL	93%	85%
Auslan		87%

It is interesting to compare these figures with the scores for identical and related signs in Auslan, BSL and NZSL when compared to ASL (McKee & Kennedy, 2000). This is shown in Table A.3 below.

Table A.3

	ASL
Auslan	31%
BSL	32%
NZSL	26%

In lexicostatistical research of this kind, it has traditionally been accepted that a result of 36%-81% identical or related lexical items indicates that two languages belong to the same family, while languages with above 81% shared vocabulary are considered dialects of the same language (Crowley, 1992). Figures such as those in Tables A.1 and A.2 would thus tend to suggest that Auslan, BSL, and NZSL are most appropriately considered dialects of the same signed language[7]. McKee and Kennedy (2000) claimed, however, that the methodology from both the study by Woll (1987) and their own use of the modified Swadesh list are likely to have selected signs which have a high degree of stability over time due to their high frequency of use. In order to study a more representative sample of lexical items, McKee and Kennedy (2000) used a second method of comparison. A set of 100 signs were randomly selected from the *A Dictionary of New Zealand Sign Language* (Kennedy, Arnold, Dugdale, Fahey & Moskovitz, 1997) and compared with signs with the same English glosses in dictionaries of Auslan, ASL and BSL. This second study produced much lower figures of identical and related signs between BSL, NZSL, and Auslan, as can be seen in Table A.4.

Table A.4

	NZSL-BSL	NZSL-Auslan
Identical or related signs	59%	65%
Different signs	41%	35%

The figures from McKee and Kennedy's (2000) study of randomly selected lexical items suggest that the non-core monomorphemic sign lexicons of Auslan, NZSL, and BSL appear to differ significantly. Questions about the reliability of this research aside (Johnston, 2000), this result is very much what we would expect. Lexicostatistical research of this kind works on the assumption that the core vocabulary is much less subject to historical change than non-core lexical items (Crowley, 1992) [8]. In fact, McKee and Kennedy's (2000) study of randomly selected signs was somewhat unnecessary if the aim was to determine degrees of relationship between the three varieties. The procedures for determining whether different language varieties belong to the same language (greater than 81% shared vocabulary) or separate languages (less than 81% shared vocabulary) is most often based on the similarities in their core lexicons alone (Crowley, 1992).

Despite the high percentages of similarity in basic lexical items described in Johnston (2000), Woll (1987) and McKee and Kennedy (2000), the rate of divergence in the core vocabulary of the three languages might be considered somewhat higher than we might expect for three varieties of the same language. Certainly, these percentages appear to be higher than the differences in core vocabulary we might find between the varieties of English spoken in each country (Crystal, 1995). Lexicostatistical methodology, as already mentioned, tends to assume that the rate of vocabulary change in the core lexicon is more or less stable. A comparative study of 13 different spoken languages with a long tradition of written records, for example, showed an average vocabulary

[7] Collins-Ahlgren (1989) disputed this claim, however, based on anecdotal reports she collected which suggested relatively low levels of mutual intelligibility between signers of BSL and NZSL.

[8] McKee and Kennedy (2000) were aware that their use of the lexicostatistical methodology is not uncontroversial. They quoted Dixon (1997) who "...has argued that it is not legitimate to assume that there is a distinction between a so-called 'core vocabulary' which behaves differently from non-core vocabulary; or that the

retention of 80.5% for every thousand years (Crowley, 1992). There seem to be a number of reasons for the relatively greater divergence between the three signed languages. Auslan, NZSL, and BSL may have undergone relatively accelerated natural processes of historical change due perhaps to the period of comparatively minimal contact between the three deaf communities for most of the last 140 years (since the establishment of the first schools for deaf children in the colonies in 1860), the lack of any standardized and codified written variety of the language, and the interrupted patterns of language transmission and acquisition which are peculiar to signed languages described above. Possibly as a result of the relatively small size of the deaf community in New Zealand and the exclusive use of spoken English in deaf education between 1880 and 1979 (when Australasian Signed English was introduced into New Zealand schools), this lack of contact with other deaf communities may have resulted in a comparatively more disrupted transmission of signed language in New Zealand from one generation of deaf children to the next. Gerrit Van Asch, the founder of the first school for deaf children in New Zealand, is known to have been an ardent oralist and is said to have refused admission to signing children (i.e., those with deaf parents or those who had received part of their education by means of the "manual" method in Australia or Britain). This policy appears to have continued for several decades after the school was first opened (Collins-Ahlgren, 1989), and differs markedly from the experiences in Australia where some use of signed communication was retained in a several schools for deaf children for most of the last century. Signed communication did, however, develop naturally amongst the school children in New Zealand and was used in the school dormitories, but it is difficult to know how much this school-based signing was influenced by BSL. The continued use of these novel school-based signs may partially explain the figures which suggest that NZSL shares fewer lexical items with both Auslan and BSL than these two languages do with each other (Kennedy & McKee, 2000).

The distance between the various schools for the deaf in state capitals of Australia and the resulting relative isolation of the deaf communities in each state also appears to have lead to the creation of school-based and/or regional lexical variation in Auslan (Johnston, 1989). This may be the reason for some of the lexical differences in the language which appear to be distinct from regional lexical variants in BSL, although this has not yet been the subject of any research.

In addition to this, Auslan has also been influenced by signed languages other than BSL and NZSL, having apparently borrowed a number of lexical items from the variety of Irish Sign Language (ISL) traditionally used

lexicon of all languages is replaced at a constant rate; or even that genetic relationships can be derived from lexical studies alone".

in Catholic schools for the deaf, and from ASL (Johnston, 1989). Examples are shown in Table A.5. A small number of Auslan signs such as HOME, COUSIN, YESTERDAY and MORNING are identical to signs still used in ISL (National Association of the Deaf, 1995)[9], although some of these signs are also used in regional varieties of BSL (it seems likely, however, that these may also represent borrowings from ISL, see Brennan, 1992; Sutton-Spence & Woll, 1999). The many lexical items which appear to have been borrowed from ASL include COLLEGE, INTERPRET, COURSE, THEORY, INTERVIEW, ORGANIZATION and CULTURE (Schembri, 1996). Although similar influences from ASL are evident in BSL (Brien, 1992; Sutton-Spence & Woll, 1999), native signers from Britain, New Zealand, and Australia anecdotally report that the number of ASL loan signs in the non-core lexicon of Auslan appears to be greater (these reports have not yet, however, been the focus of any research). The degree of influence on the Auslan lexicon from signed languages such as ISL and ASL, along with a greater understanding of the relationship between Auslan, BSL, and NZSL, awaits further investigation.

Table A.5

				
HOME	COUSIN	YESTERDAY	COLLEGE	INTEPRET
				
COURSE	THEORY	INTERVIEW	ORGANIZATION	CULTURE

A.5 Historical aspects of Auslan

In Chapter 4, it is mentioned that verbs of motion resembling the use of polycomponential verbs of motion and location in Auslan have also been reported in recently emerged creole signed languages, such as Idioma dos Signos Nicarguense (ISN) (Senghas, 1994). Although Auslan itself might be considered a comparatively young signed language variety (the deaf community in Australia being apparently less than 200 years old at the end of

9 The signs YESTERDAY and MORNING of possible ISL origin appear to be most widely used in the northern (i.e., New South Wales and Queensland) variety of Auslan.

the twentieth century), the following historical overview will show that it is related to varieties of signed language which may have been used in Britain for several centuries.

There is no evidence that Auslan developed from any indigenous signed language among non-Aboriginal deaf people in Australia (for discussion of these signed languages, see Kendon, 1988). Historical records clearly indicate that Auslan developed from the varieties of BSL that were introduced into Australia by deaf immigrants, teachers of the deaf (both deaf and hearing) and others concerned with the welfare of deaf people in the 19th century (Johnston, 1989).

Prior to the establishment of the first schools for the deaf, a number of signing deaf people from Great Britain had emigrated to Australia. The earliest known non-Aboriginal deaf person was Elizabeth Steel who arrived in Sydney in 1790 as a convict aboard the *Lady Juliana* (Branson & Miller, 1995). There is no evidence, however, that she used signed language of any kind. The earliest known signing deaf person was the Sydney engraver John Carmichael who arrived in 1825 on the *Triton*. Unlike what is known about Steel, there is a great deal of evidence that Carmichael used BSL and was indeed a talented storyteller in signed language (Carty, 2000). He was educated at the Edinburgh Deaf and Dumb Institution with Thomas Pattison, who later founded the first school for the deaf in Australia. There are no records to indicate whether Carmichael was alone or formed part of a community of deaf people in Sydney at the time, but it seems unlikely that he would have remained in Sydney without the company of fellow signed language users until his death in 1857 (Pattison did not arrive in Sydney until 1858).

It is not known if any there were any deaf people among the non-Aboriginal population in Australia before the arrival of deaf British immigrants. There may have been small numbers of deaf children and adults before this time, but no written records of deaf Europeans in Australia other than Steel and Carmichael have been found. It seems probable that the small number of deaf individuals who immigrated to Australia and lived in the larger towns at the time may have formed very small deaf communities, but that deaf people outside the largest urban centers may have never come into contact with another deaf person. Thus, apart from some basic home signs that may have developed for limited communication with their immediate family and friends, it is unlikely that most deaf people would have known a signed language. This is still the case for many deaf children today who grow up isolated in poor rural areas of countries like India (Sutton-Spence & Woll, 1999).

The recorded history of Auslan, like that of many other signed languages, is thus closely bound up with the education of deaf children. The first two schools for the deaf were opened within a few weeks of each other in 1860, first in Sydney and then in Melbourne (Johnston, 1989). As mentioned above, Pattison founded the

Sydney school, while another deaf man, Frederick J. Rose (a former pupil of the Old Kent Road School for the Deaf and Dumb in London), opened the Melbourne school. Rose had arrived on the Victorian goldfields in 1852 and had traveled back and forth between England and Australia several times before establishing the school. The method of instruction in both schools seems to have involved some use of fingerspelling and signed language, although whether this was BSL, some form of signed English, or a combination of the two is not known.

Auslan thus appears to have developed from the varieties of BSL that were brought to Australia in the early to mid 19th century by deaf immigrants and deaf and hearing teachers who started education for deaf children. It has sometimes been claimed that the traditional lexical differences which characterize the signing used in the Sydney and Melbourne deaf communities stem from differences in the varieties of BSL used in each of the original schools for the deaf (Johnston, 1989). Modern BSL exhibits a significant amount of regional lexical variation (Brien, 1992), and it seems probable that lexical differences existed in the signed language used in the Edinburgh and London schools for the deaf where Pattison and Rose were educated. Certainly, anecdotal reports suggest that the traditional lexicon of signs used in Melbourne continues to closely resemble those used in the London variety of BSL (Robert Adam, personal communication, 1999). The number systems and color vocabulary traditionally used in both of these cities is almost identical, for example, but a greater understanding of the degree of lexical similarity awaits further research.

The origins of BSL itself are unknown. The earliest historical records discovered to date show that some form of signed language was used by deaf people in Britain by at least the 16th century, although the relationship between modern BSL and these early forms of signed communication is not well understood. It is certainly misleading to suggest that these forms of signed communication were in fact varieties of BSL (Rée, 1999). Jackson (1990: 3), for example, claimed 'BSL was in common usage among deaf people, and some hearing people, by the early 1630s, and had probably been in existence for centuries before that as well'. There is simply not enough historical evidence for this, as descriptions of signed language use in centuries past are sketchy at best.

The parish register of St. Martins in Leicester, for example, mentions that in February 1575, a deaf man by the name of Thomas Tillsye was married to a woman named Ursula Russel, and that Thomas made his wedding vows in sign (Sutton-Spence & Woll, 1999), but provides very little detail of the signs he actually used.

Amongst the earliest records which describe the signed language(s) in use in 17th century Britain are two books by John Bulwer, *Chirologia* and *Philocophus*, published in 1644 and 1648 respectively (Kyle & Woll, 1985). The latter book was dedicated to a baronet and his brother, both of whom were deaf. The following passage from the dedication shows that Bulwer (1648, quoted in Kyle & Woll, 1985: 50) recognized the signed language used by the two brothers was the equal of spoken languages in expressive power:

> You already can expresse yourselves so truly by signes, from a habit you have gotten by always using signes, as we do speech: Nature also recompensing your want of speeche, in the invention of signes to expresse your conceptions.

Bulwer (1648, cited in Kyle & Woll, 1985) provided only written descriptions of the signs used by the deaf brothers, but it appears that some of these descriptions closely resemble signs with a related form and meaning used in BSL, Auslan, and NZSL today (see Table A.6), such as GOOD, BAD, WONDEFUL, SHAME, PRAISE, and JEALOUS.

A number of other written sources make it clear that deaf people were using forms of signed language before the first schools and institutions for the deaf opened in Britain. The famous diarist, Samuel Pepys, described an encounter with a deaf servant who signed to his master, George Downing, to tell him of the Great Fire of London in 1666 (Sutton-Spence & Woll, 1999). A two-handed manual alphabet clearly related to the alphabet used in modern BSL and Auslan is described in an anonymously published pamphlet *Digitilingua* from 1698 (Kyle & Woll, 1985). In the novel *The Life and Adventures of Mr. Duncan Campbell, Deaf Mute* published in 1732, Daniel Defoe described signs and fingerspelling as being widely used by deaf people (Woll, 1987). Although the majority of deaf people in rural communities were isolated from each other at this time, Sutton-Spence and Woll (1999) suggested that sources such as these demonstrate that small signing deaf communities existed in the larger towns and cities in Britain in the 17th and 18th centuries, and may have done so for many years prior to these written accounts.

The use of modern BSL, however, most certainly began with the advent of the industrial revolution and its accompanying social and economic changes. The resulting population explosion in the 18th and 19th centuries and the mass migration to cities led to a significant increase in the number of deaf children in urban centers, and this seems to have played a significant role in the introduction of public education for deaf children (Johnston, 1989). The first British school for deaf children was opened in 1760 by Thomas Braidwood in Edinburgh (Kyle & Woll, 1985). Although his teaching methods were kept secret, it is widely believed that he used some combination of signed language, reading, writing, and spoken English. By 1870, some 22 schools for the deaf had been established in the UK. In the early years of deaf education, the most common method of instruction was the combined method used by Braidwood, but by mid-century, Kyle and Woll (1985) claimed that all instruction was in sign (probably some form of BSL together with fingerspelling), with literacy in English (rather than speech) the main educational goal. Most schools were residential and many of the staff were themselves deaf. These schools allowed for the creation and consolidation of the British deaf community and of modern BSL. The signed language used today appears to have evolved from the language(s) used in these institutions. It was in the schools for the deaf that the home signs of pupils, the signed language(s) of the urban deaf communities, and signs created by educators mixed together. A similar process appears to have occurred in North America, leading some writers to suggest that signed languages such as ASL and BSL are in fact creoles (Fischer, 1978, 1996; Ladd & Edwards, 1982).

The existence of central schools for the deaf thus helped to stabilize and standardize the many varieties of BSL in use throughout the country (although considerable social and regional variation continues to this day). Many of these newer schools were set up by former students and ex-teachers of the older established schools, and this probably helped to further standardize signed language use throughout Britain (Johnston, 1989). This pattern was repeated in Australia where the first two schools in Sydney and Melbourne were opened by former pupils of the schools for the deaf in Edinburgh and London respectively. The history of Auslan is thus a relatively smooth transition from BSL, with an uninterrupted pattern of transmission of signed language from Melbourne and Sydney to schools for the deaf in Adelaide (1874), Brisbane (1893), Perth (1896) and Hobart (1904)[10].

In 1875, a deaf nun, Sister Mary Gabrielle Hogan, came from Ireland to open the Rosary Convent school for Catholic deaf children in Waratah (now a suburb of Newcastle), New South Wales. In the classroom, Hogan used signs adapted from ISL and the one-handed manual alphabet used in Ireland. In the later half of the 19th century and early 20th century, additional Catholic schools for the deaf were opened in other parts of Australia (in Castle Hill, New South Wales, and at Portsea in Victoria). The use of ISL signs was discontinued in the 1950s, however, when Catholic schools began to use spoken English exclusively as the method of instruction (together with Cued Speech). As a result, the use of ISL in Australia is now almost entirely confined to those older members of the deaf community who were educated in Catholic schools for the deaf, and almost all of these individuals are bilingual in ISL and Auslan (Johnston, 1989). Because Auslan remains the language used in

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[10] Historical records suggest that signed languages may have been in use amongst deaf people in these cities prior to the establishment of schools for the deaf. A deaf boy named Henry Hallett, for example, is known to have arrived in Adelaide on the *Africaine* in 1836 (Breda Carty, personal communication, 1999). He was just a small child when he arrived with his family (none of whom were deaf), but he later married a deaf woman, Martha Pike, who had been born in South Australia, and they were the forerunners of several generations of deaf Halletts. Although there is no direct evidence, it seems likely that Hallet and Pike (and perhaps other deaf South Australians) may have used some kind of signed language.

the adult deaf community, it appears as if the Australian variety of ISL is no longer being passed down from one generation of signers to the next and will probably be entirely extinct soon after the turn of the century.

Table A.6

Bulwer's description (1644)	Meaning	Auslan sign
"Throw the hands up to heaven"	"Amazement"	WONDERFUL 
"Hand to the face"	"Shame"	SHAME 
"Hold up thumb"	"Assent"	GOOD 
"Hold up both thumbs"	"Transcendency of praise"	PRAISE 
"Extend little finger from fist"	"Contempt"	BAD 
"Suck on finger in mouth"	"Envy"	JEALOUS 

Unlike New Zealand, the use of signs and fingerspelling continued for some students in Australian schools for the deaf through the late 19th century and into the early 20th century, but many other students were also taught to speak and lip-read (Crickmore, 1990). This was especially true after the Congress of Milan in 1880 where the majority of educators called for a ban on the use of signed communication in the classroom and demanded purely oral methods of instruction. School records from this period in Great Britain show falling numbers of deaf teachers of the deaf, and a decreasing reliance on signs in teaching (Brennan, 1992). The use of purely oral methods or the exclusive use of fingerspelling combined with speech became widespread in Australia in the early decades of this century (Johnston, 1989). From the 1950s, educational methodologies became increasingly focused on the sole use of spoken English as a medium of instruction. This was made possible by technological advances in hearing aids and other assistive devices (Crickmore, 1990). Following changes in educational philosophies in the 1960s, the emphasis shifted to "normalizing" the education of deaf children as much as possible, and residential schools began to close down. By the 1980s, deaf children were increasingly integrated into classes with hearing children or attended classes in small units attached to regular schools. The use of signed language came to be seen only as a last resort for those who failed to acquire spoken English. The closure of centralized, residential schools for deaf children meant that many deaf children did not have children from deaf families or deaf ancillary staff as linguistic role models (Johnston, 1989). This has made the transmission of Auslan from one generation of deaf people to the next even more disrupted than before. In the first chapter of the dissertation proper, I discuss the implications this has for signed language research in Australia.

The greater focus on spoken English did not, however, consistently result in higher levels of educational achievement for most deaf children (Lane, 1992). As a result, interest in the use of the signed communication returned in the early 1970s. In Australia, the prevailing educational wisdom at the time, however, stressed that the use of a signed language ought to form part of a combined method in which English was spoken and signed simultaneously, with the manual component reproducing the grammatical characteristics of the spoken component exactly (Leigh, 1995). The resulting system, known as Australasian Signed English (ASE), drew on a lexicon of Auslan vocabulary and contrived signs to represent spoken English on the hands (Jeanes & Reynolds, 1982). By 1992, a survey of teachers of the deaf across Australia indicated that 84% of those in signing programs for deaf children used this system as the method of instruction (Hyde, Power & Cliffe, 1992). Although a number of bilingual programs using both English and Auslan have been established in several states over the last decade (Komesaroff, 2000), the use of ASE remained the most widespread communicative approach in government schools for deaf children in New South Wales at the end of the 20th century (Leigh, 1995).

Despite the many changes in approaches to the education of deaf children in the last 140 years, it seems that varieties of Auslan have remained the primary or preferred language of the deaf community throughout much of that time (Johnston, 1989). Deaf children educated in a variety of settings have generally learned Auslan from their peers, or after they have left school and begun to mix with other deaf people. There can be little doubt, however, that the various educational philosophies which dominated deaf education over the last century—all of which have variously emphasized skills in signed, spoken, fingerspelled, and/or written English (with varying degrees of success) rather than the use of Auslan—have had considerable impact on the signed language of the deaf community.

A.6 Sociolinguistic variation in the Australian deaf community

All of the features of the social and historical context of signed language use in Australia mentioned above result in considerable sociolinguistic variation in the use of Auslan. In the discussion above, the historical factors which have led to a significant amount of lexical variation due to region and to the former use of ISL in Catholic schools for deaf children have already been mentioned. A range of other factors, such as age, gender, subgroup identity, education and socio-economic status also play a role. These are discussed elsewhere (Branson, Bernal, Toms, Adam & Miller, 1995; Johnston, 1989), so I shall focus here on the variation in signed communication due to the relationship between Auslan and English. An understanding of this complex sociolinguistic situation has implications for the methodology used to collect the data for this study.

The spoken language of the surrounding hearing community is perhaps the single greatest influence on the varieties of signed language found in the Australian deaf community. Although it has developed a core lexicon of signs and aspects of its grammatical organization which are relatively independent of English, Auslan nevertheless exists in a complex inter-relationship with the spoken language of the surrounding community (Johnston, 1991c, 1996b; Page, 1998). Even amongst native signers with relatively little knowledge of English, phenomena not unlike code mixing and code switching regularly occur, and many other members of the signing community use a range of contact varieties between the two languages. Influences from the spoken language are realized both lexically and syntactically, particularly as loan translations in signed form, the mouthing of English words, and by means of fingerspelling (the use of a manual alphabet which enables English words and phrases to be spelt out on the hands).

Some of these language contact phenomena appear to be unique to signed languages and have probably influenced the structure and use of these languages throughout their history (Lucas & Valli, 1992). The nature and extent of the relationship between signed and spoken languages thus remains difficult to characterize (Johnston, 1991c; Sutton-Spence, 1994). This is partly due to the existence of a range of English-influenced signed language varieties which are used in addition to Auslan by many members of the deaf community. Differentiating between these varieties, and even between English-influenced sign and Auslan, remains problematic (Page, 1998), but a number of distinctions appear useful. In this section, I will briefly discuss Australasian Signed English (ASE), pidgin sign English (PSE), sign-supported English (SSE), signed interlanguage, and contact signing.

As previously mentioned, during the last three decades of the 20th century, ASE remained the most widely used method of instruction in programs for signing deaf children (Leigh, 1995). ASE is an example of what might be called an *artificial sign system* (Fischer, 1998). Unlike a natural language, ASE is a language system devised by a committee in the 1970s as an exact representation of English in signed form (MacDougall, 1988)[11]. Although its lexicon borrows heavily from Auslan, the signs used in ASE are standardized for specific English meanings, and combined with contrived signs which represent English determiners, pronouns, prepositions and other function words necessary to represent English morphosyntax. Despite its widespread use in deaf education, several studies overseas have raised questions about the capacity of teachers to use artificial sign systems for manually encoding English (Leigh, 1995). Perhaps the most serious problem for these systems was demonstrated in a classic experiment by Bellugi and Fischer (1972). This study showed that signs on average take twice as long to articulate as words, due partly to the relatively larger size of the articulators involved in the production of signs (the hands and arms versus the speech tract). In order to represent English in signed form, the rate of articulation must thus decrease to an unnaturally slow pace, or many of the signs must be dropped. The implications of this finding for artificial sign systems have been confirmed by recent research in Australia. Leigh (1995) has shown that while some pre-school teachers seem able to represent English accurately using ASE in interactions with very young children, the greater linguistic demands of upper primary and secondary school education lead to much lower levels of accuracy in the simultaneous use of signed and spoken English. Leigh's (1995) study demonstrated that less than 30% of all utterances signed by secondary school teachers using ASE were considered to be grammatically acceptable by independent raters, compared to 53% and 78% for primary and pre-school situations respectively. The impact of such inconsistent language role models for deaf children from hearing families is not well understood. ASE is not widely used in the Australian deaf community (Deaf Society of NSW, 1998), and research overseas has reported that deaf children in schools using an artificial sign system may not always use it to communicate with each other (Supalla, 1991). The effect of two decades of instruction in ASE on the signed language used by younger members of the deaf community has not as yet been the subject of any research, but there is some evidence that it has had a significant impact on the Auslan lexicon (Johnston, Adam & Schembri, 1997).

Signed language varieties influenced by English that are used in the Australian deaf community are often collectively referred to as *Pidgin Sign English* (PSE) (Deaf Society of NSW, 1998). PSE is generally conceived of as a simplified signed language variety showing a mixture of Auslan and English grammatical features (Johnston, 1989). Strictly speaking, however, a pidgin is usually the result of language contact between adult users of mutually unintelligible languages which occurs for very specific purposes, such as trade. The vocabulary often does not come from either of the languages used by these adults, but from a third language which neither of them speak fluently (Valli & Lucas, 1995). Some researchers have thus suggested that the use of a term like *pidgin* or *PSE* to refer to these varieties of signed language is not appropriate. There are a number of other reasons for this claim.

Firstly, many hearing people and some deaf people who have successfully acquired English as a first language often use a type of signing which is best characterized as a *natural sign system* (Fischer, 1998). Like ASE, natural signs systems are ways of representing a spoken language in signed form. Unlike ASE and other artificial signs systems, however, they are varieties of signed language which result naturally from language contact between the language of the deaf community and the spoken language of the surrounding hearing community. A signer may simultaneously speak or mouth English, while Auslan signs and fingerspelling are used for the content and some of the function words in the message. In these cases, the signer is effectively using a signed variety of English, and not a pidgin. It is not simplified, as the addressee understands the full message by interpreting the combination of signs, fingerspelling, and mouthing. This is sometimes also called *sign-supported English* (SSE). In signed language interpreting, the use of this form of signing is sometimes known as *transliteration*.

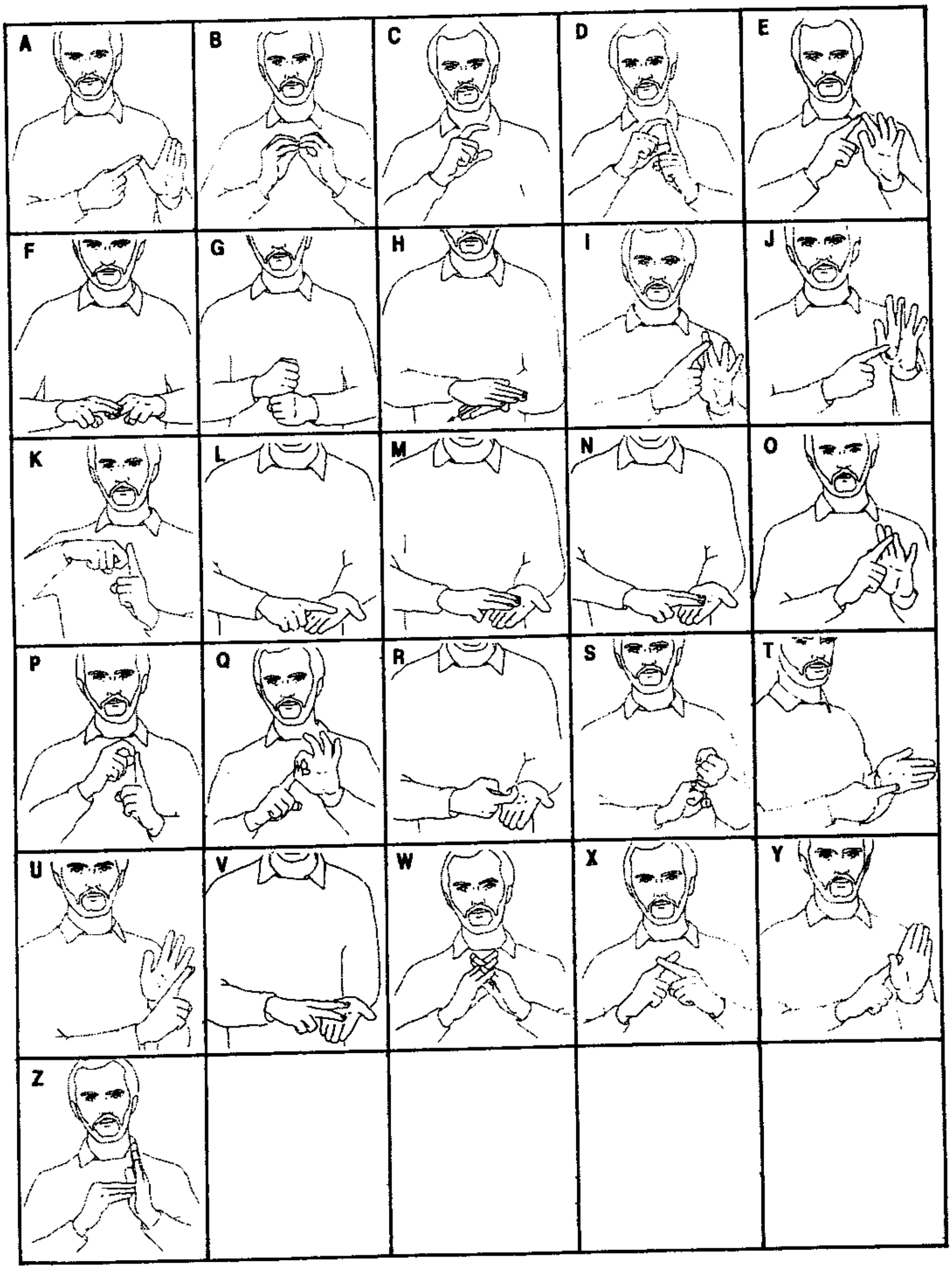
[11] The complex histories of signed languages and their relationship to forms of signing in deaf education show, however, that widely-accepted distinctions between "natural" and "artificial" signed languages may reflect difference not so much of kind, but merely of degree.

Secondly, other English-influenced varieties of signed language used by hearing and deaf people might more effectively be characterized as a type of signed *interlanguage*. This is the term used to refer to a learner's developing knowledge of a second language. Many hearing and deaf adults learn Auslan as a second language after the acquisition of English. Depending on their degree of involvement with the deaf community, their acquisition of Auslan may take many years. During this time, they may use a variety of signed language which has some of the lexical and grammatical characteristics of English, some characteristics of Auslan, and other characteristics which seem to be very general and tend to occur in all interlanguage systems (Lightbown & Spada, 1993). Native or fluent signers of Auslan who communicate with a second language learner might be said to be using a type of signed *foreigner talk*, modifying their input so that the learner will be able to understand (Sutton-Spence, 1994).

It is not clear how to differentiate SSE and signed *interlanguage* from another variety described in the literature which Lucas and Valli (1992) referred to as *contact signing*. Their research has shown that many bilingual deaf and hearing signers regularly use a type of signing which mixes features of both spoken and signed languages. It may involve the use of ASL signs, the use of space and non-manual features, combined with English word order and mouth patterns. Although often thought to be exclusively used by deaf people when signing with hearing people, research has shown that contact signing also occurs quite frequently between deaf people (Lucas & Valli, 1992).

One could argue that contact signing is separate from a natural sign system or SSE because it involves a mixture of features of a natural signed language and English, rather than simply being English in signed form (Lucas & Valli, 1992), but the distinction between natural sign systems and contact signing had not been clarified in the research literature. Contact signing may also be distinct from signed interlanguage and foreigner talk because the signers described by Lucas and Valli (1992) are fluent, near-native or native users of the language. In practical terms, however, the boundaries between the different signed language varieties are blurred, and the exact nature of the language contact situation in the Australian deaf community is extremely complex (Johnston, 1991c, 1996b; Page, 1998). There is still a need for considerable amount of research before the relationship between Auslan and English is better understood.

Appendix B
The two-handed fingerspelling alphabet used in Auslan, BSL, and NZSL



Appendix C
Glossing, transcription conventions & HamNoSys

In this dissertation, italicized words in examples are the literal translations of non-English words (e.g. *child*), while italicization is used in the text to represent examples of words from spoken languages (e.g. *tableau*). Words in quotes (e.g. "elephant") refer to a translation of the non-English examples.

For signed language data, each lexical sign is represented by means of a gloss, supplemented by symbols for non-manual signals and for modifications of signs. A gloss is one or more English word(s) that is used as a reference name for a particular sign and is written in small upper case letters (e.g. SISTER). The gloss in not meant as an exhaustive definition of a sign, but as an attempt to represent in English the central or most common meaning associated with that sign. If more than one word is required to gloss a sign, then the words are written as a single unit joined by hyphens (e.g. HOW-MUCH). Compounds are represented in the following way: MOTHER^FATHER. All glosses are based on those used in Johnston (1989), except for the use of pronominal pointing signs where I have used PRO-1 for the first person pronoun pointing sign and PRON as a gloss for the non first person pronoun pointing sign.

Fingerspelled items are represented in lower case letters, but each manual letter is represented with a hyphen before and after it (e.g. -s-o-n-).

Modifications of signs are indicated before and after the gloss with a plus (e.g. '+') symbol between the sign gloss and the symbols for the modifications as well as between each modification symbol (e.g. *center* + GIVE + *forward*). The spatial modification symbols are *center* for the signer's locus, *left* and *right* for the left and right sides of the signing space, and *forward* for a location directly in front of the signer. In some cases, a signer will use a locus such as *forward-right* or *forward-left*, or one close to the side of their body such as *side-right* or *side-left*. If a sign is pluralized, then it is represented as having a *+pl.* modification. If a sign is repeated, then + *rept.* is used.

Polycomponential signs are also represented by means of glossing, but each meaningful component is glossed separately and is written in lower case letters to distinguish them from lexical signs. The first part of the glossing (e.g. *B: vehicle*) refers to the handshape unit, followed by notations for the meaningful units expressed through movement and space, usually grouped together by means of parentheses. With a sequence of locative units expressed through movement (e.g. *left* + *move-line* + *right*), then locative unit representing the initial position of the hand(s) is represented first, and the final position is represented last. A list of handshape units is provided in Chapter 3. The terminology used for movement units is preliminary, and based on the discussion in Engberg-Pedersen (1993).

As a number of articulators are used simultaneously in signed languages, the notation of some examples makes use of a score with horizontal lines where each line represents one set of articulators. In most cases, information about articulators other than the hands is described in English. In some cases, a configuration of non-manual articulators is reduced to a single symbols. Topicalized constituents of a phrase, for example, are represented with the use of a single symbol (e.g., ____t as superscript).

Table C.1 A specification of the parameters of the signs SISTER and THANK. (Note that all signs are conventionally described from the point of view of a right-handed signer.)

	SISTER		THANK	
HANDSHAPE	[illegible]	G"	[illegible]	Bflat
ORIENTATION	^0	Hand up, palm left	^○	Hand up, palm towards the signer
LOCATION	⅄	Nose	∪X	Contact chin
MOVEMENT	X +	Contacts twice	↥	Moves away from the signer
NON-MANUAL FEATURES		–		–

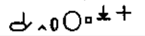
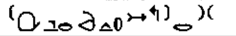
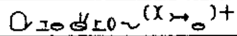
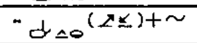
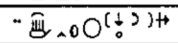
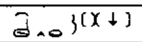
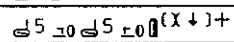
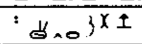
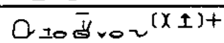
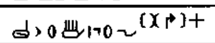
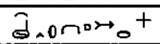
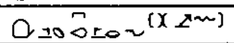
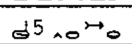
In Chapter 2, the parameter model of sign sublexical structure was discussed. In this model, each sign is analyzed as being articulated with one or more handshapes, which are oriented in a specific direction and which perform one or more distinct movements at a location or locations in the signing space or on the signer's body. Each sign may also be accompanied by a particular non-manual feature. Just as in spoken languages, transcription systems have been developed using symbols for each of the distinctive units involved in sign production. These systems have enabled researchers to describe the production of signs in written form. In Appendix D, all Auslan lexical signs discussed in this dissertation (but not all those given in examples or in the narrative in Chapter 3) are described by means of one such transcription system. In Appendix D, I have listed the most central English gloss, together with a broad transcription. The transcription system shown in these examples is known as the *Hamburg Notation System* (often abbreviated to *HamNoSys*). This was developed at the Institute for German Sign Language and Communication of the Deaf at Hamburg University, Germany, and has been used in previous work by myself and my colleague Trevor Johnston as a way of recording signs in written form (Johnston, 1991a, 1996a; Schembri, 1996). Each symbol in these examples is explained in Table

C.1 above, but there is insufficient space here to give a complete account of this notation system. For a full description of all symbols used in HamNoSys Version 2.0 refer to Prillwitz, Leven, Zienert, Hanke & Henning. (1989). For information on more recent versions of HamNoSys, visit the following website: http://www.sign-lang.uni-hamburg.de/Projects/HamNoSys.html.

Appendix D
Alphabetical list of Auslan glosses used in this dissertation and HamNoSys notation of the corresponding sign

AND	[illegible]
ARRIVE	[illegible]
ASHTRAY	[illegible]
AWARE, UNDERSTAND	[illegible]
BACKWARDS, BACK	[illegible]
BAG	[illegible]
BED	[illegible]
BE-NEAR	[illegible]
BIG	[illegible]
BIRD	[illegible]
BOAT	[illegible]
BOOK	[illegible]
BOY	[illegible]
BREATHE	[illegible]
BROOM, SWEEP	[illegible]
CLUB	[illegible]
COME	[illegible]
COTTON-BUD	[illegible]
CRASH	[illegible]
CRY	[illegible]
DANCE	[illegible]
DEAF	[illegible]
DOG	[illegible]
DREAM	[illegible]
DRINK	[illegible]
DRIVE-TO	[illegible]
DUCK	[illegible]
FATHER	[illegible]
FEEL	[illegible]
FLY	[illegible]
FORGET	[illegible]
FRIEND	[illegible]
GIRL	[illegible]
GIVE-BACK	[illegible]
GO	[illegible]
HAPPY	[illegible]
HOUSE	[illegible]
HOW-OLD, AGE	[illegible]
INSECT	[illegible]
JUMP	[illegible]

LANGUAGE	[illegible]
LEAVE	[illegible]
LIKE	[illegible]
LINGUISTICS	[illegible]
LOVE	[illegible]
ME	[illegible]
MEETING, CONFERENCE	[illegible]
MIND	[illegible]
MORE	[illegible]
MOTHER	[illegible]
MOVIE-REEL	[illegible]
NATIONAL	[illegible]
NOT	[illegible]
OWE	[illegible]
PARK-CAR	[illegible]
PAY	[illegible]
PERSON-LIE-DOWN	[illegible]
PLANE	[illegible]
PLATE	[illegible]
PLEASE-YOURSELF	[illegible]
PRETEND	[illegible]
PUT	[illegible]
QUARREL , FIGHT	[illegible]
RED	[illegible]
REMEMBER, MEMORY	[illegible]
REMIND	[illegible]
ROCKET	[illegible]
ROLL	[illegible]
ROOF	[illegible]
RULER	[illegible]
RUN	[illegible]
SCHOOL	[illegible]
SEE	[illegible]
SEW	[illegible]
SHOOT	[illegible]
SHOW	[illegible]
SIGN	[illegible]
SIT	[illegible]
SLEEP	[illegible]
SMILE	[illegible]
SOCK	[illegible]
STAND	[illegible]
STRANGE, FUNNY	[illegible]
SWALLOW	[illegible]
SWIM	[illegible]
TABLE	[illegible]
TASTE	[illegible]

TEACHER	
TEA-CUP, TEA	
TELL, SAY	
TOSS-AND-TURN	
TRAINING, TRAIN, PRACTISE	
TRAVEL	
TREE	
TRY	
VERY	
VISIT	
WALK	
WHEEL	
WORRY	
WRITE	
WRONG	

Appendix E
Complete description of all the animated film stimuli used for the data elicitation sessions

STIMULUS LIST (adapted from Supalla et al., in press)

Item number	Stimulus description
1.	A loop moves diagonally upwards.
2.	A ruler moves across a lawn.
3.	A toy girl jumps into a plumbing nut.
4.	A cylinder falls off a swing.
5.	An upright baby doll wanders across the floor.
6.	A white pipe cleaner jumps off a toy cactus.
7.	A toy porcupine moves, turns, and moves again.
8.	A toy airplane flies through a plastic T-pipe.
9.	A Christmas tree jumps onto a box.
10.	A toy wreath falls down from above a model fireplace.
11.	An ashtray zigzags across a lawn.
12.	A toy airplane moves, turns, and moves.
13.	A toy airplane hops in a straight line.
14.	A toy tractor moves backwards, and turns towards a book.
15.	A barrel hops downhill.
16.	A loop jumps over a toy tree.
17.	A toy chicken moves diagonally up to a wooden rod.
18.	A toy tricycle moves towards a toy mail truck, and turns to avoid it.
19.	A toy man rolls across a lawn.
20.	A dart with a suction cup flies and hits the wall of a toy building.
21.	A green toy train moves, turns, and moves.
22.	A yellow towel zigzags across a lawn.
23.	An upright wooden rod falls over.
24.	A tail wing falls off a Leggo airplane.
25.	A toy duck moves past a thin loop.
26.	A toy bed moves around a prone toy man.
27.	A broom sweeps slowly and randomly across the floor.
28.	A toilet moves across the floor.
29.	A toy tree hops in a straight line.
30.	A toy hen hops uphill.
31.	A cup jumps onto the head of a toy frog.
32.	A toy missile jumps backward on top of another missile.
33.	A toy tree moves in a straight line.
34.	A metal washer jumps out of an ashtray.
35.	A paper plane flies up and down through the air.
36.	A toy lawn-mower moves towards a toy palm tree, and turns to avoid it.

37.	A roll of paper jumps through a roll of tape.
38.	A toy dog jumps backwards over a toy bed.
39.	An upright phonebook falls down.
40.	A green toy creature flies through the air in a spiral fashion.
41.	A brick jumps off another brick.
42.	A cylinder rolls across a lawn.
43.	A balsa wood glider moves, turns, and moves again.
44.	A cotton bud/q-tip flies through a metal washer.
45.	A knife moves, turns, and moves.
46.	A toy Volkswagen falls off a thick loop.
47.	A band-aid moves, turns, and moves.
48.	A toy palm tree flies through the air in a spiral fashion.
49.	A toy truck hits a tree.
50.	A toy woman moves backward past a toy dog.
51.	A toy airplane takes off from the back of a toy tugboat.
52.	A toy airplane flies through the air in a spiral fashion.
53.	A toy fire hydrant moves, turns, and moves again.
54.	A thin oil paint brush flies backwards in a spiral fashion.
55.	A toy hollow log jumps over a stump.
56.	A toy bee wanders across the floor.
57.	An upright roll of masking tape falls over.
58.	A toy man falls from the branch of a toy tree.
59.	A movie reel rolls diagonally upward.
60.	A soup can falls off the top of an upright dart.
61.	A toy rabbit hops slowly downhill.
62.	A toy motorcycle moves, turns, and moves.
63.	A toy cactus plant falls over.
64.	A toy jeep pulls out of a hollow log.
65.	A doll jumps down off the head of another doll.
66.	A doll moves past an airplane, and turns towards it.
67.	A barrel tips over.
68.	A floor lamp moves towards a table and turns to avoid it.
69.	A piece of bone falls over.
70.	An egg flies up and down through the air.
71.	A thick paint brush moves backwards into an empty tin.
72.	A toy rescue truck zigzags uphill.
73.	An toy evergreen tree falls down off the top of a red pole.
74.	A toy tugboat moves backwards from a yellow pole.
75.	A toy turtle moves backward towards a toy tree.
76.	A toy motorcycle hops downhill.
77.	A toy robot walks and turns towards a toy motorcycle.
78.	A wooden rod spins slowly downhill.
79.	A toy rabbit falls backwards from the back of a toy zebra.
80.	A pencil moves backwards from a ruler.

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