

**Patterns from a signed language corpus:
Clause-like units in Auslan (Australian sign language)**

Gabrielle Hodge

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Supervisor: Professor Trevor Johnston
Department of Linguistics, Macquarie University
Sydney, Australia
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Abstract

Linguists have long been interested in the grammatical structure of native signed languages. The identification and analysis of units such as clauses and sentences has been of particular interest, and these units have been investigated from various theoretical approaches using various methods. Yet despite an extensive literature, most studies have concluded that the identification and analysis of grammatical units such as clauses and sentences in signed languages is difficult and problematic.

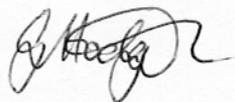
The aim of this study is to explore whether signed utterances can be identified and analysed from a clause-level perspective of analysis. To explore this aim, twenty retellings from the Auslan Corpus were enriched with annotations to identify and analyse possible 'clause-like' units (units that are potentially clauses) in the study corpus, and to identify and analyse how some of these units are linked via relations of hypotaxis. These units were identified by considering the composite nature of signed utterances as they are co-created between interactants during their face-to-face interactions. A proportion of these units were re-interpreted and re-analysed by two other annotators to ascertain percentage rates of disagreement, to resolve problematic analyses, and to identify subjective differences in the interpretation, annotation and analysis of the clause-like units identified in the study corpus.

Exploration of these annotated and checked units resulted in the identification of regular patterns of organisation in the study corpus. Many patterns appear to constitute clause-like units that may be identified and explored elsewhere in the Auslan Corpus, and may consequently suggest entrenched 'structures' of signed language use. Some patterns appear to constitute strategies of co-construction that emerge as the retellings unfold, and are highly dependent on the spatio-temporal context for recognition and interpretation. Yet other patterns appear to constitute units that are primarily by-products of the linguistic analysis undertaken here, and as such cannot be described as structures of signed language use in the study corpus.

This thesis finds that signed utterances in narratives can be identified and analysed from a clause-level perspective of analysis, but that the patterns identified represent a range of analyses—not all of which align with findings reported for other signed and spoken languages, or which necessarily suggest entrenched patterns of language use. An analysis of signed utterances from a clause-level perspective points only to symptoms of grammaticalised clause structure, not conclusive evidence of it. These findings support recent studies that indicate the tight integration of showing and telling meaning in face-to-face languages, but has significant implications for earlier claims regarding the structure of native signed languages, as well as future investigations of both signed and spoken languages.

Statement of Authorship

I hereby declare that this thesis is my own work and that, to the best of my knowledge, it does not contain any unattributed material previously published or written by any other person. I also declare that the work in this thesis has not been previously submitted to any other institution for, or as part of, a degree. This study was conducted with permission from the depositor of the Auslan Corpus and Archive (Trevor Johnston) and conducted in accordance with the guidelines stipulated.



Gabrielle Hodge

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Notation conventions

Notation	Explanation
BOY	An example sign or an annotation tag used in the Auslan Corpus or study corpus, e.g. an identification gloss (IDgloss) or other annotation (see §4.4.3).
[A V]	A schematic form of a pattern identified in the study corpus, e.g. a core argument-predicate relation (see §4.4.3).
<i>'the big bad wolf comes'</i>	A free translation of a signed utterance instantiated in the study corpus (see §4.4.3).
PT: TYPE OF POINT	An IDgloss for a token of a partly lexical pointing sign. The general tag PT is followed by additional specifications as to the type of pointing sign. For example, the IDgloss PT:PROISG tags a pointing sign that indexes first person singular (see Johnston 2013a: 24).
FS: WORD	An IDgloss for a token of a fully lexical fingerspelling. The general tag FS is followed by additional specification as to the English or other language word that is fingerspelled. For example, the IDgloss FS:VILLAGERS tags a fingerspelling of the English word 'villagers' (see Johnston 2013a: 41).
DSx(HANDSHAPE): DESCRIPTION OF DEPICTION	An IDgloss for a token of a partly lexical depicting sign. The general tag DS is followed by additional specification as to the sub-type (x) of the depicting sign. Sub-types include movement (M), location (L), size and shape (s) or the point of departure for the ground (G) of an entity or entities being depicted. This is followed by information about the formational characteristics of the depicting sign and a description of what the depicting sign depicts. For example, the IDgloss DSM(5-HORI):MANY-ANIMALS-MOVE tags a depicting sign produced using the 5 handshape in horizontal orientation to depict many animals moving from one loci to another (see Johnston 2013a: 27).
G(HANDSHAPE): DESCRIPTION OF MEANING	An IDgloss for a token of a non lexical manual gesture. The general tag g is followed by information about the formational characteristics of the manual gesture and a description of what the gesture means. For example, the IDgloss G(5-DOWN):PHOOEY tags a manual gesture produced using the 5 handshape in a downward movement to create a dismissive gesture (see Johnston 2013a: 37).
G(NMS): DESCRIPTION OF MEANING	An IDgloss for a token of a non-lexical non-manual

	gesture. The general tag G is followed by (NMS) to identify it as a Non-Manual Sign. This is followed by a description of what the non-manual gesture means. For example, the IDgloss G(NMS):NO tags a non-manual gesture produced by shaking the head to express negation (see Johnston 2013a: 39).
G(CA): DESCRIPTION OF MEANING	An IDgloss for a token of a non-lexical enactment. The general tag G is followed by (CA) to identify it as an instance of Constructed Action. This is followed by a description of what the enactment means. For example, the IDgloss G(CA):BOY-ALARMED tags an enactment that shows the boy looking alarmed.
Video FileNameIc2aCLU#XXX.mov	References an example video available in the supplementary Example Video Library. The first three or four letters (and sometimes numbers) of the FileName uniquely identify the participant. The sequence Ic2a uniquely identify the video clip as a retelling of 'The boy who cried wolf'. The sequence CLU#XXX identifies the relevant utterance in the retelling. For example, Video AJNAIc2aCLU#14 identifies the first example video in the Example Video Library. This example video comes from the retelling by signer AJNA and contains a clip of CLU#14 from this annotated file (see Appendix I).
FileName_GH.eaf	References an original ELAN annotation file (.eaf) containing all the annotations of an individual retelling. The suffix GH indicates this file is versioned by the author GH. For example, AJNAIc2a_GH.eaf identifies the first ELAN annotation file in the Study Corpus ELAN Files. This ELAN file contains annotations of the retelling by signer AJNA (see Appendix I).
FileName_GH.pfsx	References an original ELAN preferences file (.pfsx) containing the preferences for viewing an original ELAN annotation file. The suffix GH indicates this file is versioned by the author GH. For example, AJNAIc2a_GH.pfsx identifies the first ELAN preferences file in the Study Corpus ELAN Files. This ELAN preferences file contains the preferences for viewing the ELAN annotation file of the retelling by signer AJNA (see Appendix I).
FileNameIc2a.mp4	References an original video clip (.mp4) of a complete retelling produced by a signer in the study corpus that is available for download from the Auslan Corpus ELAR

deposit. For example, the video file AJNA1c2a.mp4 contains the retelling by signer AJNA (see Appendix 1). This .mp4 file can be linked to the first .eaf in the Study Corpus ELAN Files in order to view the retelling with the time-aligned annotations.

1. Introduction

He could sign beautifully. He was tall and thin, with long arms and wide, long fingers, and when he told the rest of the class stories, his arms would become whatever he was telling the story about.

— Louise Stern, *The Deaf School*

1.1. Problem statement

Linguists have long been interested in the grammatical structure of native signed languages. The identification and analysis of units such as clauses and sentences has been of particular interest, and these units have been investigated from various theoretical approaches using various methods. Many studies have investigated constituent order typology in signed languages, particularly with respect to basic word orders. Other studies have focussed on describing how specific types of units are structured in relation to morphosyntactic complexity and simultaneity. Some studies have investigated patterns of ellipsis, while yet others have investigated the role that various phenomena fulfil in signed language structure. A few studies have also considered the interaction of visual prosody and grammar for delineating the boundaries of various units.

Yet despite an extensive literature, most studies have concluded that the identification and analysis of grammatical units such as clauses and sentences in signed languages is very difficult, and that there are no clear guidelines for confidently delineating these units. This presents a serious problem for investigating the grammar of native signed languages. This problem can be attributed to the widely accepted paradigm in linguistics that signed languages are used and structured in ways that are parallel to spoken languages.

A consequence of this paradigm is that various descriptive frameworks developed for written and spoken languages are applied to signed languages without sufficient consideration of signed language ecologies, the lived experience of deaf signers, or the range of semiotic resources available to both signers and speakers during their face-to-face interactions. Instead of asking how signed language grammar is structured, one way of tackling this problem is to return to first principles by asking how signers ‘orchestrate’ and co-construct their signed utterances during their face-to-face interactions¹.

1.2. Research aim and scope

This thesis asks how Auslan signers orchestrate and co-construct their signed utterances during their face-to-face interactions. The aim of this study is to explore whether signed utterances can be identified and analysed from a clause-level perspective of analysis. This study is limited to a clause-level perspective of analysis in order to compare findings with earlier claims from the literature. The locus of this investigation is a small study corpus of twenty elicited retellings of the Aesop’s fable ‘The boy who cried wolf’. These fables were

¹ The metaphor of ‘orchestrating semiotic resources’ is borrowed from Kendon (2004) and Green (2009).

narrated by native and near-native deaf signers of Auslan and archived in the Auslan Corpus² in 2008.

Two types of corpus enrichment were undertaken. Firstly, the twenty study corpus files were enriched with annotations to identify and analyse possible ‘clause-like’ units (units that are potentially clauses) in the study corpus, and to identify and analyse how some of these units are linked via relations of hypotaxis. These units were identified by considering the composite nature of signed utterances as they are co-created between interactants during their face-to-face interactions. Secondly, a proportion of the annotations resulting from the first corpus enrichment were re-interpreted and re-analysed (i.e. ‘checked’) by two other annotators. This was done to ascertain percentage rates of disagreement, to resolve problematic analyses (e.g. clause-like units that were uncertainly identified by the author), and to identify subjective differences in the interpretation, annotation and analysis of the identified clause-like units in the study corpus.

Exploration of these annotated and checked units resulted in the identification of regular patterns of organisation in the study corpus. These patterns fell into three broad categories. Many patterns appear to constitute clause-like units that may be identified and explored elsewhere in the Auslan Corpus, and may consequently suggest entrenched ‘structures’ of signed language use. Some patterns appear to constitute strategies of co-construction that emerge as the narratives unfold, and are highly dependent on the spatio-temporal context for recognition and interpretation. Yet other identified patterns appear to constitute units that are primarily by-products of the linguistic analysis undertaken here, and as such cannot be described as reflecting structures of signed language use in the study corpus.

1.3. Research findings

This thesis finds that signed utterances in Auslan narratives can be identified and analysed from a clause-level perspective of analysis, but that the patterns identified represent a range of analyses—not all of which align with findings reported for other signed and spoken languages, or which necessarily suggest entrenched patterns of language use that convincingly reflect the way that Auslan signers organise their signed utterances. An analysis of signed utterances from a clause-level perspective points only to symptoms of grammaticalised clause structure in Auslan, not conclusive evidence of it. These findings support recent studies that indicate the tight integration of showing and telling meaning in face-to-face languages, but have significant implications for earlier claims regarding the grammar of native signed languages, as well as future investigations of both signed and spoken languages.

1.4. Original contributions

There are four original contributions of this thesis. Firstly, building upon the work of Trevor Johnston, Adam Schembri, Lindsay Ferrara and other researchers who have

² <http://elar.soas.ac.uk/deposit/johnston2012auslan>

enriched and explored the Auslan Corpus, this thesis contributes to an emerging theoretical approach for signed language description that considers the composite nature of signed utterances as they are co-created and negotiated between interactants during their face-to-face interactions.

Secondly, this thesis develops an analytical method for: (i) identifying and annotating possible clause-like units in a signed language corpus, and (ii) checking these annotated units. It also demonstrates how this method can be used to explore the full range of analyses evidenced in a data set with respect to the subjective objectivity of annotators.

Thirdly, this thesis presents an original analysis of the clause-like units identified in the study corpus and explored using the theoretical approach and analytical methods developed here. Finally, this thesis contributes empirical evidence that challenges widely-accepted ideas regarding the nature of 'structure' as an inherent feature of signed language use, and ostensibly all language use where interactants can see each other and jointly attend to shared spatio-temporal contexts.

1.5. Overview of the study

This study is framed as two enrichments and two explorations of a signed language corpus. The study corpus is primarily enriched by identifying and annotating possible clause-like units in the study corpus files. It is then further enriched by having other annotators re-interpret and re-analyse (i.e. 'check') a proportion of these units. These annotated and checked units study corpus are then explored by differentiating between tokens of possible clause-like units that 'stand alone' and tokens that are linked to others via relations of hypotaxis. The first exploration focusses on analysing the possible clause-like units identified as standing alone. The second exploration of the study corpus focusses on analysing the possible clause-like units that were identified as linked via relations of hypotaxis.

Chapter §2 examines the literature on clause-level constructions in signed languages. Previous investigations of clause-level constructions in signed languages are reviewed, and the methods for identifying and analysing these units in earlier studies are described. This review highlights four main issues that persist in the identification and analysis of clauses and sentences in signed languages, and argues that the field is in a 'pre-paradigmatic state'. Chapter §2 concludes by characterising two current problems in the literature: how clause-level constructions in signed languages are identified, analysed and described; and how signed language ecologies and the real lived experience of deaf signers are accommodated in theoretical and analytical frameworks of signed language description.

Chapter §3 strives to address these problems by drawing from the literature on face-to-face interaction, semiotics, cognitive linguistics and functional linguistics to develop a theoretical approach for identifying and analysing clause-like units in the study corpus. This chapter defines the notion of a signed language ecology and elaborates on the lived experience of deaf signers. It describes how speakers and signers engaging in face-to-face

interaction jointly orchestrate the multimodal semiotic resources available to them to create 'composite utterances'. It also outlines foundational ideas from the literature on cognitive linguistics, usage-based theory and functional linguistics.

The ideas described in this chapter shape the investigation of how Auslan signers orchestrate and co-construct their signed utterances from a clause-level perspective of analysis. Chapter §3 concludes by outlining a theoretical framework of composite utterances, lexicogrammar and clause linkage for identifying and analysing clause-like units in the study corpus.

As the aim of this research is essentially to question and explore a widely adopted approach to linguistic analysis and language description, this thesis affords significant weight and attention to the methodological processes (i.e. the two types of corpus enrichment) used to prepare the study corpus for investigating this aim. Both types of corpus enrichment were necessary and valuable for investigating the research aim.

Chapter §4 outlines the research design for the primary corpus enrichment, which involved annotating possible clause-like units in the study corpus. This chapter justifies the use of a signed language corpus for investigating the research aim, and describes the core principles and practices of modern corpus design, construction and enrichment. The Auslan Corpus and study corpus are then characterised in relation to these core principles. The specific procedure for the primary corpus enrichment is then detailed, and the study corpus metadata are summarised. Chapter §4 concludes by explaining how the problems identified in the literature review in Chapter §2 are addressed using the partly corpus-driven analytical method developed during this study.

Chapter §5 outlines the research design and findings for the secondary corpus enrichment, which involved checking the annotated possible clause-like units in the study corpus. This chapter explains why it was necessary for other annotators to re-interpret and re-analyse (i.e. 'check') a proportion of the identified units in the study corpus. It describes the iterative and collaborative method that facilitated two rounds of checking from one annotator and one round of checking from another annotator. Quantitative and qualitative findings from this secondary corpus enrichment are then summarised. Chapter §5 concludes by framing my preferences for annotating and analysing the study corpus narratives in relation to the analytical preferences of two other annotators.

The next two chapters focus on the analysis of the clause-like units identified and annotated in the study corpus. Here the reader will be introduced to substantial discussion of findings of the clause-like units identified and annotated in the study corpus. Chapter §6 and Chapter §7 present analyses of the 1,195 tokens of possible clause-like units that were identified during the primary corpus enrichment described in Chapter §4, some of which were checked during the secondary corpus enrichment described and discussed in Chapter §5.

Chapter §6 presents the first of two explorations of the prepared study corpus. The quantitative methods used for analysing the annotations extracted from the study corpus

files are first summarised. Following this summary, an analysis of three major sign types in the study corpus is presented in order to contextualise the study corpus in relation to the Auslan Corpus, and individual signers in the study corpus in relation to each other.

The various types of identified clause-like units are described according to whether they do or do not 'stand alone' (some of these tokens do not stand alone because they are linked to other tokens via relations of hypotaxis). The tokens that stand alone are then analysed according to the subjective certainty with which they were identified and their core organisation. The regular patterns of organisation identified through this analysis are then discussed in relation to the literature on spoken and signed languages, as well as the analytical method described in Chapter §4.

Chapter §7 presents the second of two explorations of the prepared study corpus. This chapter analyses the possible clause-like units that were identified as linked via relations of hypotaxis. The distribution of these units is explored in relation to the individual signers in the study corpus to ascertain intra-corpus distribution. These clause-like units are analysed according to the subjective certainty with which they were identified, the temporal ordering of linked units, how signers primarily link these units within their retellings, and their core organisation. The regular patterns of organisation identified through this analysis are then discussed in relation to the literature on spoken and signed languages, as well as the analytical method described in Chapter §4 and the findings described in Chapter §6.

Finally, Chapter §8 consolidates the major findings resulting from the two enrichments and two explorations of the study corpus. These findings converge into patterns from a signed language corpus that represent a range of analyses. This thesis concludes that signed language utterances can be explored from a clause-level perspective of analysis, but that not all analyses point to entrenched 'structures' of signed language use as often assumed in the signed language literature. Chapter §8 summarises the original contributions of this thesis and concludes with suggestions for future research and some final thoughts on this study.

1.6. Supplementary materials

Modern technology facilitates the sharing of videos of signed language data, enabling readers to view specific instantiations of signed utterances as produced by the signer and recorded in digital video. This represents a great improvement on earlier methods for transcribing and translating signed utterances as two-dimensional text. In this thesis, example videos are used instead of glossed transcriptions. Modern technology also facilitates the sharing of annotated signed language data, enabling readers to explore how signed language data is annotated by researchers. For this reason, the complete source materials and annotation files are also provided. See Appendix 1 for information about the supplementary materials included with this thesis.

2. Clause-level constructions in signed languages

Both during pre-paradigm periods and during the crises that lead to large-scale changes of paradigm, scientists usually develop many speculative and unarticulated theories that can themselves point the way to discovery. Often, however, that discovery is not quite the one anticipated by the speculative and tentative hypothesis. Only as experiment and tentative theory are together articulated to a match does the discovery emerge and the theory become a paradigm.

— Thomas Kuhn, *The Structure of Scientific Revolutions*

2.1. Introduction

Chapter §2 reviews the literature on clause-level constructions in signed languages. The aim of this chapter is to present an overview of previous investigations to the research questions explored in this thesis, and to identify any issues that remain unresolved by these previous investigations. The literature review is presented in three sections.

Section §2.2 outlines how clause-level constructions have been described in the signed language literature to date. It explains how previous studies have tended to investigate this topic from four different scopes (constituent order typology, the structure of specific types of clause-level constructions, patterns of ellipsis, and the role of various phenomena observed in signed languages with respect to morphosyntactic structure). This section discusses the major contributions of these studies with respect to theoretical framework, analytical method and findings.

Section §2.3 outlines how clause-level constructions have been identified in previous investigations of signed languages. It explains how researchers have undertaken unit analysis in signed language linguistics. Two recent studies that considered the interaction of visual prosody and grammar for delineating the boundaries of various units in unrelated signed languages are also discussed. These studies are then used to highlight four major issues that persist in the identification of clause-level constructions in signed languages. Section §2.4 evaluates the literature review with respect to analytical methods and theoretical assumptions.

2.2. Describing clause-level constructions in signed languages

2.2.1. Scopes of description

Four scopes for investigating clause-level constructions are reported in the signed language literature. Researchers have chosen to investigate: (1) constituent order typology, particularly basic word order; (2) the structure of specific types of clause-level constructions; (3) patterns of ellipsis; and (4) the role of various phenomena observed in signed languages, with respect to morphosyntax.

2.2.1.1. Constituent order typology in signed languages

A number of studies have investigated constituent order typology in signed languages. Most have focussed on identifying the constituent orders of clause-level grammatical units, also known as the ‘word’ orders of various types of constructions (see Leeson &

Saeed 2012 for a historical overview). This scope is an extension of formal and functional approaches and frameworks to the description and typological classification of spoken languages.

In formal approaches, constituent order is described according to the grammatical relations of core constituents in a clause, e.g. Subject (S), Object (O) and Verb (V) (e.g. Chomsky & Lasnik 1993). Formal approaches tend to emphasise the Subject as a grammatical role universal to all languages. In functional approaches, constituent order is described according to the semantic (i.e. conceptual) relations of core constituents, such as Actor (A), Undergoer (U) and Verbal Predicate (Vp) (e.g. Croft 2001). Functional approaches tend to question the universality of grammatical roles such as Subject and Object, and instead analyse constituent order in terms of topic and comment (e.g. Li & Thompson 1976) or conceptual relations (e.g. Croft 2001). The decision to explore constituent order from the perspective of grammatical relations or semantic relations depends on the theoretical approach of the linguist.

For example, Croft adopts a functional-cognitive approach to linguistic typology and describes constituent order analysis in terms of the “grammatical interaction between conceptual categories” (Croft 2001: 158). These interactions pattern in both language-specific and possibly universal ways. By investigating how the interaction between conceptual categories is manifested in the grammar of a given language, it is possible to identify typological patterns and suggest universal prototypes based on the representation of these concepts. That is, possible prototypes are identified and investigated on the basis of human cognition rather than structural assumptions regarding the linguistic representations of thought (Croft 2001: 158; see also Haspelmath 2008). This is quite different to formal approaches that focus on the grammatical relations between deep-structure grammatical roles such as Subject and Object.

Regardless of theoretical approach, many linguists use the resulting constituent orders to categorise languages typologically according to constituent structure, and to facilitate cross-linguistic and cross-modal comparison.

A further claim often made about constituent order typology is that, out of all possible combinations and observations of constituent orders, there is one particular order that is somehow more ‘basic’ in a given language. This basic constituent order can be used to characterise a language as of a certain ‘type’, e.g. as a predominantly SVO language or a predominantly SOV language. Dryer (1997) outlines several criteria that are used to determine the basic constituent order of a given language: (a) frequency (the most frequent constituent order is the basic one and varies according to genre, style, and so on); (b) distribution (the greater the distribution of a given constituent order, the more basic it is); (c) simplicity (a particular order is basic if it is used with simpler elements rather than more complex ones); and (d) pragmatic neutrality (a particular order is basic if it can be used in pragmatically neutral sentences because it is used in various contexts rather than restricted to fewer functional domains).

In practice, the most frequent and pragmatically neutral constituent order identified in a given language tends to be considered the basic constituent order. Distribution and complexity seem to be treated as secondary or assumed, perhaps because these particular criteria may be more difficult to determine 'in the field' without first building language corpora that are representative and balanced according to various parameters (see Chapter §4).

Some linguists also claim that the basic constituent order of a language is somehow canonical or 'unmarked' as the predominant strategy for sequencing constituents in simple declarative ditransitive clauses, and that variations of this canonical order are 'marked' versions of the basic constituent order that are also accepted by language users.

However, the idea that the less frequent, less distributed, more complex, and less pragmatically neutral constituent orders that manifest in a language are marked derivatives of a particular unmarked sequential coding of constituents is problematic in many respects. A major argument against markedness is that the patterning of 'marked' constituent orders may also be explained by other factors such as structural (and therefore frequency) asymmetries, and pragmatic inferencing, without having to resort to notions of markedness (Haspelmath 2006).

Overall, claims regarding constituent order aim to be descriptive and categorical. They attempt to qualify the most frequent and pragmatically neutral orders of clause-level constructions in terms of grammatical relations, semantic relations, or possibly even information structure. Investigations of constituent order are popular and have been undertaken on many different signed languages. These studies are biased heavily towards Western urban signed languages. Linguists have tended to focus on identifying and describing declarative ditransitive constructions, which are treated as if they are a fundamental grammatical unit of both spoken and signed language discourse. That is, declarative ditransitive constructions are widely considered to be the most frequent, distributed, simple and pragmatically neutral type of clause-level constructions for both spoken and signed languages. Furthermore, most (but not all) investigations of constituent order in signed languages have used a formal framework to describe constituent orders in terms of grammatical relations.

In studies that have used formal frameworks to describe clause-level constructions in signed languages, three types of constituent orders have been reported as basic or specific to certain environments: SVO, SOV and OSV. The most frequently reported constituent order for declarative ditransitive constructions in signed languages is SVO. According to the World Atlas of Language Structures (WALS) database, SVO order is the second-most frequent order reported for spoken languages (Haspelmath, Dryer, Gil & Comrie 2005). SVO order for declarative ditransitive constructions has been claimed for American Sign Language (Fischer 1975; Liddell 1980; Müller de Quadros & Lillo-Martin 2010); Italian Sign Language (Volterra, Laudanna, Corazza, Radutsky & Natale 1984); French Sign Language (Billiant & Beugnette 1986—with the qualification that the SVO order is 'linear', i.e. constituents are presumably all sequential with no simultaneous structures); Swedish Sign

Language (Bergman & Wallin 1985); Portuguese Sign Language (Amaral, Coutinho & Martins 1994); Mexican Sign Language (Quinto 2000); Colombian Sign Language (Oviedo 2001—with the qualification SVO is used in all sentences where all nouns are overt); Spanish Sign Language (Morales-López, Bobillo-García, Reigosa-Varela, Freire-Rodríguez & Pérez-Casanova 2007—with the qualification SVO also appears in sentences with nonreversible subject and object, and that topic, or information structure, seems to be more relevant than sign order); Hong Kong Sign Language (Sze 2003); Croatian Sign Language (Milković, Bradarić-Jončić & Wilbur 2006); Brazilian Sign Language (Müller de Quadros & Lillo-Martin 2010—with the qualification that all other word orders are derived from underlying SVO order); and Russian Sign Language (Kimmelman 2011).

SOV order is primarily reported for declarative constructions that contain transitive or ditransitive predicates expressed with a special type of verb sign. These constructions consist of one or more signs that express a semantic relation between a verbal predicate and two related arguments, and where one of these arguments (the Subject or Direct Object in formal terminology) is expressed simultaneously with the verbal predicate as an indicating sign (also referred to as 'agreement verbs', e.g. Meier 2002) or a depicting sign (also referred to as 'polycomponential classifier predicates', e.g. Emmorey 2003). In these cases, at least one of the semantic arguments is indexed or depicted by the direction, location and/or handshape of the sign (Liddell 2003; see §3.3.4).

However, it is questionable whether one can claim an SOV constituent order for these types of constructions. It is difficult to see how such simultaneous expression or inference equates to an explicitly coded sequential order equivalent to the constituent order typology reported for spoken languages. Several linguists have argued that the modification of signs and body movements in space to indicate referents in clause-level utterances does not correlate with word order (e.g. Engberg-Pedersen 2002; Liddell 2003; Johnston, Vermeerbergen, Schembri & Leeson 2007). It may be more appropriate to describe these constructions as SV, VO or even V constituent order, where particular physical characteristics of the Subject and/or Direct Object are depicted in the handshape or spatial location of the sign, and where other physical characteristics of the verbal predicate are depicted by the locatable movement of the sign within the signing space (Liddell 2003).

This issue was recently addressed in an investigation of depicting signs and clause structure in Auslan (Ferrara 2012), which was undertaken using the Cognitive Linguistics framework (Langacker 1987). While it is entirely possible for signers to express SOV constituent order where each constituent is explicitly expressed in sequential order, it is important that this type of ordering is differentiated from supposed SOV orders that express core constituents simultaneously: they are not necessarily one and the same. This point has often been obscured in studies of constituent order of signed languages. If this type of differentiation is not explicitly described, it is very difficult to compare constituent orders and studies.

Some studies have reported other constituent orders as basic, or have reported additional orders for clause-level constructions with other (non-declarative, non-transitive) types of perceived transitivity or semantic functions. These include SOV, which is also the most frequent order reported for spoken languages, and OSV, which is extremely rare in spoken languages and is reported for only four spoken languages (Haspelmath et al. 2005). Both SOV and OSV orders have been reported for Japanese Sign Language (Nakanishi 1994—with the qualification that these two orders are evidenced ‘almost without exception’), and in Russian Sign Language (Kimmelman 2011). SOV order is also reported for ditransitive predicate constructions in Colombian Sign Language (Oviedo 2001—who defines ditransitive predicates as signs where the ‘Direct Object is marked by a classifier within the verb handshape, thus making it [the sign denoting a Direct Object] an internal morpheme of the verb’, i.e. presumably simultaneously expressed via a depicting sign); and for transitive predicate constructions in Argentinian Sign Language (Massone & Curiel 2004—who also report SV order for constructions with an intransitive predicate).

With respect to the reporting of OSV order in signed languages, Kimmelman reports that the OSV order is only evidenced in elicited locative constructions in Russian Sign Language, and suggests this is due to a spatial versus syntactic coding strategy (Kimmelman 2011). OSV order is also reported as the unmarked pattern for locative constructions in American Sign Language (Liddell 1980) and as an alternative order in Spanish Sign Language (Morales-López et al. 2007).

A number of studies have reported that constituent order is free (‘not fixed’) in certain signed languages, or that constituent order is irrelevant to describing signed language structure for various reasons. Free ordering is reported for Israeli Sign Language (Schlesinger 1970); Swedish Sign Language (Bergman & Wallin 1985—who qualify that while the most basic order is SVO, free order occurs ‘when the signed language uses morphological mechanisms’, presumably referring to the use of indicating and depicting signs); Quebec Sign Language (Bouchard & Dubuisson 1995—who conclude that a basic constituent order will only be found for languages where sequential order fulfils an important functional role); British Sign Language (Sutton-Spence & Woll 1999—who report that constituent order seems to be preferential rather than fixed); Auslan (Johnston & Schembri 2007a); and Finnish Sign Language (Jantunen 2008).

Although oriented to a formal approach, Bouchard & Dubuisson (1995) find that structural analyses of the sequential ordering of constituents in American Sign Language and Quebec Sign Language are superfluous and therefore not warranted. While some ordering can be attributed to functional or articulatory aspects of communication (e.g. how information is to be interpreted, and the fact there is a limit to how much one can express at a given time), Bouchard & Dubuisson reject the notion of a basic word order for signed languages that is determined by universal principles. They suggest that spatial indexing, semantic proximity and figure-ground principles instead contribute to the organisation of signed utterances.

Johnston & Schembri (2007a) observe that Auslan often seems to share the same basic constituent order as English (SVO), but also observe that there are many possible constituent orders of clause-level constructions in Auslan. They suggest that constituent order in Auslan is more flexible than the orders described for many spoken languages. For example, the main predicate may appear at the beginning, middle or end of a sentence, depending on factors such as the potential for a sign to be modified for direction and location, or because a signer wishes to emphasise particular aspects of an utterance. Furthermore, signs that can be modified for direction and location may be recruited to express actor versus patient roles using a sequential SVO order with no modification required, or the sign may be modified within the signing space with no sequential order required.

However, Johnston & Schembri (2007a) do make a general observation that the first constituent in a clause tends to express an actor semantic role, except for clauses where the main predicate is a depicting sign. Depicting signs often visually 'ground' information in an utterance by showing how a thing moves or what it looks like. In these types of clauses, the actor may occur before, after or simultaneously with the depicting sign. This suggests that constituent order is possibly less important for encoding or constraining semantic relations in Auslan compared to other strategies of use. For example, Johnston (1996) suggests a more convincing characterisation of how utterances are organised in Auslan:

There are grounds for believing, though detailed textual analysis is needed to confirm this, that an Auslan text often unfolds in a spiral manner with a central event or proposition being stated and restated several times from different perspectives and in different ways with increasing embellishment and detail. In this way the event or proposition is gradually 'brought into focus' and clarified (Johnston 1996: 32).

Constituent order has been described as irrelevant for American Sign Language (ASL) by several researchers (Friedman 1976; Anderson 1978; McIntire 1982). Friedman expressed concern regarding the influence of English over ASL structure, while Anderson and McIntire suggested that constituent order depends more on information structure (old information precedes new information) rather than relations between grammatical roles of Subject and Object. Anderson further claimed that locative constructions cannot be analysed according to grammatical relations (probably because they depict objects and movements as located in signing space, and the extent to which this is grammatical is an empirical question), and that topic-comment analyses are more relevant. Deuchar (1984) also reported that constituent order is irrelevant to describing clause-level constructions in British Sign Language (BSL) on the basis of similar reasoning, and because she observed that not all arguments are overtly expressed in the canonical SVO order.

Fewer studies have used functional frameworks to investigate constituent order from the perspective of semantic relations such as Actor (A), Undergoer (U) and Verbal Predicate (Vp). Coerts (1994) reported there was no preferred constituent order for all types of declarative sentences elicited in her study of Sign Language of the Netherlands

(Nederlandse Gebarentaal, or NGT). This data included both Verbal Predicates (Vp) and Non-Verbal Predicates (NVp)³. Coerts identified AUVp and AVp or NVpU as the most frequently occurring orders for non-locative expressions. She also identified AVpU and AUNVp as the most frequently occurring orders for locative expressions. These patterns, and others, may be generalised into a preferred order of AVp or NVp, “with the possibility that the second argument is produced between the first argument and the verb, or simultaneously with the verb” (Coerts 1994: 61).

Engberg-Pedersen (2002) reported that the basic word order for simple clauses with two arguments in Danish Sign Language (Danske Tegnsprog, or DTS) is typically AVpU or AUVp, but that multiple variations of these patterns occur as signers draw upon various manual and non-manual strategies to focus information in different contexts. In order to determine the status of DTS arguments as topics and/or grammatical Subjects, Engberg-Pedersen examined the role of pre-verbal nominals in simple clauses in DTS, considering that these constituents are a prime candidate for identifying both topics and grammatical Subjects. Following Van Valin & LaPolla (1997), Engberg-Pedersen only accepted Subjecthood if it could not be explained by either semantic or pragmatic relations. This was explored by considering whether word order, prosody and spatial expressions may encode arguments as grammatical Subjects, and whether zero anaphora are syntactically or pragmatically controlled.

Engberg-Pedersen (2002) found that word order patterns in DTS may be described according to semantic and pragmatic influences of face-to-face communication without needing to posit grammatical relations of Subject and Object. She found that the general pattern for simple clauses in DTS is for signers to first mention the participant or circumstance that is most ‘communicatively relevant’ to the predicate, and then to talk about it (Engberg-Pedersen 2002: 36). If a clause contains more than one argument constituent (e.g. both an Actor and a Patient constituent), then the ordering tends to be semantically determined. Post-verbal arguments tend to be used to focus constituents, or to indicate the end of longer, multi-clausal sequences. This patterning is influenced by both ‘iconically determined’ word order and spoken Danish SVO word order, resulting in AVpU sequences, and where one or both constituents may be inferred from the discourse context.

³ Both Coerts (1994) and Johnston et al. (2007) use a numbered notation to refer to the identification of constituents that express semantic arguments in their papers, i.e. A1=Agent, A2=Patient, VP=Verbal Predicate, NVP=Non-Verbal Predicate. Jantunen (2008) uses a lettered notation, i.e. A=Agent, P=Patient, V=Verbal Predicate. However, the numbered notation is used throughout this study to indicate the ordering of appearance in a clause-like unit, i.e. A1=first argument, A2=second argument, within square brackets. For example, [A1 A2] denotes two arguments in order of appearance and says nothing about their specific semantic role (see §4.4.3.3). To avoid confusion, all argument constituents in functional descriptions of constituent order in Chapter §2 and later on in the comparison with the literature in Chapter §6 have been modified to reflect Johnston et al.’s (2007) conventions, i.e. A=Actor, U=Undergoer/Theme. Johnston et al.’s conventions were adopted because they are the most ‘macro’ and inclusive for all reported studies. All predicate constituents in functional descriptions of constituent order in Chapter §2 have been modified to reflect Coerts’s (1994) conventions, i.e. Vp=Verbal Predicate, NVp=Non-Verbal Predicate. Ferrara’s (2012) convention for depicting verb predicates, i.e. DV=Depicting Verb Predicate, has also been modified to fit with the conventions adopted here, i.e. DVp=Depicting Verb Predicate.

Jantunen (2008) investigated the constituent order of transitive declarative clauses in Finnish Sign Language (Suomalainen Viittomakieli, or FinSL). He found that constituents in these clauses do not appear to be ordered in any fixed way, and reported at least three combinations of core argument and verbal predicate constituents that were evidenced in the data. These combinations are AVpU, AUVp and UAVp, depending on the semantic relation expressed by the construction, and whether the clause was 'textual' or 'isolated', i.e. cohesively linked in the narrative or not. Isolated clauses occurred only with AVpU and AUVp orders, whereas textual clauses also manifested as UAVp order or with omitted core arguments. Overall, the signers in Jantunen's study produced AVpU or AUVp clauses with either plain or indicating verbs.

Johnston et al. (2007) conducted a cross-linguistic study of three types of constructions in three unrelated signed languages: Auslan, Irish Sign Language (ISL) and Flemish Sign Language (Vlaamse Gebarentaal, or VGT). Data was elicited using the Volterra picture elicitation task, which targets reversible, non-reversible and locative transitive clauses (Volterra et al. 1984). Four signers each from Auslan, ISL and VGT contributed a total of 354 clauses, the largest cross-linguistic collection of clause-level constructions reported in the literature at the time. The authors identified several orders of semantic roles across the three unrelated signed languages. In non-reversible clauses, they found the Actor precedes the Verb and the Undergoer follows (AVpU) approximately 66% of the time (although both arguments are not always present).

In reversible clauses, they found that the patterning of the Actor preceding the Verb and followed by the Undergoer (AVpU) increases to approximately 69%. In locative transitive clauses, no clear pattern emerged but AVpU and AUVp orders were most frequent. The most frequently identified orders for each language were AVpU and UAVp. However, the authors agree with Van Valin & LaPolla (1997) that semantic functions such as agent and patient, as well pragmatic factors such as topic, appear to be more relevant to constituent order than concepts such as Subject and Object (Johnston et al. 2007).

The findings summarised above suggest several characteristics of constituent order in signed languages. Firstly, most studies have reported that the most basic constituent order is SVO and SOV (from the perspective of grammatical relations) or AVp and AUVp (from the perspective of semantic relations). Secondly, it is not certain whether constituent order is relevant to investigations of signed language structure or signed language use.

Some linguists reported that constituent order is an important grammatical strategy (e.g. Müller de Quadros 2010; Kimmelman 2011). Others question this importance, but still present claims for basic constituent order in their signed language (e.g. Massone & Curiel 2003). Few linguists reported that constituent order does not seem to be relevant, either because constituent order is not fixed or because other factors are more important (e.g. Bouchard & Dubuisson 1995; Engberg-Pedersen 2002; Johnston et al. 2007; Jantunen 2008).

Thirdly, many studies found that constituent order is often influenced by several factors. These include the type of verbal predicate used in the clause (such as whether the main

verb can be modified to indicate who does what to whom); the information status of the clause; the semantic role of arguments in expressed by the clause; and whether arguments in a clause are reversible (e.g. Coerts 1994; Engberg-Pedersen 2002; Johnston et al. 2007).

In general, most linguists concluded that analyses of constituent order in signed languages are similar to those in spoken languages, except for those types of constructions where the visual-gestural modality appears to determine constituent order. For example, in the case of locative constructions or constructions that contain depicting signs (e.g. Kimmelman 2011). However, several studies also raised concerns with the confidence of reported analyses, questioning the methods and theoretical assumptions regarding investigations of constituent order in signed languages (e.g. Bouchard & Dubuisson 1995; Johnston et al. 2007).

2.2.1.2. Structure of clause-level constructions

Investigations of clause-level constructions in signed languages have also described how specific types of units are 'structured' in relation to simultaneity and morphosyntactic complexity. These studies have extended the aim of identifying constituent order typologies beyond the sequential unfolding of constituents one after the other, by additionally considering how signers structure clause-level constructions in the three-dimensional signing space. They have also considered how clause-level constructions are linked in discourse to create complex clause-level constructions. As this domain of the signed language literature is prolific, this review is mostly limited to functional-cognitive approaches to this topic.

Linguists oriented in the functional-cognitive approach have described: simple and complex clause structures (Johnston & Schembri 2007a); clause-level constructions containing depicting signs (Ferrara 2012); equative constructions (Jantunen 2007); constructions of reported speech (Engberg-Pedersen 1995); causative constructions (Engberg-Pedersen 2010); and clause-level constructions co-expressed with enactment (Ferrara & Johnston 2014).

Johnston & Schembri (2007a) present an introductory overview of Auslan grammar that is informed by native signer observations and experimental data. They differentiate clause-level constructions in terms of simple and complex types of sentences. Simple sentences are clauses that usually contain one or two arguments, and/or one or more verbs. Different types of simple clauses are described. These include verbless clauses, clauses with intransitive and transitive plain verbs, and clauses with indicating and depicting verbs.

Verbless clauses contain two arguments juxtaposed in a sentence as a verbless predication, where one argument is an attribute of another argument. Clauses with intransitive and transitive plain verbs contain main verb(s) that cannot be modified in any way to express information about the actor and undergoer, such as by changing the movement of the sign, or moving it to another location in the signing space. Clauses with indicating and

depicting verbs contain main verb(s) that can be directionally and locationally modified to represent information about the actor and undergoer.

Complex sentences usually contain two or more simple clauses that are linked in some way. Different types of complex sentences are described. These include complex constructions that express semantic relations of coordination and subordination. Johnston & Schembri also consider how Auslan signers express several types of complex sentences commonly reported in the literature, such as conditional clauses and relative clauses. They observe that signers may use lexis, morphosyntax and/or visual prosody to create complex clauses.

Ferrara (2012) reports the first corpus-based investigation of the structure and use of depicting signs in Auslan. Following Liddell (2003) and Johnston & Schembri (2010), Ferrara analysed these types of signs as partly lexical signs that are composed of both linguistic and gestural elements (see §3.3.4). This represents a significant departure from the traditional approach of analysing these types of signs as multi-morphemic and polycomponential (see Emmorey 2003 *inter alia*).

Ferrara investigated the occurrence of depicting signs in clause-like units using videos of conversations between groups of signers talking about their experiences of various medical procedures, as well as filmed narratives of the picture task 'Frog where are you?' that were archived in the Auslan Corpus. Ferrara presented an analysis of 15,565 sign tokens across 5,649 clause-like units to partially describe how depicting signs are used in context, and how signers integrate linguistic and gestural strategies to construct meaning at the clause level.

Focussing on predicate-argument relations and the function of depicting signs, Ferrara found that a variety of patterns are evidenced in the data. The most frequent type of unit identified is a (usually) noun-like argument followed by a depicting verb predicate (DVp), i.e. an [A V] pattern. Other patterns where the main verbal predicate is a depicting sign include single DVp constructions, some of which are simultaneously expressed with constructed action, i.e. a [V] pattern; constructions where a non-depicting verbal predicate is followed by a DVp, i.e. a [V1 V2] pattern, and constructions where the first argument is followed by a DVp and then a second argument, i.e. an [A1 V A2] pattern.

Ferrara observed that depicting signs are also used to function as nouns in Auslan, as depicting nouns. Patterns of clause-like units where the core argument is a depicting noun include constructions where a depicting noun argument is followed by a non-depicting predicate, i.e. an [A V] pattern, and where a non-depicting argument is followed by an argument that is a depicting noun, i.e. an [A1 A2] pattern.

Ferrara's study represents the largest corpus-based investigation of clause-level constructions in any signed language to date, and highlights the significance of using a multimodal corpus to investigate how signers use their language. Furthermore, the corpus-based method allowed Ferrara to investigate the nature of clause-level constructions empirically, looking at the language on its own terms, rather than assuming

that particular structural patterns such as constituent order dominate Auslan usage on the basis of claims reported in the signed language literature.

Based on her findings from corpus data, Ferrara concluded that it is crucial to consider the contribution of gestural elements present in depicting signs (and other non-linguistic behaviour such as enactment) as strategies for creating meaning in Auslan. Ferrara's study supports earlier claims made by other Auslan researchers that linguists need to consider the integration of linguistic and gestural behaviour in all signed languages (e.g. Johnston 1996; Cogill-Koez 2000; Schembri 2001; de Beuzeville, Johnston & Schembri 2009).

Jantunen (2007) investigated the occurrence of equative sentences in FinSL, i.e. sentences of the type in English such as [the capital of France is Paris] or [X is Y] (Lyons 1977: 496-473). The equative sentences investigated by Jantunen for FinSL consist of noun phrases (NP), and are similar to the verbless attributive clauses described by Johnston & Schembri (2007a). Jantunen explains that equative sentences in FinSL have typically been analysed as having the clausal form [NP Copula NP], as in English and Finnish, but that different forms such as a non-copular [NP NP] are possible cross-linguistically (Van Valin & LaPolla 1997: 25).

Jantunen analysed data from the Basic Dictionary of FinSL (Malm 1998), nineteen example sentences from the Suvi⁴ corpus, and native signing judgements from his colleagues and students. This data was analysed using the functional frameworks of Role and Reference Grammar (Van Valin & LaPolla 1997) and Systemic Functional Grammar (Halliday 1994). In these frameworks, constituents are identified and analysed in terms of their core or non-core status, and information structure (see §3.4.1).

Jantunen (2007) identified three types of equative constructions in the FinSL data. Each type contrasts predicating (pred) versus non-predicating (non-pred) constituents, and two types use the FinSL manual sign PI. The sign PI is characterised functionally as a sign that "strengthens the co-referentiality of NPs" (Jantunen 2007: 131). Type 1 has the schema [NPnon-pred + NPpred], Type 2 has the schema [NPnon-pred + PI + NPpred], and Type 3 has the schema [NP + NPnon-pred + PI + NPpred], where the first NP is a 'left-detached position' (Jantunen 2007: 118). These three types are represented as variations of a general schema: [(NP) + NP + (PI) + NP]. Jantunen concludes that:

- (a) the first NP constituent in FinSL equative clauses always functions as topic;
- (b) topics in FinSL are marked syntactically, prosodically and morphologically;
- (c) the preferred organisation of equative sentences is topic-comment; (d) the double indexing phenomenon (cf. pronoun copy) is functionally a means to increase textual cohesion; and (e) the sign PI in equative sentences is a certainty expressing modal device, although it may be in the process of grammaticalising into a copula (Jantunen 2007: 137-138).

⁴ Suomalaisen viittomakielen verkkosanakirja [e online dictionary of FinSL]: <http://suvi.viittomat.net/>

Very few linguists have investigated how clause-level constructions may be linked in a signed language, and most have used a formal approach. Early studies focussed on the use of non-manual features such as eye blinks for linking clause-level units (e.g. Baker & Padden 1978; Liddell 1978; Wilbur 1994). However, these studies were oriented to documenting and describing the role of non-manual features in signed languages more so than identifying how clause-level constructions are linked and organised. As such, the existence of complex constructions such as conditional clauses and relative clauses in various signed languages have generally been taken as given. Identifications of these complex constructions have been used to describe the non-manual features of the linked clauses and their role in language structure, not the identification and exploration of linkage per se.

The focus on non-manual features as structural phenomena has persisted in formal approaches. More recently, complex clause-level constructions linked via non-manual features have been described as reflecting a more conventionalised stage in the emergence of an 'isolate' signed language used among the Al-Sayyid Arab-Bedouin in Israel (e.g. Sandler, Meir, Padden & Aronoff 2005; Sandler 2012; but cf. Kisch 2008 on the characterisation of this signed language as a language isolate). Sandler (2012) reports that signers of various delineated generations (she terms these groups 'strata') exhibit increasingly skilled and complex usage of Al-Sayid Bedouin Sign Language.

For example, second-generation signers of Al-Sayyid Bedouin Sign Language, who have supposedly experienced richer signed language interactions than their elders, are observed to use "gestures of the hands, head, and face to give structure and richness of expression to sentences and discourse, signalling subordination, reported speech, and parentheticals" (Sandler 2012: 289). In other words, the nonmanual features observed for these signers are analysed as contributing to explicitly encoded and conventional linguistic structures equivalent to those reported in the spoken language literature. This is problematic because the identification of complex clause-level constructions is still assumed, not explored, and the use of pragmatic inferencing or other discourse factors are not considered (see Kisch 2008, 2009 for critical discussion of Sandler and colleagues' characterisation and analysis of the Al-Sayyid Arab-Bedouin in general).

Pragmatic discourse factors have been considered, however, in more functionally-oriented approaches to complex clause-level constructions. Engberg-Pedersen (1995) conducted one of the first studies of complex clause-level constructions in a signed language using a functional approach. Rather than investigating how specific articulatory phenomena contribute to language structure, Engberg-Pedersen looked at how signers organised a particular discourse strategy. She investigated instances of reported speech in Danish Sign Language (Danske Tegnsprog, or DTS).

Engberg-Pedersen (1995) observes that DTS signers may report actions and states as well as thoughts and beliefs (see §3.3.4.2). Signers tend to identify who is doing the reporting in the introductory clause of the reported speech. In these clauses, signers may: (1) lexically identify the sender of the reported speech using nominals (including pointing signs); (2)

use a verb of saying with or without explicitly identifying the sender; (3) rely solely on non-manual expression and body shifts to identify the sender, and/or infer the receiver by their spatial locus; or (4) both lexically identify the sender using a nominal and report the speech using a verb of saying, but outside the scope of the reported speech (Engberg-Pedersen 1995: 53). Lexical nominals and verbs of saying may occur both before and after the reported utterance, thereby 'embedding' the speech report.

More recently, Engberg-Pedersen (2010) investigated several lexical and morphosyntactic strategies that signers use to express causation in DTS. Engberg-Pedersen explains that, cross-linguistically, causal relations are expressed using lexical and morphosyntactic strategies, and a single language may use one or more of these strategies to express different types of causation (Haiman 1985; Shibatani & Pardeshi 2002). Engberg-Pedersen analysed clause-level constructions in DTS taken from several data sets, including retellings of 'Frog where are you?' and elicited examples from the Dictionary of Danish Sign Language (2008)⁵. She investigated how signers use different types of verb signs (e.g. signs functioning as labile or stative verbs) with other dynamic sign types (e.g. depicting signs) to express causation.

While Engberg-Pedersen (2010) identified several DTS signs that are used to encode various types of causal relations using lexis and morphosyntactic strategies, such as the signs for 'make' and 'change', she also found that signers describe sequences of events as causally related without explicitly coding any causal relation between the events. Rather than using lexis or morphosyntax to interpret a causal relation between sequences of events in the narrative context, signers must interpret the small temporal distance between events as inferring a causal relation between these events, and not just a temporal relation. This pragmatic strategy for expressing some types of causation contrasts with the morphosyntactic strategies preferred by many spoken languages typologically.

Looking at the rhetorical style of narratives, Engberg-Pedersen (2010) also found that DTS signers rely heavily on enactments of action and dialogue, as well as the use of depicting signs, to depict and describe the event frames of the narratives in detail (although she uncharacteristically refers to depicting signs as 'classifier predicates' in this particular paper).

Enactments involve elements of both manual and non-manual expression to partially demonstrate or 'construct' action and dialogue (Tannen 1989; Winston 1991, 1992; Metzger 1995; see §3.3.4). During constructed action one enacts a non-linguistic action, while during constructed dialogue (essentially a sub-type of the former) one enacts a language event. This means signers may not need to express their opinion of the intention and purposes of the actors described in a narrative, as their enactment of actions and dialogue enable these to be referenced indirectly. It also means there is less need to explicitly encode referents because the referent is depicted via the enactment. These strategies have also been identified in the use of constructed dialogue in spoken language discourse,

⁵ Ordbog over Dansk Tegnsprog [Dictionary of Danish Sign Language]: <http://www.tegnsprog.dk/>

although research on spoken languages suggests it is common for speakers to use constructed dialogue to express their opinions about events and dialogue (e.g. Buchstaller & D'Arcy 2009; Fox & Robles 2010; Rodríguez Louro 2013).

Engberg-Pedersen (2010) hypothesises that the tendency for DTS signers to infer causal relations between sequences of events is part of a general trend for signers to infer information rather than encode it explicitly in morphosyntax, often by enacting the actions and dialogues of characters in the narrative. These strategies reflect a general tendency for DTS signers to depict and elaborate events and activities in narratives rather than explain them explicitly. Engberg-Pedersen concludes that the visual-spatial modality of signed languages encourages the depiction of events in certain types of discourse, rather than the morphosyntactically encoded representation of these events. In turn, this suggests that in addition to interpreting the representation of events, signers are skilled at inferring information from the depiction of events.

Ferrara & Johnston (2014) also investigated the use of enactment in signed language discourse. They conducted a corpus-based investigation of how constructed action interacts with clause structure in Auslan narratives. Ferrara & Johnston found that constructed action often functions as the core predicate or argument of a clause, thus creating tightly integrated 'composite utterances' (Enfield 2009). They also suggest that the use of constructed action in Auslan narratives means there is no need to manually express the concepts demonstrated by the enactment using lexis or morphosyntactic strategies. They conclude that investigations of signed language grammar must consider the contribution of non-linguistic enactment to meaning construction.

2.2.1.3. Ellipsis

Linguists have also explored pragmatic discourse factors and clause-level constructions by investigating patterns of ellipsis in constituent order. Ellipsis refers to the omission of explicit lexical or morphosyntactic coding of constituents from a clause-level construction because the omitted information is clear from the context. This includes argument omission (often referred to as 'null arguments') and verb omission (often referred to as 'verb deletion').

However, the notion of ellipsis implies that all usage events must be fully explicit, which is not necessarily the case. As with some aspects of enactment, it is more appropriate to say that ellipsis points to the pragmatic aspects of signed language use in context (e.g. that inferential information enriches the interpretation of explicitly encoded information; see §3.2.4) rather than an absence of constituency representing null constituents or 'slots' in constituent structure. Ellipsis occurs because not all information needs be repeatedly explicated to ensure the cohesiveness and joint interpretation of ongoing discourse. There are many strategies that speakers and signers may draw upon to maintain discourse cohesion in the shared communicative event. For example, certain information may remain 'active' in the memory of interactants in a discourse context, and may be re-prompted via anaphoric strategies.

Discussions of ellipsis in signed languages are infrequent in the signed language literature. Despite this, it is important to consider ellipsis when considering the development and use of clause-level constructions in signed languages. As mentioned above, ellipsis may be conditioned by syntactic, semantic, and/or pragmatic factors. For example, the co-referentiality (or not) of omitted arguments. The identification of elliptical strategies is essentially the differentiation between strategies of inference and strategies of explicitly encoded lexis and morphosyntax (see §3.2.4).

Jantunen (2008) reported that one or both arguments are sometimes omitted in textual clauses in FinSL, but he gives no information on frequency. However, Ferrara (2012) notes that it must be fairly frequent because Jantunen suggests “it indicates that sign order is not, after all, a central factor in the functioning and understanding of FinSL” (Jantunen 2008: 111). Jantunen (2008) also investigated the ‘degree of grammaticality of clauses in FinSL’ and observed a relatively high frequency of core element omission in his data. He found that 67% of the clauses in the data manifest as ‘incomplete’ in terms of their core clausal structure, i.e. core elements such as core arguments and clause nuclei are frequently omitted in the narratives. On the basis of this data, Jantunen concluded that FinSL clauses are not very governed units syntactically.

Wulf, Dudis, Bayley & Lucas (2002) investigated pronoun ellipsis in ASL narratives, whereby the pronoun marking for the actor (i.e. a pointing sign that indexes a referent) is omitted from a construction. They found that 65% of plain verbs occurred without a noun or pronoun representing the actor, and reported that this tendency can be attributed to both social and linguistic factors. The strongest factor was the previous expression of the subject referent in the preceding clause.

Recent work suggests the same may be true for Auslan, where the information about the actor is clear from the referential cohesion and context of the utterance (Johnston & Schembri 2007a: 208). This tendency was later confirmed by a comparative study of ‘variable subject presence’ in both New Zealand Sign Language and Auslan (R. McKee, Schembri, D. McKee & Johnston 2011). However, the authors of this later study argue that variable subject presence is largely a consequence of referential coherence rather than morphological factors such as verb type, or the sociolinguistic factors of age, gender, ethnicity and language background. They concluded that information structure accounts for this tendency in New Zealand Sign Language and Auslan more so than sociolinguistic effects.

Engberg-Pedersen (2006) took the study of ellipsis a step further by considering the referentiality of argument omission across adjacent clauses in a DTS narrative. The narrative was about a boy washing a dog, and contained two main participants. She investigated “whether there are any reasons to consider several clauses as constituting one larger unit—a sentence—because of argument omission” (Engberg-Pedersen 2006: 2). Particular attention was given to instances where the core arguments of two consecutive predicates are not co-referential, i.e. sequences of DTS utterances where the appropriate interpretation of the elided core arguments of adjacent predicates switches between actor

and undergoer, despite there being no overtly expressed argument(s) to explicitly differentiate between these referents. Engberg-Pedersen terms this ‘intertwined ellipsis’, and questions whether this occurrence is due to specific constructions (suggesting syntactic factors) or whether it is simply because the referents are already established in the discourse (suggesting ellipsis as a pragmatically conditioned phenomena in DTS).

Engberg-Pedersen (2006) identified three types of sequences in her data in which argument omission was observed: (1) restrictive clauses; (2) clauses after verbal predicates of saying or thinking, e.g. signs for ‘say’, ‘believe’, etc; and (3) clauses expressing actions and effects. She coded whether the initial argument or predicate from the first clause is resumed at the end of the sequence, and whether the argument omission was obligatory. Engberg-Pedersen concluded that sequences of clauses with omitted arguments that contain referential shifts (e.g. shifts from actor to undergoer to actor over several clauses) do not seem to constitute a larger unit, because the initial argument reference is not resumed at the end of the sequence. She also concluded that argument omission does not appear to be conditioned by specific types of constructions.

However, Engberg-Pedersen did find that “argument omission may contribute to the cohesion of constructions constituted by other means” (Engberg-Pedersen 2006: 35). As indicated in §2.2.1.2 above, this presumably refers to signer’s use of enactment to depict who is doing what to whom in narratives, whereby enactment may render the explicit repetition of referents unnecessary. The omission of explicitly encoded arguments may contribute to cohesion of constructions during periods of enactment if explicit repetition of referents during enactments interrupts the flow of narrative.

2.2.1.4. Role of various phenomena in signed language structure

In addition to investigating textually-defined grammatical units and ellipsis such as those described in Sections §2.2.1.1, §2.2.1.2 and §2.2.1.3 above, linguists have also investigated the role that various observed phenomena fulfils in signed language structure. Some phenomena can be described as communicative strategies, while others are products of language use. Linguists have investigated the syntactic functions of various manual and non-manual features (e.g. Wilbur 1994, 1999; Wilbur & Patschke 1998); simultaneous structures (e.g. Engberg-Pedersen 1994; Miermeerbergen, Leeson & Crasborn 2007 *inter alia*); the use of signing space (e.g. Winston 1992; Engberg-Pedersen 1993; Johnston 1996; Janzen 2004; Wrobel 2007; de Beuzeville et al. 2009); grammaticalisation processes (e.g. Janzen 1995; Janzen & Schaffer 2002; Pfau & Steinbach 2011; Johnston 2012; Johnston & Ferrara 2012); and typologies of various strategies of signed language use (e.g. Zeshan 2005; Wilkinson 2009).

2.2.2. Unit analysis in signed language linguistics

2.2.2.1. Traditions of unit analysis in signed languages

There is a strong tradition of propositional analysis in the signed language literature, with particular attention given to the identification of grammatical units such as ‘phrases’, ‘clauses’ and ‘sentences’, i.e. utterances that express propositional content, particularly

propositional content that minimally predicates something about another thing. Propositional units in signed languages have primarily been identified according to definitions and phenomena reported in the spoken language literature, thus following the seemingly well-established paradigm that signed languages are used and structured in parallel ways to spoken languages. Semantic and prosodic criteria used for identifying propositional units in spoken languages have been 'transposed' into signed language parallels, which then constitute the semantic and prosodic criteria with which propositional units may be segmented and analysed in signed language data (see Meier 2008 for a summary of similarities and differences between spoken and signed languages).

For example, many linguists have been driven to find out exactly what are sentences, clauses, or other sentence components in a signed language for the purpose of linguistic analysis (e.g. Liddell 1977; Nespor & Sandler 1999; Sandler & Lillo-Martin 2006). A common aim has been to work out how to decide where one sentence ends and another begins, and where a signer does not complete a sentence (see Crasborn 2007).

The preoccupation with identifying sentences stems from a long tradition of framing sentences and clauses as the basic units of spoken and written language production and perception, and therefore the basic units of grammatical analysis. The general consensus is that once we are able to identify sentences in signed languages, grammatical analysis, language description and typological comparison will follow as it has for analyses of spoken languages.

Most signed language linguists have adopted this approach to some extent, accepting that sentences and clauses are useful units in signed language grammatical analysis, just as it is for the analysis of written and spoken languages. Typically, the unit of analysis used in a particular study is defined in terms of a specific framework, units are then segmented in the source material, thus organising it into manageable chunks of linguistic units ready for further analysis.

The development of this tradition in signed language research can be attributed to both generative and functional approaches to language structure. Propositional units of grammatical analysis applied in the signed language literature include: clause (e.g. Johnston 1996; Engberg-Pedersen 2006; Johnston & Schembri 2006a; Jantunen 2008); phrase (e.g. Boyes Braem 1999); proposition (e.g. Bellugi & Fischer 1972; Hansen & Heßmann 2007); and sentence (e.g. Bellugi & Fischer 1972; Grosjean & Lane 1977; Boyes Braem 1999; Meir 1999; Nespor & Sandler 1999; Lucas, Bayley & Valli 2001; Metzger & Bahan 2001; Massone & Curiel 2004; Crasborn 2007; Fenlon et al. 2007; Hansen & Heßmann 2007; Jantunen 2007). The term construction also appears in the literature, but tends to be used to refer generally to all types of grammatical units (e.g. Crasborn 2007; Jantunen 2007).

Several studies have focussed on identifying and analysing the semantic content of identified propositional units. This has largely been achieved using principles from functional linguistics to analyse core constituents according to their function and

information structure (e.g. Johnston et al. 2007 investigated clauses and constituent order; Jantunen 2008 investigated clauses and information structure; and Hansen & Heßmann 2007 investigated sentences, clauses and information structure). Other studies have focussed on identifying and analysing the prosodic cues at the boundaries of identified propositional units, in order to investigate the hypothesis that certain manual and non-manual features of signed languages may be used to delineate sentences in signed language data (e.g. Hansen & Heßmann 2007 and Fenlon et al. 2007 both analysed prosodic cues at the boundaries of their delineated units). Studies that focus on both grammar and prosody in the delineation of propositional units represent a particularly interesting development because they explicitly investigate the interaction of grammar and prosody in signed utterances, rather than just focussing on constituency.

2.2.3. Identifying clause-level constructions

2.2.3.1. Prosody and grammar in spoken and signed languages

Many spoken language linguists have investigated grammatical structure by considering spoken language prosody, and have developed frameworks to describe the interaction between prosody and grammar (e.g. the generative framework of Prosodic Phonology, Nespor & Vogel 1986). In the formal approach, spoken language prosody is characterised by vocal cues such as phrase-final lengthening, rise or fall in pitch, changes in voice quality (e.g. intensity), or pauses (Cruttenden 1995). These prosodic cues function to create boundaries that indicate when a speaker has finished talking, and to resolve syntactic ambiguities (Pynte & Prieur 1996). Perceptual studies on English language listeners have suggested that the completeness of an utterance can be predicted using prosodic cues (Grosjean & Hirt 1996), and that listeners use prosodic cues to reliably segment boundaries in a language they do not know (Carlson, Hirschberg & Swerts 2005; Frazier, Carlson & Clifton 2006).

Formal studies such as these have contributed an understanding that spoken language production and comprehension is achieved by a process of perceiving, decoding, and interpreting speech. This process involves recognising individual words and how they are linked in syntactic, semantic, and prosodic structure. Linguists working within this approach have concluded that both syntactic and prosodic structure is crucial in allowing speakers and hearers to 'parse' propositional units in spoken language discourse, and that the interaction of these structures is best investigated at the boundaries of these units.

These studies have been particularly influential for signed language linguists, leading to investigations of syntactic and prosodic structure in signed languages that tend to focus on identifying specific properties found at the boundaries of delineated units in signed language data. The aim has generally been to identify prosodic cues that somehow 'mark' prosodic and syntactic boundaries, in order to describe the functions of these prosodic properties and to establish methodological means for identifying these propositional units in signed languages.

Most of the literature on signed language prosody is based on American Sign Language data (e.g. Sandler 1999; Brentari & Crossley 2002; Sandler & Lillo-Martin 2006; Nicodemus 2007). There has been very little research on prosodic structure in Auslan or other signed languages (although see Nespor & Sandler 1999 on Israeli Sign language; Boyes Braem 1999 on Swiss German Sign Language; Fenlon et al. 2007 on British Sign Language; Hansen & Heßmann 2007 on German Sign Language; and Sze 2008 on Hong Kong Sign Language).

Most researchers have agreed that both manual and non-manual characteristics of signed language use constitute a set of physical properties of signed language prosody. These include changes in head and body position, head tilts, brow movements, shifts in eye gaze, eye blinks, drop hands, and timing. Most also agree that some properties are more salient and perceptually reliable than others. For example, properties such as drop hands, head nods, pauses and the final lengthening or repetition of signs are perceived much more reliably than less salient properties such as eye blinks (Fenlon et al. 2007; Nicodemus 2007). However, there is some disagreement regarding the syntactic or prosodic function of various prosodic properties (cf. Wilbur 1994, 1999; Fenlon et al. 2007; Hansen & Heßmann 2007; Nicodemus 2007).

2.2.3.2. Case studies

In order to illustrate how the identification and analysis of clause-level constructions in signed languages according to semantic and prosodic criteria is developing in signed language linguistics, two recent studies are summarised. These two studies particularly influenced the development of this thesis: (1) Hansen & Heßmann's (2007) investigation of German Sign Language (Deutsche Gebärdensprache, or DGS) sentences in a single narrative text; and (2) Fenlon, Denmark, Campbell & Woll's (2007) investigation of BSL and Swedish Sign Language (Svenskt teckenspråk, or STS) sentences in two narrative texts. Both studies were published in a special issue of *Sign Language & Linguistics* in 2007 (see Crasborn 2007). In this special issue, linguists working on several different signed languages reported their theoretical perspectives and language-specific findings regarding the identification and delineation of sentences in native signed languages.

Hansen & Heßmann (2007) investigated sentence boundaries in DGS by segmenting a single narrative text into 'elementary units' and applying a semantic analysis that identified four information structure components: Topics, Predicates, Adjuncts, and Conjuncts. These components function as constituents of larger textual units such as sentence or clause types, i.e. propositional units. In this study, a sentence is defined as a collection of "meaningful units that consist of sequences of mostly small numbers of signs" (Hansen & Heßmann 2007: 119). The DGS text was broken down into "fairly small sentence-like units on the basis of pragmatic decisions about what goes together" (Hansen & Heßmann 2007: 119).

The authors explain they were looking at: (a) how aspects of the complex interaction between form and meaning can be used to identify sentences in their data; and (b)

whether the functionally identified units are supported by manual and non-manual elements that may function as boundary markers. Hansen & Heßmann found that their functional and information structure approach does indeed facilitate the identification of 'nuclear' units such as clauses, but that there may also be other mechanisms that integrate these delineated units into more complex units akin to sentences. This analysis closely matched an earlier pragmatic analysis (Heßmann 2001) of the same text.

Once propositional boundaries were established using this functional analysis, Hansen & Heßmann investigated whether their delineated propositional units were supported by manual and non-manual elements that may function as boundary markers. Several manual and non-manual elements were considered as candidates for boundary markers on the basis of the signed language literature. These include various manual signs; the interactively prominent 'palm up' gesture; head nods; eye blinks; changes of gaze direction; dynamic features such as pauses, transitions, and holds; and aspects of visual rhythm that reinforce the temporal contours of the functional units (e.g. the lengthening of final phrases by repetition of final signs, or prolonged holds).

The authors investigated the extent to which these manual and non-manual markers accompany boundaries between their delineated sentence units. They found that while most sentence endings are marked in some way, there was no consistent and constrained use of the candidate markers, and some sentences do not seem to have any marking at all, even though there were good semantic reasons for delineating them as sentences in the first instance. Indeed, the authors found that while there is some clustering of prosodic markers at the boundaries of their sentences, none of the selected candidate markers stood out in signalling unit boundaries. Of all the candidate markers investigated, manual signs and gestures appear to be the most reliable indicators of sentence boundaries, even though these features may also be used within units as well.

Hansen & Heßmann concluded that while semantic interpretations and formal prosodic markings often concur, "it seems that any delimitating effect displayed by the form elements considered here derives from some more primary prosodic, textual, pragmatic or other function whose manifestation often but not necessarily coincides with sentence boundaries" (Hansen & Heßmann 2007: 169). In other words, there was no conclusive evidence that the candidate prosodic elements can be used to delineate sentences in this particular DGS text. Despite this, the authors maintained that, "one way or another, recipients will have to recognise the sentences that a signed text consists of if they are to understand what they see" (Hansen & Heßmann 2007: 169).

Fenlon, Denmark, Campbell, and Woll (2007) investigated how native signers and non-signers interpret visual cues with respect to sentence boundaries in a sign language they may or may not know. As little is known about how native signers interpret prosodic cues with respect to sentence boundaries, the authors aimed to: (a) investigate how native signers segment the ends of sentences in a signed stream; (b) identify the prosodic cues that native signers use to decide on sentence boundaries; and (c) investigate if such

boundaries can be detected using prosodic cues alone, in lieu of lexical or other information, by asking non-signers to segment the same data (Fenlon et al. 2007: 180).

In this study, sentence boundaries were defined in terms of a prosodic unit described in the Prosodic Phonology framework: the Intonational Phrase (Nespor & Vogel 1989). Prosodic Phonology describes prosodic structure in terms of a hierarchy of prosodic units. This hierarchy is formulated in order of decreasing autonomy in the hierarchy, i.e. phonological utterance (U) > intonational phrase (IP) > phonological (or intermediate phrase) (PP) > clitic group > prosodic word > foot > syllable > mora. In this framework, prosodic structure and syntactic structure are considered strongly autonomous, i.e. prosody and syntax are considered to be strongly independent levels of structure.

Thus, while the IP may align with syntactic units such as sentences, it is not always the case that IP boundaries will align with the end of a sentence. As a result, the authors hypothesised that native signers would be more able than non-signers to identify IP boundaries that aligned with the end of a sentence, because they can use all aspects of the signed utterance in their interpretation. They further hypothesised that non-signers would not be able to access information other than visual prosody. In this way, the reliability of prosodic cues for identifying the end of sentences was tested.

Six deaf native signers and six hearing non-signers were asked to view two narratives, one presented in BSL, and one presented in STS. Using ELAN software, each participant was asked to view the narratives and to press a button whenever they saw a sentence boundary, i.e. they identified boundaries on the basis of what they could subjectively perceive. Participants were asked to do this twice for each narrative in order to assess intra-participant reliability. Responses from each participant were then analysed and compared to each other. These responses were also compared to the IP boundaries identified by the main author using a cue-based approach.

This cue-based approach involved identifying IP boundaries by: (a) checking for the occurrence of a blink between signs; (b) verifying these potential boundaries by checking for other cues such as pauses and head nods (the authors reasoned that these three prosodic cues function as IP markers in BSL and STS as they have been identified as IP markers in ASL and ISL); (c) further verifying these potential boundaries by asking native signers with a background in linguistics to assess the presence of a boundary; and finally (d) applying a strict 1.5 second window to all IP boundaries identified by the linguists in which participant responses could be included as aligning with that boundary (Fenlon et al. 2007: 183).

The authors identified 26 IP boundaries in the BSL narrative and 21 IP boundaries in the STS narrative using this method. They found that participant responses for the BSL narrative tended to cluster around 13 of the 26 IP boundaries. Participant responses for the STS narrative tended to cluster around 12 of the 21 IP boundaries. There was a high level of agreement amongst native signing and non-signing respondents in identifying these boundaries. These boundaries were henceforth characterised as 'strong' boundaries. When

these strong boundaries were further analysed, there appeared to be no significant difference between signers and non-signers viewing either narrative, i.e. both signers and non-signers responded in a similar way. The native BSL signers were able to identify boundaries in a signed language they do not know, and the non-signers were able to identify boundaries in a language and modality they do not know. The authors concluded that both manual and non-manual prosodic cues are highly informative for segmenting units in BSL and STS (Fenlon et al. 2007: 188).

The authors then investigated the type and frequency of nine different cues observed at the IP boundaries in each narrative. These cues were head rotation, head nod, head movement, eye blinks, eye gaze changes, eyebrow movements, holds, pauses, and drop hands. In both BSL and STS narratives, between two and eight different prosodic cues were observed at each IP boundary. Further analysis could not establish a relationship between the number of cues and the number of respondents who identified the boundary, i.e. multiple cue marking did not appear to make a boundary perceptually stronger. However, the authors did establish that pauses, drop hands, and holds occurred relatively infrequently in both narratives, and that occurrences of these cues mostly aligned with strong IP boundaries. They hypothesised this is because these three cues are highly visible cues that involve the transition or cessation of movement that may clearly mark boundaries.

As responses from both native and non-signers were comparable for both narratives, Fenlon et al. (2007) concluded that not only do native signers use visual cues to segment sentence boundaries in their own language, these boundaries can also be perceived by non-signers who do not know a signed language. Prosodic cues are reliable indicators of sentence boundaries, and grammatical (i.e. semantic) knowledge is not essential for segmenting these units. Some IP boundaries evidenced high agreement ('strong boundaries') among participants, even though not all participants identified all IP boundaries determined by the linguists. These strong boundaries tended to align with the ends of identified sentences, which further suggests grammatical knowledge is not essential for delimiting these boundaries.

The intra-group agreement of these strong boundaries indicated that some IP boundaries are perceptually stronger than others, which suggests that "not only are IP boundaries marked differently, but that they interact with syntax in a way so that important boundaries (such as the end of a sentence) may be more marked than others" (Fenlon et al. 2007: 195). Analysis of the prosodic cues at all IP boundaries found that some gestural prosodic cues such as head movements and head rotations may possibly be used to mark sentence boundaries in both signed and face-to-face spoken language narratives.

2.2.4. Issues in the identification of clause-level constructions in signed languages

The two case studies summarised above constitute a mix of functional and formal approaches to the identification of clause-level constructions in signed languages, where the focus is primarily on the identification of unit boundaries. Studies such as these have

resulted in valuable findings regarding the characteristics of unit boundaries, and how both visual prosody and grammar may contribute to the interpretation of signed language communication.

However, there are four issues that remain unresolved by these types of investigations: (1) the application of the sentence as the unit of analysis; (2) the theoretical approach to prosody and grammar as independently organised and strongly autonomous structures; (3) the particular attention given to unit boundaries rather than unit contours; and (4) the fact that reported findings from perceptual studies of unit boundaries may be analysed alternatively to how they are reported in the literature, and in a way that potentially illuminates aspects of language use that have previously received little attention from signed language linguistics, i.e. the ambiguity and fuzziness of unit boundaries. These issues remain problematic for the investigation of clause-level constructions in both spoken and signed languages.

2.2.4.1. Issue 1: Application of the sentence as unit of analysis

For many linguists, the notion of the sentence as a basic unit of grammatical structure in spoken and signed languages is not very useful for analysing data of face-to-face interactions (e.g. Goodwin 1979; Mithun 2005; Slobin 2006). Many view sentences as either just a notion borrowed from written language, or as a clause with various additions (e.g. Van Valin & LaPolla 1997; Croft 2001). Part of the issue is that sentences are units of analysis that have developed from theories that consider language as hierarchically structured. These theories have largely resulted from work on the oral/aural/written aspects of major spoken languages, typically the major Indo-European languages.

Major spoken languages may be characterised as having long oral histories, established writing systems, and widely varied domains of use, i.e. they are intensely standardised and codified. This contrasts starkly with the characterisation of native signed languages as emerging within deaf ecologies that are comparatively young, have no native writing system, and are used in comparatively fewer domains of use, i.e. they are standardised (if at all) to a much lesser degree, and with less codification of communicative strategies and, consequently, grammatical organisation (Johnston 1996; see §3.2.2).

When signed languages are analysed with respect to sentences and sentence boundaries, there are two major assumptions being made that may not necessarily be warranted. Firstly, the assumption that sentence recognition is the basis of language perception, and is therefore essential for making sense of signed language utterances. This entails a corresponding assumption that signed languages are structured in primarily componential ways, and that signers 'decode' language by interpreting the manual and non-manual features they see using componential strategies of analysis.

Secondly, the assumption that sentences in signed languages are structured and interpreted in primarily componential ways entails a corresponding assumption that all of these components are analysed as 'linguistic', just as the components of spoken or written sentences are analysed as linguistic.

All of these assumptions emphasise the idea that signed languages are structured in ways that are parallel to the spoken languages, and downplays the ways in which they may be different (see Bellugi & Fischer 1972). Investigations of signed language grammar that accept these assumptions are therefore constrained to units of analysis described in the literature on spoken languages, whereby the 'text' of signed language analysis is limited to signed utterances as they are produced with the hands and body, just as the 'text' of spoken language analysis is traditionally limited to utterances as they are produced with the vocal apparatus or in writing.

Crasborn (2007) identifies two specific problems regarding the identification of sentences in signed languages that have challenged researchers so far. Firstly, it is difficult to determine what characteristics of signed language use function as verbal predicates, and therefore what does and does not function as the core of a clause or sentence. Most linguists accept that depicting signs and pointing signs may function as the core constituent of a propositional unit, but differ widely on their linguistic analysis of these types of signs (e.g. 'depicting sign' and 'pointing sign' are non-mainstream terminology). The case is not so clear with full-fledged enactment, however, which is difficult (if not impossible) to analyse componentially. As Johnston, Vermeerbergen, Schembri and Lesson point out, "it is difficult to know how to analyse such examples of constructed action and gesture, let alone analyse them consistently across utterances, between researchers, or cross-linguistically" (Johnston et al. 2007: 197).

Secondly, it is difficult to analyse the use of simultaneity in signed languages at any 'level' of analysis (whether word, clause, etc), and to incorporate simultaneity into sentence-based frameworks developed for describing sequential structures. The visual-spatial modality of signed languages entails that signers may use their hands and/or their face and body to express related information simultaneously, and that not all constituents may be analysed as discrete components that combine in representation (Johnston et al. 2007; see §3.2.3). Instances of clause-level simultaneity may involve the overlapping of core constituents (so they cannot be analysed in terms of sequential constituent order), or even the overlapping of some delineated clause-level units. Identifying clause-level units on the basis of analytical units defined by frameworks that prioritise componential analysis, and that do not make recourse for simultaneity, creates further complications in the analysis of clause-level units in signed languages.

These problems with the application of the sentence as a unit of analysis suggests that axiomatic parallelism between spoken and signed languages is not warranted. As the historical scope of spoken language linguistics has not included multimodal analyses of face-to-face spoken language data until recently, this means that transpositions of this scope to signed languages (which are inherently face-to-face) are too narrow. As Johnston et al. (2007) point out:

Many signed language scholars appear to assume that when signers use a natural signed language, the vast majority of their intentional communicative output is actually, if not necessarily, part of a visual-gestural lexicogrammatical

system, with little or no place for gesture in supporting, complementing, or even forming the very essence of some of the meanings which are conveyed. In this conception of signed languages, signed utterances are treated as being entirely composed of lexical constituents that themselves form part of grammatical constructions. It is sometimes assumed that in those signed utterances that include a signed element that appears not to be lexical but, rather, an iconic depiction or gesture, an underlying syntactic structure is still present (Johnston et al. 2007: 197).

2.2.4.2. Issue 2: Theoretical approach to prosody and grammar as independently organised structures

The theoretical approach to prosody and grammar as independently organised and strongly autonomous structures creates a further issue in the identification of clause-level constructions in both spoken and signed languages. There has been a tendency for investigations of clause-level constructions in signed languages to analyse data according to frameworks that adopt a position of strong autonomy between prosody and grammar, i.e. frameworks that posit prosody and grammar as strongly independent levels of language structure. In particular, the framework of Prosodic Phonology (Selkirk 1984; Nespor & Vogel 1986) has been particularly influential in studies of signed language morphosyntax and prosody.

Prosodic Phonology is based on Chomsky & Halle's (1968) transformational (generative) grammar approach to language analysis. This approach posits an abstract, deep structure of human language that is phonetically realised as surface structure, with the sentence as the basic unit of production, comprehension and therefore analysis (see §2.2.2.1 above). Frameworks that adhere to this approach consider syntax and prosody as strongly and uniformly autonomous. Thus, Prosodic Phonology predicts that not all prosodic boundaries will align with the start or end of a sentence, because they are independent structures that interact with each other to create surface structures. Prosodic structure is composed of different types of prosodic constituents, which are ordered according to the prosodic hierarchy summarised in §2.2.3.1 above.

In the Prosodic Phonology hierarchy, each prosodic constituent consists of a level that fits within the level above, and which contains units of all the levels below. In other words, each Utterance unit contains a hierarchy of a given number of Intonational Phrases, Phonological Phrase, clitic groups, prosodic words, feet, syllables and morae, all fitting together neatly like a set of Matryoshka dolls. This hierarchy was proposed to account for the prominences of certain prosodic constituents and syllables in a sentence, and means that instances of strong autonomy between syntactic and prosodic structures are explained via readjustment rules. This hierarchical model has also been used as a method for identifying sentences. Several linguists have used Prosodic Phonology to investigate the grammatical structure of spoken languages (e.g. Pynte & Prieur 1996; Grosjean & Hirt 1996). Several linguists have adopted the Intonational Phrase (IP) from Prosodic

Phonology as a basic unit of analysis for signed languages (e.g. Nespor & Sandler 1999; Fenlon et al. 2007; Nicodemus 2007; Fenlon 2009).

However, the characterisation of 'prosody' and 'grammar' as strongly and uniformly autonomous should not be taken as axiomatic. There are a number of reasons to consider weaker degrees of autonomy. Weaker autonomy suggests that the prosodic and grammatical organisation of utterances in face-to-face spoken and signed communication are more likely to be isomorphic and aligned with each other than not, or that the degree of autonomy is in fact emergent and not a fixed property of linguistic structure. Many functional linguists who work primarily with spoken language interaction and who also consider the ontogenic development of language are more likely to characterise prosody and grammar as weakly autonomous (e.g. Goodwin 1979; Bolinger 1983, 1986; Chafe 1994; Croft 1995; see §3.2.4.2).

The notion of strong and uniform independence between prosodic and grammatical structure is possibly yet another product of written language analysis, in which intonation manifests as punctuation and may therefore be devalued in linguistic analysis, and where language is easily disembodied from face-to-face contexts and recorded more permanently. As writing allows readers and writers to scan back and forth across written texts, activating and re-activating at will, the cognitive constraints placed on face-to-face spoken or signed communication are lessened, and writing systems are free to codify in ways more elaborate and sentence-like than face-to-face spoken or signed communication.

However, signed languages are not regularly written down using a commonly shared writing system or a native signed language orthography. Furthermore, it is impossible to use a signed language in its physical instantiation (i.e. not a written transcription) without seeing or touching the body. It is possible for signers to 'teleport' via video link, but each places the other in a virtual space on the other side of the camera during which visual attendance must still be maintained if one is to use a signed language (although note it is not possible for people to share eye contact during video chat; see Sindoni 2013). This means that signed languages cannot be 'disembodied' in the way that a spoken language may be when it is written down (see §3.2.3). It follows that visual prosody is always a part of the interpretation and analysis of signed languages, and all signed utterance units are 'unified' in some way by their physical expression.

There is a further argument against the idea of strong and uniform autonomy that is presented by the framework of Prosodic Phonology itself. In order to truly accommodate the observation that prosody and morphosyntax are strictly autonomous, the description of any constituent from the prosodic hierarchy must necessarily exclude any relationship or condition placed upon it by grammatical constituents, otherwise it appears that the two are, in fact, analysed as isomorphic. In other words, if one wishes to assert a position of strong autonomy, each type of constituent (whether prosodic or syntactic) should be defined independently of the other. In practice, this is not usually what happens when identifying units in signed language data.

For example, Fenlon (2009) later elaborated on the identification of IPs in his dissertation, which investigated similar phenomena in BSL, STS and ASL. In this later study, it is unclear whether IPs in these data were delineated according to the principles of a prosodic hierarchy, i.e. by looking for prosodic constituents within an utterance domain. The IP data in this study actually appears to have been segmented perceptually and semantically. As Fenlon explains:

As a starting point, attention was paid to the articulation of the hands. Specifically, signs were examined for holds, repetitions, and whether the size of the sign in phrase-final position was larger than in non-final positions. In addition to this, signs were also grouped together according to semantic roles to determine which signs are likely to 'go together'. For example, a verb can join with adjacent nouns that are related semantically to it (as in 'Billy kicked the football', where 'Billy' is the agent of the verb 'kicked' and 'football' is the patient). As prosodic structure is also dependent on factors linked to production and individual style, using this combined approach (referring to the signer's rhythm as well as meaning) to indicate boundaries is highly satisfactory (Fenlon 2009: 67).

Thus, the IPs in this study were identified primarily on the basis of both form and meaning, not by looking for prosodic constituents within an utterance domain. This method makes a lot of sense for identifying units in signed language data, but it is actually more similar to a cognitive-functional approach than the one suggested within the Prosodic Phonology framework. Studies such as these demonstrate that while some types of unit boundaries can be perceived by both native signers and non-signers, parallel applications of frameworks based on written and spoken languages to signed languages result in difficulties when it comes to reconciling data with theory.

There is a further downside to applying units from Prosodic Phonology (and other componential frameworks that conceptualise 'prosody' and 'grammar' as distinct and separate structures) to signed language data. It is not possible to explain or extend the relevance of the analytical unit beyond the concept of the prosodic hierarchy and its supposed projection from syntactic structure. These units are considered to be strongly autonomous in origin, developing independently of each other and then put together by the speaker or signer. Such an approach cannot advance our understanding of how a particular unit came to be organised in a certain way, e.g. due to the biological, cognitive and interactional constraints that manifest in social interactions. It only attempts to predict it.

Evidence from child first language acquisition suggests the opposite—that language units develop isomorphically through social interaction (i.e. as 'chunks' or exemplars), and that speakers learn to re-organise them with the facility that comes with knowing, using and manipulating various modes of language as skill (e.g. Tomasello 2003; Givón 2009; see §3.2.4.2).

2.2.4.3. Issue 3: Focus on unit boundaries but not contours

Reliance on prosodic boundaries rather than expressive contours also presents an issue for identifying clause-level constructions in signed languages. Boyes Braem (1999) found that rhythm and temporal contours, i.e. physical movements perceived in transition across time, are highly significant for differentiating between native and non-native signed language production. Sze (2008) considered the multi-functionality of non-manual features and found that not all eye blinks necessarily indicate unit boundaries, and that signers' blinks are often synchronised with other physical movements such as head movements and changes in eye gaze.

Consider also recent research on face-to-face spoken language interactions that suggests synchronic eye blinking between interactants, i.e. entrainment, reflects smooth communication (Nakano & Kitazawa 2010). Most signed language linguists agree that it is unclear whether any manual or non-manual elements may be considered boundary markers in the sense that they exclusively mark boundaries (see §2.2.3 above). Studies that have focussed solely on potential boundary markers also do not tend to consider the possibility that weaker boundaries may be parts of larger contours.

Linguists who have taken an information structure approach to segmenting signed language data have found that while there is some clustering of physical prosodic properties at boundaries between semantically and syntactically cohesive units, none were singled out as signalling sentence boundaries (Hansen & Heßmann 2007). Linguists who have tried to establish how signers perceive and use individual physical properties of prosody have concluded it is very difficult, even though sign language prosody is visible to signers and non-signers alike (Fenlon et al. 2007). If particular features are identified as potential boundary markers, it is also unclear which of those features may be shared by all signed languages and which may be language-specific (Hansen & Heßmann 2007: 157).

There is also fact that the physical properties of signed language prosody (such as manual signs, head nods, eye gaze and so on) also occur at places other than the boundaries of various units (see Sze 2008). All of these observations suggest it is important investigate the interaction of visual properties that create coherent intonational contours rather than focussing solely on boundaries, and to investigate the use of contours for chunking signed utterances and identifying clause-level constructions in a signed language.

2.2.4.4. Issue 4: Alternative analysis of unit boundaries

There is at least one alternative analysis for the reported findings from perceptual studies of unit boundaries that has not been discussed in the signed language literature: these findings may suggest that signers shape and negotiate utterance units that are very often ambiguous with fuzzy boundaries. As explained in §2.2.3 above, several studies on several different signed languages have failed to identify a single prominent marking strategy of signed language prosody. Rather, investigations of prosodic perception have found clusters of prosodic features that appear to delineate boundaries of grammatical units in some way. Clusters tend to suggest a 'fuzzy' sense of finished-ness rather than a

strictly demarcated boundary, yet previous analyses of perceptual data have not discussed the possibility that fuzziness may be a characteristic of language use, particularly for face-to-face and signed languages where anything that can be seen may potentially be interpreted as meaningful (see §3.2.3).

Investigations of spoken language prosody have characterised speech signals as continuous with few robust and reliable cues to word boundaries (Cutler & Mehler 1993: 104; see also Cutler, Dahan & Van Donselaar 1997). Frequency of use has been found to contribute to the development of automaticised processing chunks in which boundaries are 'blurred' and whole chunks are 'compressed and reduced' (Diessel 2007: 124; see §3.3.1). The indeterminacy of (morphosyntactic) word segmentation in spoken languages presents serious issues for developing a cross-linguistically valid concept of 'word' in the field of linguistics, also suggesting there is no good basis for a strict differentiation between morphology and syntax (Haspelmath 2011).

Furthermore, the ambiguous identification of many kinds of communicative units in signed languages is evident during both online negotiation between signers and the acts of interpretation involved in translation or annotation in corpus-based investigations (see §4.2.3.2). Due to these factors, it is suggested that fuzzy unit boundaries and ambiguously identified units (when they are observed) may be more readily accommodated within an approach that considers the communicative origins of languages (e.g. Armstrong, Stokoe & Wilcox 1995; Givón 2009; cf. Piantadosi, Tily & Gibson 2012: 282).

2.3. Evaluating claims from the signed language literature

Section §2.2 outlined four scopes for investigating clause-level constructions that have been reported in the signed language literature, and discussed the major contributions of these studies with respect to theoretical framework, analytical method and findings. Most of these studies constitute exploratory investigations rather than detailed descriptions of general patterns of signed language use. Claims made regarding the description and identification of clause-level units must be evaluated with respect to the method on which findings are based and key paradigmatic assumptions underlying these investigations.

2.3.1. Methods in signed language research

There are issues with both the number and type of methods used to investigate clause-level constructions in signed languages, and how data are analysed. Evaluation of the methods used for identifying and describing clause-level constructions in signed languages highlights the need to consider the lived experience of signers and three-dimensional signing space when describing signed language lexicogrammar, and the need for empirical investigations of balanced and representative corpora.

Johnston et al. (2007) argue that the number of methods that researchers have used to collect data for investigating constituent order in signed languages make it difficult to compare findings cross-linguistically and cross-modally. Jantunen (2008) also challenges the validity of methods that concentrate on utterances that are elicited in experimental contexts, which are often based on the principle that certain features of signed languages

do indeed function syntactically, and which explore these features in isolation from other aspects of signed language grammar and use. Methods to investigate constituent order in spoken languages usually involve elicitation tasks and acceptability judgements of constructed examples in conjunction with language surveys, sketch grammars and other resources resulting from fieldwork.

Signed language linguists have adopted many of these methods to determine basic and alternative constituent orders in various signed languages. These include translations from written English sentences (e.g. Fischer 1975; Liddell 1980); picture descriptions to elicit various types of states of affairs (especially those developed by Volterra et al. 1984; e.g. Volterra et al. 1984; Boyes-Braem, Fournier, Rickly, Corazza, Franchi & Volterra 1990; Coerts 1994; Vermeerbergen 1996, 1998; Sze 2003); grammaticality judgements of possible constructions (Neidle, Kegl, MacLaughlin, Bahan & Lee 2000); and less commonly, analysis of naturalistic narratives or conversations filmed in informal situations (e.g. Friedman 1976; Deuchar 1983; Vermeerbergen 1996, 1998; Neidle et al. 2000; Engberg-Pedersen 2002).

Most investigations are limited to simple declarative transitive or intransitive clauses on the grounds that these types of constructions are the most universal and basic of all types found in the worlds' languages. However, it is debatable whether simple declarative clauses are in fact the most basic type of clause-like unit in spoken or signed language grammar. Many spoken language studies have refuted the claim that the basic utterance is a clause with two arguments and a predicate (e.g. Du Bois 1987; Thompson & Hopper 2001). Instead, these studies find that not only is argument structure much more variable than reported in the literature, ordinary conversation is characterised by clauses with very low transitivity that usually consist of only one participant, along with entrenched expressions (which challenges the idea that verbs 'choose' their arguments).

Observations and analyses of face-to-face spoken language development and use suggest that "scattered verbless constituents with their own intonation contour" are a more ontogenically original and simple type of clause (Givón 2009: 253; see also Ochs, Schieffelin & Platt 1979). These Givónian units emerge in contexts of situated embodiment between two or more people, and involve a co-construction of meaning between speakers interacting in the same physical space (see §3.2.4.2). This type of construction is frequent in exchanges between users of least two unrelated spoken languages, early childhood language, second language pidgin and Broca's aphasic communication. This claim also contradicts perspectives that the basic constituent order of a language is that which is the most frequent, widely distributed, pragmatically neutral and unmarked constituent order.

Johnston et al. (2007: 198) note that many linguists have observed that constituent order is not just a product of language-specific strategies of syntax and the interaction of grammatical roles (e.g. Van Valin & LaPolla 1997). It also results from the interaction of semantic and pragmatic factors (e.g. verb meaning and the information structure within the clause in its discourse context). Patterns of constituent order also result from human cognitive development and processing (see §3.4.1).

Furthermore, the strong tendency for identified SVO order can also be explained by iconicity or Gestalt principles rather than grammatical relations, e.g. as figure-ground depictions, or event structure constructions that explicate who did what before explicating what was done and to whom (see Haiman 1985; Armstrong et al. 1995; Givón 2005). These alternative explanations suggest there may be no requirement for claims about grammatical relations in a modality that does not generally seem to prioritise the order of constituents.

Johnston et al. (2007) also argue that there are a number of issues with how data are analysed. Very few studies discuss problematic data (e.g. data that were difficult to delineate and analyse) or make allowance for their data to be checked by native signers during their investigation. If data has been checked, the method and analysis of data checking is not usually reported in detail. Many methods do not enable sufficient and empirically supported evidence for the research questions they are used to investigate, particularly those investigations that make generalised claims regarding patterns of basic constituent order. Methods based on spoken language tasks also face the problem of sequentiality versus simultaneity explained in Sections §2.2.2.1 and §2.2.4.1 above. Furthermore, findings based on very few numbers of signers may not necessarily result in conclusive claims that are reflective of general signed language use. If most claims are based on elicited responses or narratives from very few signers, the generalisability of such claims is immediately called into question (see §4.2.1).

Analysing signed language constituent orders and other clause-level phenomena, and comparing findings from different studies is a difficult and problematic task (Johnston et al. 2007). For example, Johnston et al. (2007) discuss alternative analyses of their elicited and narrative data of Auslan, ISL and VGT, showing that several clauses in the data sets for each language either had other possible analyses or contained units that were completely unanalysable in terms of their constituent structure. These units were unanalysable either because of signer disfluencies or poor video quality, signer idiosyncrasies, or because the data were difficult to interpret and analyse within the constraints of the analytical framework.

In fact, these problematic clause-level constructions usually contained complex predicates (i.e. depicting signs) or simultaneous constructions (i.e. two or more core elements expressed and/or inferred simultaneously). The ISL and VGT data from the elicitation tasks also showed how idiosyncratic signers can strongly influence the patterns found in signed language data. The quantified observations that linguistic data can be difficult to analyse highlights the fact that 'real data are messy' (Johnston et al. 2007).

In many sciences it is standard practice for messy data to be interpreted as 'accidental information' (i.e. noise) that is not relevant for inferring regularities from the data, and may therefore be omitted at some stage of the analysis. However, this can potentially have serious implications for the resulting analysis and evaluation of findings. Instead, it is important to contextualise all data, analyses and findings in relation to each other.

Presenting the full range of one's data and analyses, and then compressing regularities from this range, results in a more robust and informative investigation.

For example, Rissanen (1989) discusses the impact of this practice in applications of information theory. He shows how his Minimum Description Length principle, by avoiding assumptions about the data generating process (and therefore first considering all observations), aims to 'learn useful properties from the data' (Rissanen 1989). This school of thought acknowledges that messy data is not noise, and that all observations may contribute a context from which one can use inferencing methods (such as statistics) to reveal regularities (see also Grunwald, Myung & Pitt 2004).

2.3.2. Paradigms in signed language research

The review of literature has also highlighted an underlying assumption that must be addressed before this study proceeds. This is the tendency to analyse (multimodal) signed language structure on the basis of reported (unimodal) spoken language structure. It seems that many analyses of clause-level constructions in signed languages have been driven by a single paradigm: that signed languages are used and structured in ways that are parallel to spoken languages.

However, researchers who unquestioningly accept this as a foundation of their knowledge about signed languages are essentially committing to a paradigm of language structure and use that is yet to be established. Investigations conducted with the constraints of unquestioning parallelism tend to find it difficult to reconcile all aspects of their data with this paradigm.

The review of literature has also highlighted a tendency to misapply the paradigm of parallel structures despite committing to it. This is particularly evident in studies that investigate signed language prosody on the basis of spoken language prosody. Spoken language prosody is characterised in terms of physical properties such as pitch accents and voice quality. In turn, signed language prosody is characterised in terms of physical properties such as body movements, facial expressions, head movements and so on.

However, the physical properties of each modality are not strictly parallel because speakers also have bodies and faces, and do manipulate them in meaningful ways when using a spoken language. With respect to prosody and visual expression at least, it is not just a simple case of 'signed languages are like spoken languages'. To claim this is to assert a strategy that is essentially mismatched and not parallel at all.

It may be more appropriate to consider the physical properties of signed languages that are typically attributed to prosody in a different way. For example, in Gestalt models of visual perception (e.g. Lehar 2012) or movement models of language (e.g. S. Wilcox 2012). If visual prosody is considered in a different way, it may be necessary to question whether we can reasonably expect to delineate multimodal signed or spoken language units in the same way that linguists have arguably achieved for unimodal text or auditory data of spoken languages. Perhaps a greater degree of 'gradience' and 'fuzziness' may be afforded by the wider range of articulatory and perceptual strategies of the visual-gestural

modality, and consequently all face-to-face communication, regardless of whether it is conducted using a signed or spoken language.

A truer characterisation of modern signed language linguistics is that, with respect to the identification and analysis of clause-level utterances at least, the field is in a pre-paradigmatic state (see Kuhn 2012 [1962]: 162). Many widely-held assumptions and beliefs about signed languages reported in the literature as if they are axiomatic deserve to be questioned (Armstrong et al. 1995; Johnston 1996; Liddell 2003).

This is certainly not to suggest a return to the pre-Stokoe era where signed languages remain to be established as human languages. The language status of native signed languages such as Auslan is not in question. What is in question is some of the entrenched ways of thinking about signed languages as ‘structured’ equivalently to spoken languages, and even some entrenched ways of thinking about language structure (especially hierarchically organised structure) more generally. While we can expect signed and spoken languages to exhibit many interesting parallels with regards to use and organisation, there are good reasons to expect many differences too (Johnston 1996; Liddell 2003). These aspects of signed language use and linguistic theory are explored further in Chapter §3.

The nature of these similarities and differences is an empirical question, one that depends on each language being considered in its own terms (Haspelmath 2007, 2010). While one language may share many features with others, they do not necessarily evolve and conventionalise in parallel ways (see §3.2). Closer inspection of the use and organisation of signed languages that considers real lived experience of signers is warranted.

A gentler ‘pre-paradigm’ to explore is one that considers that both spoken and signed modalities share similar potential for conventionalising communicative strategies, and that these strategies emerge and conventionalise as each social ecology requires them (i.e. that both modalities manifest as human languages). This is a step back from asserting that the conventionalised strategies that emerge in varied language ecologies are all used and organised in the same ways (i.e. that all spoken and signed languages manifest as types of human languages that are structurally and functionally parallel).

2.4. Conclusion

The identification and analysis of clause-level constructions in signed languages have been investigated from several perspectives in the signed language literature. Section §2.2.1 described how linguists have chosen to investigate clause-level constructions by looking at constituent order, the structure of specific types of clause-level constructions, patterns of ellipsis and the role of various phenomena in signed language structure.

Section §2.2.2 and §2.2.3 described studies that have considered the interaction of prosody and grammar for delineating the boundaries of various units, with the aim of finding out if boundary markers can be identified as confidently delimiting these units. Section §2.2.4 identified four issues with this tradition of unit analysis that need to be addressed. Section

§2.3 evaluated these claims reported in the signed language literature with respect to their method of analysis and key underlying assumptions.

Overall, this review of the signed language literature found that, regardless of theoretical approach, most studies have concluded that the identification and analysis of clause-level constructions in a signed language is very difficult. This review also found that there are no clear guidelines or rules that can be used to delineate the boundaries of clause-level units as they are currently defined in the wider linguistics literature.

The main problems regarding the description of signed language grammar concern: (1) how clause-level constructions in signed languages are identified, analysed and described; and (2) how signed language ecologies and the real lived experience of deaf signers can be accommodated and reflected in theoretical and analytical frameworks of language description. Both of these problems are addressed in this thesis by exploring an annotated signed language corpus.

3. Theoretical approach

I would say that the poem exists in a space somewhere between the reader and the author, and in a sense belongs to neither, and both.

— Don Paterson

3.1. Introduction

The enrichment and exploration of the study corpus was informed by a theoretical approach that draws from the literature on interaction, semiotics, cognitive linguistics and functional linguistics. This approach was developed from different but interrelated traditions for investigating human sociality and communication, all of which overlap in numerous ways. Each illuminates important and complementary aspects of language use and language description that are relevant to this study.

Chapter §3 describes and justifies this approach in five sections. Section §3.2 defines the notion of signed language ecologies and elaborates on the lived experience of deaf signers. It brings together observations from research in semiotics and interaction, and describes how speakers and signers engaging in face-to-face interaction jointly orchestrate the semiotic resources available to them to create ‘composite utterances’ (Enfield 2009). These sections draw from the literature that emphasises language as a communicative, social and interactive phenomenon (e.g. Goodwin 1986; Johnston 1996; Bavelas 2007).

Section §3.3 presents key ideas from cognitive linguistics and usage-based theory, and describes a framework of lexicogrammar used to identify and analyse the possible clause-like units investigated in the study corpus. This section draws from the literature on language as a conceptual phenomenon that emerges through use (e.g. Langacker 1987, 2008; Tomasello 2003; Givón 2009).

Section §3.4 presents key ideas from functional linguistics and language typology, and describes the emergence of clause linkage (i.e. hypotaxis) from discourse. It also describes how strategies of clause linkage may be analysed, identified and characterised according to discourse-pragmatic function and typological gradience. This section draws from the literature on language as a meta-functional phenomenon that has evolved to do what we need it to do in our interpersonal relations (e.g. Lehmann 1988; Halliday 1994).

Section §3.5 evaluates how the ideas outlined in this chapter shape the exploration of how Auslan signers organise and co-construct their signed utterances from a clause-level perspective of analysis. In this way, the theoretical approach for annotating and analysing the study corpus is shown to facilitate an investigation of a native signed language that considers the language ecologies in which signers interact, the lived experience of deaf signers, and the range of semiotic resources available to both signers and speakers during their face-to-face interactions.

3.2. Signed language ecologies

3.2.1. Language ecologies are shaped through interactions over time

Goodwin (1995) defines context as “the phenomenal environment that provides from the ongoing intelligibility of talk, action and situation” (Goodwin 1995: 131). However, he later argues that holistic descriptions of language use must go beyond static notions of context in language use and consider the ecology in which the language is used (Goodwin 2003a). While Goodwin was referring to an ecology of signs, in this thesis, the concept of ecology is also interpreted through the paradigm of mutualism in the cognitive and biological sciences (Maturana & Varela 1987).

In this paradigm, an ecology is not simply the environment in which an organism exists; it is the constantly emerging complex shape and history of interactions between an organism and its environment. Organisms are described as self-maintaining systems that develop ‘structural couplings’ between their internal structures (such as the brain) and external structures (such as other organisms) via encounters with the environment in which the organism acts.

These encounters result in changes to both internal and external structures that develop and are maintained over various time frames, all of which “reflect the history of interaction between an organism and its environment, and have the effect that future interactions occur in a new and adaptive way” (Pickering 1997: 192).

Put simply, ecologies emerge and develop through the interactions of organisms in their environment. Thus, a signed language ecology is not simply the contexts in which a signed language is used; it is the constantly emerging complex shape of interactions between signers via encounters within the environment in which they act.

3.2.2. Auslan ecologies

Auslan is a minority primary signed language that has emerged within social networks of deaf signing families, residential schools for the deaf, and social groups such as religious organisations and deaf societies over the past two hundred years (see Schembri, Cormier, Johnston, D. McKee, R. McKee & Woll 2010 for a short history). Only 5–10% of the Australian deaf community are deaf or hearing native signers, so Auslan ecologies are extremely heterogeneous due to sociolinguistic and idiosyncratic variation (Johnston 2004). Contemporary ecologies of Auslan are diachronically and synchronically shaped by factors both unique to its place and time, and also shared with other urban primary signed languages.

There are four major factors influencing the evolution of Auslan. Firstly, the relatively recent expansion of the traditional social and domestic communicative domains of Auslan usage into public social life, higher education and white collar professions (see Bernstein’s formal code versus public code, Bernstein 2003[1971]). This expansion is primarily facilitated by the increasing access achieved through individual and organisational advocacy, the Disability Discrimination Act 1992 and the growing Auslan interpreting industry.

Secondly, sustained contact with other languages, particularly spoken and written English. For example, younger signers experience potentially greater access to English due to assisted technologies such as hearing aids, cochlear implants and communicative technologies that facilitate English-based interactions. Thirdly, the fact that signed languages are used in relatively local contexts, concentrated in urban areas near accessible facilities.

Finally, the idiosyncratic development of Auslan ecologies according to education history, age of acquisition and other sociolinguistic variables means that personal idiosyncrasies may be more evident and influential for the signers with whom one engages on a daily basis (see Johnston & Schembri 2007a for more detail).

The emergence of Auslan ecologies contrasts with the emergence of village signed languages among peoples such as the Al-Sayyid Arab-Bedouin, which are characterised by “the pervasive use of signing by both hearing and deaf” (Kisch 2008: 284; see also Nyst 2012, although note that there is some inter-collegial discussion about just how many villagers in these communities are proficient signers).

Schembri & Johnston (2013) describe a number of sociolinguistic variables that have been identified as influencing the ongoing variation of Auslan and other urban signed languages. These are broadly categorised as linguistic constraints (e.g. phonological assimilation, grammaticalisation), social constraints (e.g. age, gender and region), or stylistic constraints (e.g. casual and formal styles of signing), all of which manifest in interrelated and adaptive ways (Schembri & Johnston 2013).

Empirical studies of Auslan have identified sociolinguistic motivations for lexical variation in colour terms and other core vocabulary (Johnston 1998; Johnston & Schembri 2007a), and phonological variation in the location of particular signs, the handshapes of particular depicting signs, and the movements of noun-verb pairs (Johnston 2001; Schembri 2001). Phenomena such as the location variable have been empirically identified as led by younger people, individuals from larger urban areas, and women.

Linguistic constraints such as immediate phonological environment and correlations between frequency and grammatical function have also been identified as contributing motivations for the location variable of Auslan signs (Schembri, D. McKee, R. McKee, Pivac, Johnston & Goswell 2009). Older signers aged 51 and over have been found to favour use of the manual alphabet more than signers aged 50 or younger, a preference that reflects the fingerspelling-rich educational experiences of older deaf people (Johnston & Schembri 2007a).

Much remains unknown regarding sociolinguistic variation in Auslan ecologies, especially regarding urban versus rural communities, immigrant communities, or the impact of hearing and deaf late learners on Auslan (Schembri & Johnston 2013). However, the gathering evidence makes it clear that while Auslan ecologies are characterised by many commonalities, they are also characterised by great diversity and susceptibility to differences due to the complex interactions of various signers in various social networks.

This undoubtedly has a significant effect on the patterns that may be identified from a signed language corpus, and the types of generalisations that can be inferred from linguistic analysis.

3.2.3. Elaborating the lived experience of deaf signers

An additional consideration of signed language ecologies that warrants elaboration is the observation that signed languages are shaped by what can be perceived visually in face-to-face interaction (Bouchard & Dubuisson 1995; Johnston 1996). Johnston (1996) argued that the interaction of constituents in signed languages is different from spoken languages due to the availability of space in a visual-gestural language, rather than to the simultaneity of codings in signed languages as commonly claimed in the literature (see also §2.2.1.1). The major implication (at that point largely ignored by the field) of noting the availability of space for linguistic expression and its subsequent effects on linguistic structure is that it recognised that signed languages are “quintessentially face-to-face languages: a fact that may influence, and even constrain, the linguistic system in other ways” (Johnston 1996: 1).

At least four additional implications follow from this observation. Firstly, as quintessentially face-to-face languages, signed languages are fixed to the specific spatio-temporal contexts within which interactions unfold. Both deaf and hearing signers are required to attend generously to whoever is signing during interactions, in order to perceive and share all the nuances of meaning that can be expressed visually in the signing space. This necessary attendance means that peripheral activities (such as reading the menu in a restaurant, catching the eye of the waitress, ordering the food and then actually eating it) are achieved differently than for non-signers who have the luxury or possibility of listening or speaking without looking, or of not paying attention to voice quality or gestures.

Secondly, as it is not usually practical to do other things with the hands while signing, signers must often shift between ‘interacting using a signed language’ and ‘doing other things’. Signers typically do so with great facility. For example, signed interactions in cars between driver and back-seat passengers usually involve relays via the front-seat passenger and/or the rear-view mirror. Conversation may be contiguously maintained while doing other things such as driving, but not usually concurrently. This means that signers are obliged to maintain a strong awareness of both their interactants and their physical surroundings when using a signed language.

Thirdly, considering the human lifeworld is largely visual, temporal and spatial, signers who use these resources for representation “can directly express the visual and spatial qualities of the world they wish to represent” (Johnston 1996: 8). This suggests that signers may make habitual recourse to ‘showing’ meaning throughout their face-to-face interactions in addition to ‘telling’ it by encoding meaning linguistically (Liddell 2003; see §3.3.4.2 below).

Finally, using any language involves negotiating a specific spatio-temporal geography, but deaf signers particularly need to negotiate and maintain 'visual communication spaces' (Kusters 2009; see Lefebvre 1991). The importance of visual communication spaces to signers cannot be underestimated. For example, Kusters (2009) describes the visual communication spaces that eventuated when the Mumbai Western Railway started providing separate train compartments for Mumbaikars with a physical and/or intellectual disability. This provision allowed deaf people and others to experience an easier and safer journey by avoiding the dangerously overcrowded general compartments.

Since their inception, the separate train compartments have greatly improved the visual-spatial mobility of deaf signers on the Mumbai suburban train system, and has facilitated their interactions with each other. The re-organisation of the spatio-temporal geography of public space in such a huge metropolis, where signers are often distanced by hours of transit if not geography, means that deaf signers can now meet and travel together with greater ease and frequency than before. This is partly because there is more opportunity to create visual communication spaces. The availability of such visual communication spaces gradually contributes to more frequent and richer interactions with other deaf signers, to the point where many journeys are now taken primarily for the purpose of catching up with friends on the train. The train system has become the 'social lifeline' for deaf signers in Mumbai (Kusters 2009).

Understanding the lived experience of deaf signers is particularly necessary for considering the language ecologies of signers who experience different perceptual influences, and how these ecologies may constrain their linguistic system in specific ways. For example, the language ecologies of deafblind signers are shaped by what can be perceived from tactile sensation, or gauged from visual percepts at very short distances in particular types of light (see Mesch 2001). The image in Figure 3.1 below hints at some differences that may be experienced by signers with deafblindness.



Figure 3.1 Edan Chapman. 2012. *Sam in St Kilda*.

This image was captured by Edan Chapman, an Australian professional photographer who is Deafblind. It suggests some insight into visual aspects of deafblind perception. In particular, the sharp outline of the figures created by the position of the photographer against the fading light creates a striking figure/ground composition. In this composition, recognisable percepts such as humans and birds can be visually perceived and interpreted, along with some of the textural appearance of the natural world. However, the finer details of visual percepts crucial for face-to-face interaction, such as faces, are almost indistinguishable⁶.

Investigations of signed languages require careful consideration of the dynamics of the varied perceptions and interactions as shaped by individual lifeworlds. After all, many signers contribute to the evolution of Auslan within their social networks. Some of these signers experience other perceptual influences in addition to deafness, which in turn shapes their signed language ecologies.

However, the prevailing paradigm that spoken and signed languages are structured in parallel ways fails to accommodate the manifested range of both signed and spoken language ecologies. The fact that signed languages are constrained to visual-spatial percepts is not often explicitly acknowledged as a factor that potentially influences the emergence of signed language structure, nor is it reflected in spoken or signed language analytical frameworks.

⁶ Note that this is a highly subjective characterisation. A person with relatively typical vision may be quick to describe a particular visual percept as 'indistinguishable' because it is comparably poorer to what they are used to seeing. On the other hand, a person who often experiences great difficulty with their vision may be very skilled at picking out the meaningful aspects of what they do see in favourable circumstances. The same goes for speech reading.

The particular aspects of signed language ecologies and deaf lifeworlds discussed in this section have significant implications when considering what constitutes the 'text' used for linguistic analysis of signed languages, or when comparing signed languages to spoken languages. Investigations of signed languages must consider the real lived experience of deaf signers and the language ecologies in which they interact, just as investigations of spoken languages are increasingly considering the face-to-face, multimodal language ecologies of speakers, as we shall see in the next section.

3.2.4. Composite Utterances

3.2.4.1. Contexts of interpretation are shaped by composite utterances

Strategies and patterns of meaning construction vary within and across language ecologies, depending on how contexts of interpretation are constrained and shaped in different ways by the lifeworlds of individual language users, the grammar of each language, and the spatio-temporal and pragmatic context in which any given utterance is made (LaPolla 2003, 2005).

This notion challenges generative understandings of context as being used to disambiguate fixed language forms, whereby the interpretation of ostensive-inferential communication involves a coding-decoding process (e.g. Sperber & Wilson 1986; Wilson & Sperber 1993). Instead, humans are understood to use language and other semiotic resources to disambiguate their context, whereby disambiguation is negotiated between interactants during social interactions via ostensive and inferential acts (LaPolla 2003, 2005).

This principle is fundamental to this thesis because it incorporates the situated embodiment of human lifeworlds as perceptually contextualised (Merleau-Ponty 1962), and the presumed heuristic of semiotic unity that characterises human experience (Enfield 2009). Crucially, it enables investigations of signed languages to relax from the restraints of 'structure' and 'representation' that have resulted from the mixed lineage of de Saussure's important contributions to linguistics (see R. Hodge & Kress 1988: 13-36). This principle re-establishes meaning, not structure, as a foundation upon which to identify and explore patterns of signed language use.

Following from a long line of researchers on human sociality, interaction and gesture-with-speech, Enfield (2009) presents an 'anatomy of meaning' that elaborates how both speakers and signers draw upon a repertoire of semiotic resources to shape the context of interpretation during face-to-face interaction. These resources include speech, signs, gestures and enactments (i.e. semiotic signs of different types) that are combined in various ways to produce 'composite utterances'.

Composite utterances are defined as communicative 'moves' in face-to-face interaction during which speakers or signers combine different types of semiotic signs to create unified utterances that are interpreted holistically. A communicative move may be recognised as part of an interactional sequence, such as a turn, or more specifically as an instantiation of a type of linguistic utterance, such as an intonation unit or clause. These

moves are further defined by the temporal domain of 'conversation time', i.e. the moment-by-moment temporality in which communicative moves unfold. Enfield uses the term 'enchrony' to refer to conversation time and to differentiate it from historical time, i.e. diachrony (Enfield 2009: 10).

3.2.4.2. Communicative moves

Communicative moves are considered to be "a single-serve vehicle for effecting action socially" (Enfield 2009: 11). These moves have a strong basis in the ontogeny of communicative development in children, especially children's use of pointing gestures and ritualised gestures (Kita 2003; Tomasello 2003). For example, Tomasello describes a ritualised gesture that infants all around the world learn use to request to be picked up by an adult, i.e. by raising their arms above their heads, towards the adult, as the adult approaches (Tomasello 2003: 32). The gestures in these types of moves are intentional and communicative, but they evolve from infants learning that certain actions such as crawling and reaching bring about other actions. These other actions are typically satisfactory responses from adults. While an important skill to develop, the use of ritualised gestures is not necessarily bidirectionally symbolic, as the infant is unlikely to recognise this gesture as similarly meaningful if another child were to use it with them.

However, as children develop their cognitive and social understanding of the semiotic resources used within their language ecologies, a ritualised gesture such as RAISE-ARMS may be co-articulated with a bidirectionally symbolic form such as "up", thereby creating a gesture-with-speech composite utterance "RAISE-ARMS up". In this instance, the child experiences some desire to be picked up, and combines the two semiotic strategies of gesture and speech in order to express this intent by constraining the adult's context of interpretation. As the move unfolds, the adult likely interprets the child's move as an ostensive act and infers meaning from the child's unification of gesture and speech.

In this way, an interpretation 'pick me up' is enchronically co-constructed between the child and adult during the communicative move, and some type of social action is effected. The adult either picks up the child, does not pick up the child, or instigates some other kind of social action. Speech-with-gesture composite utterances such as these effect social actions in a richer and more precise way than communicative moves of ritualised gestures.

Children's use of gestures in ontogenically early communicative moves has been found to scaffold early linguistic utterances (Kelly 2002; 2006). The basis of communicative moves in social interactions is also evident in the organisation and sequencing of turn taking during conversation (Sacks, Schegloff & Jefferson 1974; Schegloff 1979), and in the organisation of interaction between humans who are cognitively traumatised, such as adults with aphasia (Goodwin 1995; Givón 2005).

For example, adults with aphasia who have lost most of their speech ability have been observed to rely upon pointing signs and a small number lexical forms such as "yes" and "no" to co-construct composite utterances during their communicative moves (Goodwin

2003b). During interactions between aphasic and non-aphasic individuals, sequences of moves gradually disambiguate aspects of the physical environs of the utterance for all interactants, thereby effecting some negotiation of communication between aphasic individuals and their social intimates who do not have aphasia⁷.

Communicative moves involving pointing signs and ritualised gestures have also been observed in interactions between non-human primates (e.g. Leavens & Hopkins 1998, 1999), and moves involving spitting-as-pointing have been observed in cross-species interactions between chimpanzees and humans (de Waal 2009: 154).

3.2.4.3. Conventional signs, non-conventional signs and symbolic indexicals

Unified composite utterances can be analysed according to their components and the interactions in which they emerge. Enfield differentiates three types of signs that are used to create composite utterances: conventional signs, non-conventional signs and symbolic indexicals (Enfield 2009: 12).

Conventional signs are signs that are frequently used and widely understood within a language ecology. They are expressions that are typically considered as part of a language and that language users recognise as conventional signs in most contexts. This may include arbitrary expressions and emblematic manual gestures. For example, the English idiom *have a look*, the Auslan sign BOY, the English mouthing *wolf*, the Gbaya ideophone *sélélé* and the emblematic THUMBS-UP gesture are all tokens of conventional signs. More precisely, they are tokens of types of conventional signs.

Non-conventional signs are signs that emerge within specific spatio-temporal contexts and communicative events. They are ‘singular events’ during which interactants enchronically interpret a form as ‘standing for’ a meaning (Kockelman 2005). Furthermore, these standing-for relations “become signs only when taken as signs in context” (Enfield 2009: 13). Non-conventional signs include manual and non-manual gestures, which are defined as ‘visible actions’ that are recognised and interpreted as part of the move (Kendon 2004).

They also include the manual signs used to depict particular various physical and dynamic characteristics of an object, activity or process (Liddell 2003; Streeck 2008; see §3.3.4 below). For example, a person describing the ‘V’ shape of a vase might coordinate their hands into a flat shape. They might use these handshapes to depict a ‘V’ shape in the space in front of them while also producing a spoken utterance such as “the vase looks like this”. The manual sign would likely be interpreted as concurrently showing what the basic shape of the vase looks like from a medial viewpoint.

Singular events of constructed action are also non-conventional signs. Constructed actions are demonstrations, or enactments, of embodied actions within a communicative move

⁷ While there are many commonalities between individuals with aphasia, the manifestation of aphasia varies between individuals (Menn & Opler 1990). As a result, the repertoire of semiotic resources available to aphasic individuals partly varies according to the manifestation of a their specific language disorder (agrammatism). For example, “the speech patterns in Broca’s dysphasia (=aphasia) vary from patient to patient along a continuum ranging from pure apraxia of speech with minimal agrammatism to relatively pure agrammatism” (Albert, Goodglass, Helm, Rubens & Alexander 1981: 71).

(Tannen 1989; Winston 1991, 1992; Metzger 1995; see §3.3.4 below). For example, a person narrating a story about a boy who cried wolf might enact elements of a character's action during a communicative move, as in Video BFS1c2aCLU#54. During this enactment, signer BFS demonstrates the boy hitting, or pretending to hit, the wolf with a stick in an ineffective manner. This enactment emerges in the context of the narrative and is therefore recognised and interpreted as demonstrating an action of the boy from his subjective viewpoint. In other words, this token of an instantiated enactment is taken as a sign in context. It is analysed as a token of a non-conventional sign.

However, to the extent that the standing-for relation remains focally or peripherally active for interactants, or remembered, tokens of non-conventional signs may be used recurrently in subsequent communicative moves (see Chafe 1994). Interpretations of singular events may or may not remain active for participants during the interaction in which they emerge and subsequent interactions thereafter. Thus, even though non-conventional signs emerge as tokens of singular events and not tokens of types, and are by definition non-conventional, recurrent events may index prior interpretations for the interacting individuals. In this way, a token of a non-conventional sign may evolve to become a token of a symbolic indexical, or even a conventional sign, during the course of an interaction or series of interactions. The components of composite utterances (and consequently their analyses) are characteristically dynamic because they emerge through interactions, and evolve throughout the histories of interactions, between speakers and/or signers within their language ecologies.

For example, two friends might be trying a new drink together, where one is repelled by the taste and experiences a strong physical reaction that involves a dramatic facial expression. This expression may be re-enacted in later interactions between the two friends in a way that stands for, and is recognised as standing for, the situation of the unfortunate drink and its shared relevance as a humorous experience. It may also be enchronically enriched by each recurrent event as standing for the original situation, the situation as a private joke and all the prior re-enactments (even to the point where it is not funny anymore). That is, the non-conventional sign evolves to symbolically index all of the singular events it stands for.

Symbolic indexicals are signs that have properties of both conventional and non-conventional signs. They are "form-meaning mappings whose proper interpretation depends partly upon convention and partly on context" (Enfield 2009: 13). This includes conventional expressions of deixis in spoken and written languages. It also includes forms of hand-pointing, lip-pointing, and other culturally-appropriate bodily actions during which speakers or signers extend parts of their body (or objects that act as an extension of their body) in a direction towards, or actually contacting, some referent in the context of the utterances. The indexed referents may be physically present and jointly attended, or they may be entirely conceptual and mapped onto a jointly attended real space (Liddell 1995).

For example, a person offered two choices of a particular type of plant at a nursery might point to one and say “I’ll take that one”. A conversationally relevant interpretation of this expression depends upon recognising the conventional form of the English “that”, while also interpreting the instantiation of this form as relating to a specific referent (a plant) in the shared context of the communicative event. In addition—or perhaps instead of, if the nursery is noisy or the staff member is deaf—the interpretation also depends upon recognising the pointing sign as symbolically indexing one of the two plants as the chosen one. Both “that” and the pointing sign are tokens of singular events of symbolic indexing.

3.2.4.4. Negotiating meaning with composite utterances

A further aspect of communicative moves and composite utterances that warrants elaboration is their role in ‘negotiating’ meaning. The meta-language of composite utterances used here implies some sense of what it is for meaning to be negotiated, through the use of terms such as ‘co-construct’, ‘jointly attend’ and ‘shared relevance’. This section describes this notion more explicitly by discussing how it diverges from the coding-decoding paradigm of human communication, and by summarising several studies on human interaction that support this view.

The notion that meaning is negotiated tends to be overlooked in branches of linguistics that background the emergence of language through social interaction. For example, Enfield (2009) points out a frequent inconsistency in the way that identifiably linguistic expressions and non-linguistic expressions have been understood in the literature. The inconsistency is that linguistic expressions have tended to be understood as conventionally ‘encoding’ meaning, whereas non-linguistic expressions such as gestures and implicatures have tended to be understood as non-conventionally ‘conveying’ meaning (cf. Sperber & Wilson’s coding-decoding process of language comprehension, and poietic analysis in semiotics, e.g. Molino 1990).

However, the encoding-conveying dichotomy obscures the fact that recognising and understanding all types of intentional signs involves acts of interpretation (Enfield 2009: 14). In other words, it is not the case that the encoded components of an utterance are ‘decoded’ while the conveyed components are ‘interpreted’ and ‘context-mediated’. Instead, the components of unified composite utterances are all interpreted holistically, whereby all token forms are used and recognised as tokens of intentional information, and together they are taken as one (Enfield 2009: 14).

The way that composite utterances are interpreted also depends upon a number of heuristic ‘triggers’ which direct, or shape, the interpretation of the semiotic resources and types of signs used in composite utterances (Enfield 2009: 16). This includes general heuristics of convention, physical orientation, contextual associations such as timing and spatial juxtaposition, the assumption of the unified meaning of composite utterances, and measures of agency, all of which manifest according to ecological contexts.

It also more specifically depends on the semiotic resources and types of signs that an individual is more likely to attend to according to their lived experience in given contexts.

For example, during face-to-face spoken language communication, hearing speakers may be more likely to attend to speech more than co-speech gesture, whereas deaf and hard of hearing speakers and signers are more likely to attend to mouthing and co-speech gesture (see G. Hodge 2014 for a vignette of how deafness may emerge as a disability as social interactions unfold depending on the inter-subjective negotiation of this type of heuristic).

Each composite utterance offers up a number of sources of meaning that are available to be interpreted. These sources may be identified as 'encoded' components or as 'enriched' components (Enfield 2009: 15). The encoded components of composite utterances are conventional signs such as lexical and grammatical expressions. For example, the Auslan form BOY and the English form *that* presented in the sketch above.

The enriched components are the results of indexing, such as the recognition that the plant being pointed to in the nursery is relevant to the interaction, and the corresponding interpretation of this relevance. The enriched components are also the results of implicatures, such as the recognition that two plants spatially juxtaposed are relevant both to each other and to the interaction, and the corresponding interpretation of this relevance through social code or context. Both encoded and enriched components are interpreted as one in composite utterances. This distinction is an important one for the study presented here, and is taken up again in Section §3.4 and §4.4.

The encoding-conveying inconsistency is partly an effect of mentalist dualism, and partly an effect of linguistic structuralism as interpreted in the generative tradition (see Streeck 2003). It is also a reflection of the way that many sciences have tended to investigate 'the individual' in ways that isolate individuals from their social lifeworlds (Danziger 1990). However, this is certainly less true for the anthropological and sociological traditions than it is for linguistics. Consequently, researchers working at intersects of these traditions have well appreciated the value and importance of investigating human language in context of social lifeworlds.

For example, researchers investigating face-to-face communication have made significant contributions to our understanding of how humans talk, look and share with each other in social ecologies (e.g. Goodwin 1981; Bavelas 2007). These types of investigations have highlighted the multi-functional roles and complex manifestations of collaboration in all aspects of human interaction, and have furthered our understanding of how meaning emerges through interaction. Specifically, that meaning is co-constructed through skilled and constantly negotiated interaction.

In the early days, Goodwin challenged established individualised notions of the sentence by showing that speakers 'shape and reform' each other's utterances as they emerge in situated contexts (Goodwin 1979; cf. §2.2.2). He also explored the coordination of several actions that speakers and hearers are observed doing during their face-to-face interactions, such as eye gazes, restarts and pauses (Goodwin 1981). Analysis of multimodal video data revealed that speakers and hearers use these actions to 'mutually orient' each other as

interactions unfold, which suggests that the various bodily actions of all participants engaging in conversation are mutually relevant to each other.

Later investigations found that manual gestures also contribute to this mutual orientation by exploiting the availability of space, because “gesture provides a resource for negotiating features of the moment-by-moment organisation of the interactive processes within which it emerges” (Goodwin 1986: 47). For example, speakers coordinated manual gestures with eye gazes and eye contact to draw each other’s attention to conversationally relevant information, such as points of visual focus within their shared spatio-temporal context.

Many of these observations on mutual orientation are reflected in findings from the early language development of children (e.g. Kelly 2006; Givón 2009; Knudsen 2012). For example, Givón found that children often create one-word ‘verbless clauses’, where the related predicate is expressed by an adult either before or after the child’s turn, so that the clausal utterance is co-constructed and shared between both the child and the adult during their sequence of turns (Givón 2009: 267).

Building upon these observations of mutual orientation, Bavelas characterises face-to-face communication as facilitating ‘micro-social interactions’, i.e. interactions where there is a “high level of reciprocity and mutual influence” (Bavelas 2007: 128). In other words, interactants are able to attend to each other very closely when they are engaging in face-to-face interaction, and each interactant reciprocates elements of the other’s verbal and non-verbal actions. This often occurs simultaneously, so that interactants are both reciprocating and influencing each other at the same time (see also Quaeghebeur 2012 on the ‘all-at-onceness’ of multimodal expression). Bavelas and colleagues have conducted a number of experiments to investigate the micro-social actions that may be relevant for face-to-face social interactions (e.g. Bavelas, Black, Lemery & Mullett 1986; Bavelas, Coates & Johnson 2000; Bavelas & Chovil 2006).

One of these studies is particularly relevant to this thesis because it involved investigating the motor-mimicry of facial expression during the activity of story telling (Bavelas et al. 2000). During this experiment, speakers narrated a ‘close-call’ story to a listener. As speakers narrated their story, their listeners were either: (i) able to fully attend to the story, or (ii) repeatedly distracted from the content of the story by experimental stimuli.

The authors reported that distraction from the story generally eliminated motor-mimicry responses of the listener, suggesting that motor-mimicry responses require cognitive processing. They also reported that distracted listeners who made fewer motor-mimicry responses experienced comparably poorer story telling from the narrator, i.e. the story ‘fell flat’. These findings suggest that the collaboration of both narrator and listener contribute to a good story, and support a view that story telling is a reciprocal and collaborative activity that is co-constructed throughout an interaction.

The collaborative and mutually reciprocal nature of face-to-face interaction has been evidenced by a number of other studies. It is observed in the way that speakers frequently

use verbal references that the addressee had previously helped to shape (Clark & Wilkes-Gibbs 1986), and which may not be as clear to other speakers who were not present during the enchronic development of the reference (Schober & Clark 1989). It is also observed the way that speakers use manual gestures and other actions to 'co-participate' in the activity of searching for a word (C. Goodwin & M. Goodwin 1986).

More generally, the collaborative and mutually reciprocal nature of face-to-face interaction is also relevant to other human activities such as dance and music. It aligns closely with what has been described as 'embodied co-regulation', which is defined as "a social process by which individuals dynamically alter their actions with respect to the ongoing and anticipated actions of their partners" (Fogel 1993a: 12; see also Fogel 1993b; Fogel, Garvey, Hsu & West-Stroming 2006).

Examples of co-regulation include parents with their infant, couples synchronising their walk, experienced chefs working at the same stove, musicians interacting in an improvised duet, and dancers improvising Tango Argentino (see Kimmel 2012). Satisfyingly co-regulated activities where the level of skill and the level of challenge are enchronically and anticipatorily matched may be further characterised as having an element of mutual 'flow', which is defined as "a state of concentration so focussed that it amounts to absolute absorption in an activity" (Csikszentmihalyi 1990).

Investigations of mutual orientation and the micro-social interactions of face-to-face communication are just two of many contributions to the view that meaning is co-constructed through skilled and constantly negotiated interaction. Further contributions from cognitive and functional linguistics are discussed in §3.3 and §3.4 below.

By way of one final illustration of the semiotic and interactionist approach to language use outlined here, consider the following instance of spoken English that was captioned during a recent workshop:

And a corpus file right now, **this** is the first file of the Brown Corpus, and we can see it shows up **there** six times. Okay. One time so in the first example and the first case **this** is the sentence and it shows up **here**, second one it is **here**, **third** one, **fourth**, **fifth** and **sixth**.

During this sequence of communicative moves, the speaker was teaching from the front of a classroom. He was looking at the monitor view of the computer in front of him, on which a list of corpus files were displayed. This monitor view was also projected onto the wall behind him. Students in the lab were seated in rows in front of the speaker, also with their own personal computer monitor views. While the speaker was talking, the students interacted with their computers and used them to mirror some of the actions of the speaker.

The speaker orchestrated these moves by using a combination of semiotic strategies that included conventional signs, non-conventional signs and symbolic indexicals, along with complex coordinations of other bodily actions such as facial expressions, eye contact and so on.

During these moves, the tokens of English symbolic indexicals (the bolded words in the transcription above) were co-articulated with other symbolic indexicals (pointing actions and eye gazes) that aligned meaningfully with each spoken utterance. For each pointing action, the speaker's hands were extended in a direction towards or actually contacting particular referents in the context of the utterances. For example, the speaker sometimes pointed to specific locations on the monitor view projected onto the wall in order to index specific files. In some instances, the speaker even used his computer mouse to action the cursor to move across the monitor and point to specific files.

These moves effected different actions from different students, including mirrored sequences on their own personal computer and shifts in visual focus. Furthermore, the speaker also oriented his face and action gestures towards the students at various turns. The students reciprocated with bodily actions such as head nods, blank expressions of incomprehensibility, or a number of other coordinated actions that duly influenced the speaker's subsequent moves.

In producing these composite utterances and as each move unfolded, the speaker conventionally and efficiently assumed that his interactants: (1) can see his immediate physical space; (2) can hear his voice; (3) will attend specifically to the particular space to which the speaker is intentionally directing eye gaze and pointing gestures; (4) will infer a connection between the space the speaker is pointing to and the spoken utterances used to simultaneously encode similar or alternative meaning; and (5) interpret all of these actions as an integrated unit. Put simply, the speaker was talking about something by encoding it conventionally while also physically referring to that thing to show us what he means, thereby enriching his meaning non-conventionally.

At the same time, the speaker was orienting himself to his interactants, who reciprocated with bodily actions that further influenced the speaker's moves. All of these actions were intended to constrain the context of interpretation (the topic, the computer software, the spatio-temporal context) for the students, and reciprocally for the speaker. In this way, composite utterances develop as shared and constantly negotiated symbolic artefacts that are co-constructed between interactants engaging in face-to-face interaction. The next section describes additional aspects of this view from the perspective of cognitive linguistics and usage-based theory.

3.3. Lexicogrammar

3.3.1. Cognitive linguistics and usage-based theory

The cognitive and usage-based approach to linguistics views language as a conceptual phenomenon that emerges through use. It also views grammar as the cognitive organisation of language, or even of an individual's experience of language (e.g. Langacker 1987, 2008; Bybee & Hopper 2001; Tomasello 2003; Croft & Cruse 2004; Bybee 2006). This approach attributes the emergence and organisation of grammar to various biological, cognitive and pragmatic pressures that shape the way humans interact with each other.

Some of the pressures discussed in the spoken and signed language literature include: global cognitive processes such as association, automaticisation, categorisation and schematicisation (Langacker 1987, 2008; Tomasello 2003); the ongoing activation and scanning of thought (Chafe 1979, 1994); the development of various types of intent (Tomasello 2003; Givón 2005); processes of conceptual blending (Fauconnier & Turner 2002); information processing and information structure (Givón 1979; Shibatani 1991; Halliday 1994; Lambrecht 1994); iconicity and economy (Haiman 1985); the ontogenic development and use of co-speech gestures (Clark & Kelly 2006); the entrenchment and evolution of discourse tendencies (Givón 1979; Du Bois 1987, 2003; Hopper 1987); cognitive iconicity (S. Wilcox 2004); depiction (Liddell 2003; Streeck 2008); and the probabilistic assessment of experience (Bod, Hay & Jannedy 2003; Bod 2010).

The underlying principle of this approach to language is that constructions are an emergent property of language that are created and fed by repeated usage events, i.e. frequency of use (Hopper 1987; Bybee & Hopper 2001; Diessel 2007). Frequency of use contributes to emergent grammar via the various biological, cognitive and pragmatic pressures listed above. It also contributes to emergent grammar via language-internal processes such as lexicalisation and grammaticalisation.

Lexicalisation and grammaticalisation describe unidirectional processes of language change, by which emergent units of lexicogrammar decrease in phonological complexity as they increase in frequency. These processes have been investigated in spoken languages (e.g. Bybee & Hopper 2001; Bybee 2003; Diessel 2007; Haspelmath 2008) and signed languages (e.g. Janzen 1995, 2012; Jantunen 2007, 2008; Johnston & Schembri 2010; Johnston, Cresdee & Schembri 2011; Pfau & Steinbach 2011; Johnston & Ferrara 2012).

Frequency effects have been found to facilitate language ontogeny, unit comprehension and production, and diachronic change (Diessel 2007). Diessel (2007) also reports that frequency effects are evidenced by psychological manifestations of three types. Firstly, frequency of use strengthens linguistic representations in the memory of individuals, i.e. expressions become entrenched through use, which in turn feeds into how expressions activate and are interpreted in specific usage events. Secondly, frequency of use strengthens the linguistic expectations of individuals, i.e. the frequency of particular arrangements or orders of expressions contributes to the development of user expectations.

Thirdly, frequency of use contributes to the development of automatised processing chunks in which boundaries are 'blurred' and whole chunks are 'compressed and reduced' (Diessel 2007: 124; cf. §2.2.3). Diessel also emphasises that while frequency of use is integral for cognitive linguistics and usage-based models of lexicogrammar, it is not the only factor affecting the emergence of linguistic structures and patterns of use. Other factors include the cognitive, biological and pragmatic factors outlined above.

Corpus methods are particularly well suited for exploring the frequency and distribution of patterns of language use (see §4.2.2). Indeed, recent analysis of corpus data suggests

that one widely accepted motivation for certain grammatical asymmetries, iconicity (specifically, the iconicity of quantity, complexity and cohesion, as proposed by Jakobson, Haiman and Givón), may actually be explained as resulting from frequency of use (Haspelmath 2008).

3.3.2. Defining lexicogrammar

Various aspects of Auslan lexicogrammar are considered throughout this thesis. This section defines lexicogrammar according to the definition provided in the Cognitive Linguistics framework (Langacker 1987, 2008).

The exploration of lexicogrammar in the cognitive linguistics and usage-based approach is generally described as ‘construction grammar’ or ‘usage-based theory’. Specific frameworks include Cognitive Grammar (Langacker 1987, 2008); Construction Grammar (Goldberg 1995); Radical Construction Grammar (Croft 2001); and Embodied Construction Grammar (Bergen & Chang 2003). Usage-based theorists have frequently adopted concepts from cognitive and construction grammar frameworks, and they are often presented as a unified theory, especially regarding the concept of ‘constructions’ (e.g. Diessel 2004).

While these frameworks all adopt the ‘usage-based’ paradigm, they vary somewhat in how they define grammatical structures, and how they conceptualise the relation between lexicon and grammar (Langacker 2005; see also Langacker 2010). For the purposes of this thesis, it is necessary to define ‘lexicogrammar’ in order to discuss various aspects of the data, and to differentiate it from traditional models of lexicon and grammar. As the theoretical approach developed during this study was influenced by and more closely aligns with the definitions proposed in Langacker’s Cognitive Grammar framework, lexicogrammar is defined here according to the core principles of that framework specifically.

The core principles of Cognitive Grammar are that grammar is meaningful, symbolic, emergent and gradient (Langacker 1987, 2008). Firstly, grammar is meaningful because it allows speakers and signers to negotiate and co-construct symbolic expressions that elaborate conceptualisations of great complexity. This means that no autonomous structures are presumed or necessary for understanding and describing observed phenomena of language use, which in turn entails ‘theoretical austerity’.

For example, there is no need to posit distinct language modules that interact via transformational rules of grammar, because these modules and rules are not meaningful aspects of language use. It also entails a content requirement for the identification and description of all aspects of language use, so grammar can only be described on the basis of observations of actual language use. It cannot be described, for example, on the basis of a set of logical possibilities of language structures or pre-determined linguistic universals.

Secondly, grammar is symbolic because phonological forms and meanings pair together to form complex expressions that prompt conceptualisations. A form-meaning pairing is essentially a symbolic assembly between a phonological structure (an instantiated form

such as a sound, sign, gesture, depiction, intonational contour or orthographic representation) and a semantic structure (an ecologically-shaped conceptualisation). All assemblies are symbolic in the sense that one is able to evoke the other: a semantic structure is able to prompt a particular phonological structure, and a specific phonological structure is able to evoke particular aspects (a construal) of a semantic structure.

For example, the English lexical item [book] is symbolic because it pairs a phonological structure, in this case an orthographical representation, with a semantic structure [BOOK], in this case the conceptualisation of a specific or prototypical book (whatever comes to mind because the construal in this instance is not very specific). This lexical item is symbolic because it resides in a pairing of a phonological structure and a semantic structure.

This pairing can be formulated as [[BOOK]/[book]], where [BOOK] refers to the semantic structure and [book] refers to the phonological structure. Symbolic assemblies such as these combine together in various ways to elaborate conceptualisations of great complexity. Instantiations of symbolic assemblies prompt a particular conceptual referent, known as a profile. For example, nouns are defined as profiling things, whereas verbs are defined as profiling relationships.

Thirdly, grammar is emergent because symbolic expressions arise across varied temporal domains and evolve as abstractions from repeated contextualised usage. The temporal domains during which symbolic expressions emerge include time frames that exceed the life span of individual humans, i.e. expressions that emerge and evolve over many hundreds and even thousands of years. They also include time frames that span the lives of individual humans, i.e. expressions that emerge within and across varied communicative domains and social ecologies over decades, years, and even the real-time contexts during which utterances are enchronically shared (see §3.2.4 above).

Symbolic assemblies that emerge in specific usage events may become progressively entrenched as linguistic units in varied contexts for individual speakers and signers. These units may or may not become conventionalised across varied language ecologies (see Verhagen 2010 for further discussion on the role of abstraction for language users and linguists, and further arguments against strongly autonomous structures). The emergent nature of grammar and its constant evolution through use means it is constantly in flux.

Finally, grammar is gradient because these symbolic expressions vary gradiently according to their relative symbolic complexity, schematicity and conventionality, depending on their manifestation in specific usage events. The lexicogrammar of a language can be understood as consisting of form-meaning pairings that vary gradiently according to the three parameters of complexity, schematicity and conventionality. All instances of symbolic assemblies may be described in relation to each other according to these three parameters.

This means that the domains of language traditionally referred to as 'the lexicon' and 'the grammar' are instead conceptualised as a gradient three-dimensional continuum of

'lexicogrammar'. This approach contrasts with formal and some functional-cognitive approaches to language that present lexicon and grammar as separate modules that somehow interact with each other, and which use a separate meta-language to conceptualise, connect and describe each module (see Haspelmath 2011 for further arguments against the modular dichotomy with respect to morphosyntax). The parameters of the lexicogrammar continuum and their mappings are described in the next section.

3.3.3. Parameters of lexicogrammar

The Cognitive Grammar framework provides precise definitions for the three parameters of symbolic complexity, schematicity and conventionality. Figure 3.2 below presents a model of these parameters as a three-dimensional continuum of lexicogrammar⁸. This model is adapted from the three-dimensional continuum created by Ferrara (2012) during her investigation of depicting signs in Auslan.

During this study, Ferrara adapted the two-dimensional diagram of complexity and schematicity presented in Langacker (2005) and also used by Croft & Cruse (2004). Ferrara expanded this two-dimensional model to include the parameter of conventionality. This greatly increased the descriptive power of the lexicogrammar continuum, because the parameter of conventionality had thus far only been implicit in descriptions of symbolic assemblies. The parameters of particular symbolic assemblies can be mapped onto some $x y z$ coordinate point within this three-dimensional model.

Symbolic complexity refers to the size of a symbolic assembly, and therefore the degree of explicitness that it construes. The parameter of symbolic complexity ranges from atomic (i.e. small units) to complex (i.e. large units). For example, consider three symbolic expressions: [[BOOK]/[book]] and [[BLACK BOOK]/[black book]] and [[LITTLE BLACK BOOK]/[little black book]]. These three expressions exemplify symbolic assemblies of increasing complexity. Each expression construes a conceptualisation that is larger and more explicit than the one before it. The parameter of symbolic complexity is mapped on the x axis of the three-dimensional lexicogrammar continuum presented in Figure 3.2.

Schematicity refers to the content of a symbolic assembly, and therefore the level of specificity it construes (or conversely, the degree of abstractness it instantiates). The parameter of schematicity ranges from substantive (i.e. a phonologically instantiated form) to schematic (i.e. an abstraction from a number of phonologically instantiated forms). Due to the content requirement, all expressions at the schematic end of the continuum result only from many instances of symbolic assemblies that have a specific phonological instantiation.

For example, the three 'little black book' expressions are all phonologically instantiated forms of differing complexity, and each one is entrenched in English lexicogrammar to varying degrees of schematicity. Each one may be abstracted to a wholly schematic

⁸ All retrieval operations, statistics and plots presented in this thesis were computed with R 2.14.0 using RStudio 0.97.551 and the stats and vcd packages (see R Core Development Team, 2013). Other scripts developed by R users are referenced in the relevant text.

structure of English. For example, the fully instantiated expression [[BLACK BOOK]/[black book]] may be abstracted to a wholly schematic structure [Adjective + Noun Phrase]. The parameter of schematicity is mapped on the *y* axis of the three-dimensional lexicogrammar continuum presented in Figure 3.2.

Conventionality refers to the degree of entrenchment of a symbolic assembly, and therefore the 'unit status' afforded to the symbolic assembly. As mentioned above, symbolic assemblies may become progressively entrenched through use in varied contexts. The parameter of conventionality ranges from novel to conventional. Fully conventionalised expressions are frequently used in varied contexts and are widely distributed within networks of language ecologies. These symbolic expressions arguably have status as linguistic units, and correspond with the conventional signs and encoding symbolic indexicals described in §3.2.4.3.

Conversely, novel units are used only in the specific contexts in which they emerge, and are not widely distributed within networks of language ecologies. Novel expressions emerge enchronically between interactants as they co-construct a symbolic assembly between some phonological structure and a semantic structure. These types of symbolic expressions probably do not have status as linguistic units. They correspond to the non-conventional signs and non-encoding symbolic indexicals described in §3.2.4.3.

For example, [[LITTLE BLACK BOOK]/[little black book]] is characterised as a fully conventionalised linguistic expression. Yet if one of us were to create a novel phonological form to pair with a specific [LITTLE BLACK BOOK] in a real-time spatio-temporal context, where the book in question was lying between us on a table, this form would be characterised as a non-conventionalised expression that has not yet reached linguistic status.

However, once established in this particular context, this novel symbolic assembly may potentially become progressively entrenched during subsequent interactions, depending on the strategies that individuals use to constrain the context of their interpretation (see §3.2.4 above). Over time and repeated use in many interactions between many individuals, the novel expression may come to be used and shared by members of socio-cultural groups who may not necessarily know each other, across diverse contexts and communicative domains. In this way, it may become conventionally symbolic. The parameter of conventionality is mapped on the *z* axis of the three-dimensional lexicogrammar continuum presented in Figure 3.2.

Three-Dimensional Lexicogrammar Continuum

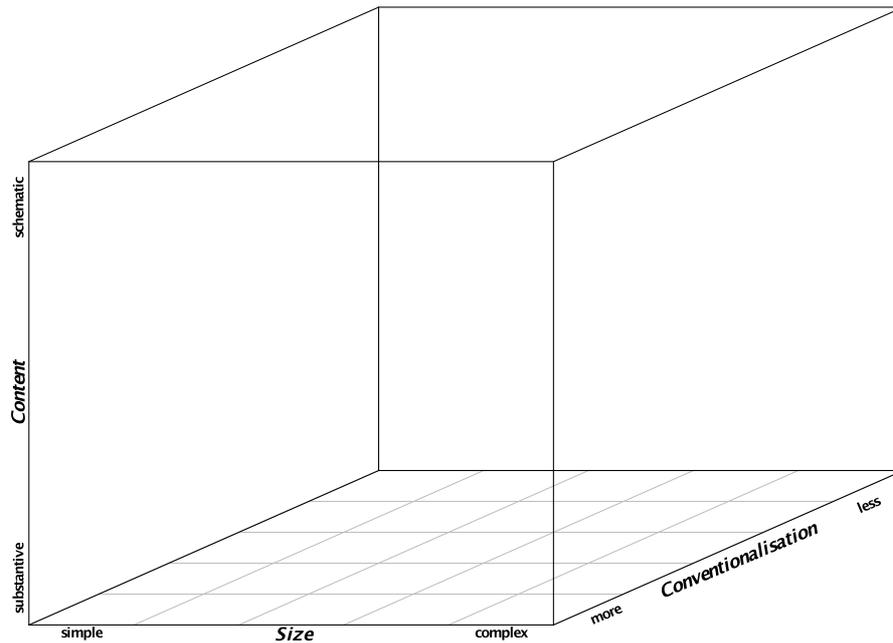


Figure 3.2 Three-dimensional lexicogrammar continuum (after Ferrara 2012)

Idioms provide a useful phenomenon for elaborating on these three parameters of lexicogrammar, particularly because non-cognitive and non-usage-based approaches to language struggle to fully accommodate idioms in their frameworks. Idiomatic expressions are described as “something a language user could fail to know while knowing everything else in the language” (Fillmore, Kay & O’Connor 1988: 504). This means they are “fixed expressions that are not predictable from their parts” (Langacker 2008: 18).

Cognitive linguistic investigations of both spoken and signed languages have explored idioms with respect to their complexity, schematicity and conventionality, thereby showing that the parameters of lexicogrammar are able to characterise all types of symbolic assemblies that emerge through use (e.g. Croft & Cruse 2004 for spoken language; Johnston & Ferrara 2012 for signed language).

For example, the English idiom *have a look* is a fixed expression that is not predictable from its parts. According to the Longman Grammar of Spoken and Written English (LGSWE), this idiom (as a fully substantiated unit) is represented by over forty occurrences per million words in the conversation part of the LGSWE Corpus, and by over twenty occurrences per million words in the fictional writing part of the LGSWE Corpus (Biber, Johansson, Leech, Conrad & Finegan 1999: 1028). It is reasonable to conclude that this idiom is highly frequent in both the spoken and written British English and American English materials captured in the LGSWE Corpus.

As these frequencies of occurrence represent the upper limits of usage captured in the LGSWE, it is also reasonable to infer that both specific instances of this expression, and abstractions of this expression, i.e. [Verb + Noun Phrase], are highly conventionalised across diverse English-speaking communities in Britain and North America (especially relative to other idioms and constructions evidenced in the LGSWE). Thus, this idiom may be characterised as relatively complex, substantive and conventionalised.

If an expression is characterised as conventionalised, it may further be afforded status as a lexical unit, grammatical unit, or (in the case of idioms) somewhere in between. All of these symbolic assemblies may be mapped onto the three-dimensional lexicogrammar continuum presented in Figure 3.2. According to these parameters of lexicogrammar, lexical units are symbolic assemblies that are characterised as atomic, specific and fully conventionalised; idiomatic units are complex, mostly specific and fully conventionalised; and grammatical units are complex, mostly schematic and fully conventionalised.

Regardless of relative size or degree of conventionality, repeated specific instantiations of symbolic expressions may be abstracted to schematic constructions, which may further be abstracted and categorised into types (albeit cautious and variable types, see Verhagen 2010). One of the most important contributions of the framework of lexicogrammar described here is that these three parameters facilitate usage-based characterisations of all types of symbolic expressions, regardless of their supposed linguistic status. In other words, it is not necessary to presuppose any kind of demarcated identity such as ‘word’ or ‘sentence’ to the multitude of expressions that are observed to manifest through social interactions and language use.

This is particularly useful for analysing and describing symbolic expressions in native signed languages, or any kind of visual-gestural interaction or cross-modal comparison. The activity of language description can therefore accommodate all types of semiotic expressions by characterising them according to their relative size, complexity and frequency of use. Language description is therefore not limited only to expressions that are assumed to be conventionally linguistic. This framework also aligns with the analytical components of composite utterances described in §3.2.4 above.

3.3.4. Lexicogrammar and composite utterances

3.3.4.1. Sign types

Section §3.2.4.3 explained that not all signs are of the same type. This is especially true for signed languages, where “an utterance in a signed language is highly likely to consist of lexical signs (modified or not), classifier signs (simultaneous or not), fingerspelled items, constructed action, and gestures” (Johnston et al. 2007: 197). While it is possible to distinguish between content and function signs, it is also useful to explore signs according to degree of lexicalisation and how these different sign types are used.

Signs vary gradiently from fully lexical, through to partly lexical, and to non-lexical according to degrees of conventionality, complexity and schematicity (Johnston & Schembri 2010; Johnston & Ferrara 2012). Manual and non-manual signs may be loosely

categorised as fully lexical, partly lexical or non-lexical depending on their usage in a given utterance. This differentiation of sign types aligns with those described for composite utterances in §3.2.4.3 above, yet foregrounds frequency of use as an analytical parameter more explicitly.

Fully lexical signs have most meaningful characteristics specified in their form and are heavily entrenched in use. These signs constitute the listable lexicon of Auslan, and generally align with prototypical notions of words in spoken languages, and the conventional signs in Enfield's composite utterance analysis.

Partly lexical signs have only some characteristics specified in their form (commonly handshape and orientation). All other specification of partly lexical signs emerges from mapping these forms onto the signing space. Pointing signs (also known as 'pronouns' and 'indexing' signs in the signed language literature) and depicting signs (also known as 'classifier' and 'polycomponential' signs) are two major sub-classes of partly lexical signs. They are both types of symbolic indexical signs insofar as they have partly conventional aspects and index something in the signing space or text.

Non-lexical signs, such as manual and non-manual gestures, have very little conventionalisation or specification of form and meaning, and rely overwhelmingly on context and inference for correct interpretation. As described in §3.2.4.3 above, they are 'singular events' during which interactants enchronically interpret a form as 'standing for' a meaning (Kockelman 2005). Interpretations of singular events may or may not remain active for participants during the interaction in which they emerge and subsequent interactions thereafter (see Chafe 1994 and §3.2.4.3 above).

Enactments involve elements of both manual and non-manual expression to partially demonstrate or 'construct' action and dialogue (Winston 1992; Metzger 1995). During constructed action one enacts a non-linguistic action ("quotes an action"), while during constructed dialogue (essentially a sub-type of the former) one enacts a language event ("quotes signs or words"). Enactments are also non-lexical and non-conventional, as they are primarily context-dependent embodied demonstrations of what an entity is doing or saying.

Figure 3.3 presents an elaboration of the three-dimensional lexicogrammar continuum described above in Figure 3.2. Following Ferrara (2012), several main types of symbolic assemblies described for signed languages have been plotted onto relevant coordinates of this model.

Fully lexical signs such as BOY are described as simple, substantive and conventionalised (e.g. see an instantiation of this sign in Video AKRA1c2aCLU#6). These types of symbolic assemblies may be mapped in the region of coordinate A in Figure 3.3. Constructional schemas such as those described in §2.2.1.1 are described as complex, schematic and conventionalised symbolic assemblies. For example, the frequent AVp pattern of clause-level constructions reported for signed languages are described as complex, schematic and conventionalised (e.g. see a substantive instantiation of this schema in Video

BAOBB1c2aCLU#9). These types of symbolic assemblies may be mapped in the region of coordinate B in Figure 3.3.

Partly lexical tokens of gestures such as G(5-DOWN):PHOOEY are described as simple, substantive and only partly conventionalised (e.g. see an instantiation of this gesture in Video MBCB1c2aCLU#28). These types of symbolic assemblies may be mapped in the region of coordinate C in Figure 3.3. Partly lexical tokens of depicting signs such as DSM(5-VERT):MANY-HUMANS-MOVE are described as partly complex, partly schematic and only partly conventionalised (e.g. see an instantiation of this depicting sign in Video SGMB1c2aCLU#20). These types of symbolic assemblies may be mapped in the region of coordinate D in Figure 3.3.

Non-lexical tokens of enactment, such as the signer’s demonstration of the boy hitting the wolf with a stick in Video SSNA1c2aCLU#49, are described as partly or fully complex, substantive and non-conventionalised. These types of symbolic assemblies may be mapped in the region of coordinate E in Figure 3.3, although it is arguably more difficult to ascertain the relative complexity of instantiated enactments. See Ferrara (2012) for further discussion about plotting symbolic assemblies onto this model.

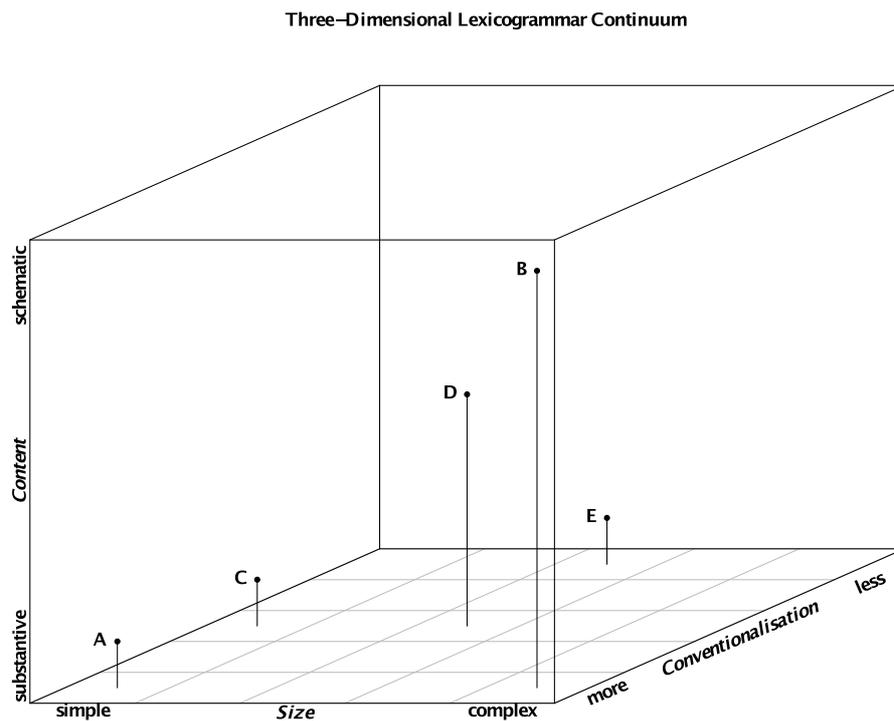


Figure 3.3 Three-dimensional lexicogrammar continuum with various symbolic assemblies plotted onto $x y z$ coordinates

3.3.4.2. Showing and telling meaning

The availability and use of different sign types suggests that signers may make habitual recourse to 'showing' meaning during face-to-face interactions in addition to 'telling' it by encoding it conventionally (Liddell 2003; see also Clark & Gerrig 1990; Mulrooney 2006; Cormier & Smith 2011; Ferrara & Johnston 2012, 2014; Hodge & Johnston 2014). This is a characteristic of all face-to-face interaction and can be investigated in both spoken and signed languages by applying a modality-free notion of gesture (Okrent 2002).

For example, co-speech gestures, sign systems and other depictive strategies such as enactments and ideophones have been investigated for spoken English (Clark & Gerrig 1990), Walpiri (Kendon 1998), Arandic speaking communities in Central Australia (Green 2014; Green & Wilkins 2014), and Siwu (Dingemanse 2011; see also Dingemanse 2012). The role of showing meaning in a signed language is particularly important, and the full import of this may not be appreciated unless signed languages are described in their own terms (Johnston 1996; see §3.2.3 above). So how is meaning 'shown' during signed interactions?

The position adopted in this thesis is that signers create composite utterances by exploiting the three-dimensional space in front of the body to co-construct elements of meaning simultaneously with their hands and body. For example, they may point to referents with one hand and predicate something about that referent using their other hand (Liddell 2003; e.g. the utterance in Video SPKA1c2aCLU#41). The indexed referents may be physically present and jointly attended, or they may be entirely conceptual and mapped onto a jointly attended surrogate space (Liddell 1995; see Fauconnier & Turner 2002).

Other signs, such as indicating verbs (also known as 'agreement' verbs), can be modified in the same way to symbolically index the location and/or direction of referents in the discourse (Casey 2003; e.g. the sign GRAZE in Video AMMA1c2aCLU#11). Signers may use both hands to depict various physical and dynamic characteristics of an object, activity or process alternatively specified by conventional signs (i.e. fully lexicalised signs) or symbolic indexicals elsewhere in an utterance (Liddell 2003; e.g. a token of a depicting sign DSM(5-HORI):MANY-HUMANS-MOVE is followed by a fully lexical sign RUN in Video BDCB1c2aCLU#20). This depiction creates a complex blend that profiles particular construals of that object, activity or process. Signers also use enactment with or without conventional signs to demonstrate who did what to whom and how (Metzger 1995; Liddell & Metzger 1998; e.g. the non-lexical enactment that co-occurs with fully lexical and partly lexical signs in the utterance in Video SSSB1c2aCLU#16).

A number of researchers have begun to explore various strategies for showing meaning in native signed languages. Research suggests that partly lexical depicting signs undergo lexicalisation to fully lexical signs in Auslan (Schembri, Jones & Burnham 2005); that non-lexical gestures (including facial expressions) are a substrate for grammaticalisation in American Sign Language and Auslan (Janzen & Schaffer 2002; Johnston et al. 2011); and is

also an integral element of first language acquisition in children learning both spoken languages and/or signed languages (Tomasello 2003; de Beuzeville 2006; see §3.2.4.2).

Depicting signs have been found to pattern within Auslan clause-like units in several recurrent ways, all of which suggest that the interaction of depicting signs within clause-like moves is 'tightly integrated' in the grammar of Auslan (Ferrara 2012; see §2.2.1). For example, fully lexical signs such as fingerspellings of English words are frequently used to prompt a specific construal or scope of reference, while depicting signs are used to elaborate elements of this scope.

Constructed actions and dialogues have been found to be 'framed' in signed language narratives according to at least two preferences (Ferrara & Johnston 2012; Cormier, Smith & Zwets 2013; see also summary of Engberg-Pedersen 1995 in §2.2.1). For example, signers may use expressions of fully lexical signs (a noun phrase) to frame enactments when they are first introduced in the narrative, or when the signer switches reference during the narrative. Alternatively, signers may omit this lexical framing whenever the enactment is clearly maintained in the discourse, which suggests signers may rely solely on enactment to show elements of their narratives rather than encoding these elements using conventional fully-lexical signs when the reference is accessible in the discourse.

Researchers have noted that these patterns for framing enactment in signed languages have been identified in spoken language narratives (e.g. Cameron 1998), and also mirror patterns for 'verb omission' in null subject/pro-drop spoken and signed languages (e.g. Wulf et al. 2002; Flores-Ferran 2007; McKee et al. 2011).

The role of showing meaning during interactions between signers is particularly important to understanding the emergence and use of signed languages. The full import of this may not be appreciated unless signed languages are described on their own terms. However, this is not to claim that signed languages 'show' meaning more than spoken languages, because the degree to which any interaction shows meaning in relation to telling it is an empirical question, and multimodal analyses of signed and spoken language interactions on this topic have not yet been undertaken.

Overall, evidence is converging to suggest that both showing and telling strategies are tightly integrated into recurrent patterns of organisation in signed and spoken languages. As with the aspects of signed language ecologies and deaf lifeworlds described in §3.2.2 and §3.2.3 above, this has significant implications for analysing signed languages. For example, the availability of visual percepts and strategies for showing meaning may entail that a greater degree of ambiguity and 'fuzziness' may be expected during the identification and analysis of signed utterances (see §2.2.4.4).

By way of illustration, Figure 3.4 below demonstrates a tight integration of showing and telling meaning in a composite utterance. The figure is a reproduction of a concrete poem created by Ian Hamilton Finlay, a Scottish poet who lived for a time in the far north Orkney Islands.

In this poem, an intimately personal construal of waves and rocks is prompted by the conventional English signs [wave] and [rock] encoded orthographically, and by the way these signs are enriched. The recurrent and spatial arrangement of these conventional signs in the composite depicts particular physical and sensory characteristics of the wave/rock construal, namely the physical and dynamic interaction of blue ocean waves with brown earth rock, as perceived from a medial view.

This arrangement also implies that the components of the wave/rock are closely interrelated at the place where liquid ocean and solid earth meet. Yet it is a conceptually integrated and dynamic interrelation, not a componential one. Together, the elements of telling and showing meaning in this poem combine in their organisation. They are recognised, interpreted and construed as one.



Figure 3.4 Ian Hamilton Finlay. 1966. *Wave/rock*.

While initially emerging in contexts of situated embodiment, the frequent and routine use of semiotic resources by speakers and signers leads to richly indexed conventions across the diachronic, synchronic, ontogenic and enchronic domains of face-to-face interaction and language use. This happens regardless of form across all aspects of multimodality. Our embodiment and lived experience provides a range of semiotic and constructional resources with which to create composite utterances that integrate aspects of both telling and showing meaning in spoken and signed face-to-face interaction.

3.4. Clause-like units and clause linkage

3.4.1. Clause-like units

Section §3.2 explained that communicative moves may be recognised and analysed as part of an interactional sequence, such as a turn, or more specifically as an instantiation of a type of linguistic utterance, such as an intonation unit or clause. The scope of analysis mostly depends upon the research question. So far in this chapter, Section §3.2 focussed on communicative moves as interactional composite utterances, and Section §3.3 elaborated on the components of these utterances with respect to frequency of use and construal.

This section describes the notion of composite utterances as clauses by drawing from the concept of the clause as defined in cognitive and functional frameworks. It suggests how

some instantiated communicative moves may be analysed as ‘clause-like units’, and how these units may be linked via relations of hypotaxis. It also describes how clause-level utterances and strategies of clause linkage may be identified, analysed and characterised according to discourse-pragmatic function and typological gradience. This section draws from the functional linguistics literature that views language as a meta-functional phenomenon that has evolved to do what we need it to do in our interpersonal relations.

Chafe (1987) observes that in spoken language discourse, speakers segment their speech into chunks that are described as “a sequence of words combined under a single, coherent, intonation contour” (Chafe 1987: 22). These Intonation Units appear to have a cognitive and biological basis in that they can be processed using echoic memory and pattern between breaths. Analysis of Intonation Units suggested that they generally express one coherent thought or idea, such as a state or event construal (Chafe 1995: 66).

In spoken languages, Intonation Units are primarily identified via intonation contours, i.e. dynamic changes in pitch, duration, intensity, voice quality and alternations of vocalisation with silence (Chafe 1994: 58; cf. the statically construed ‘prosodic properties’ reviewed in §2.2.3). These contours have been identified as aligning with both typologically shared patterns of intonation, as well as those specific to each language (Du Bois, Schuetze-Coburn, Cumming & Paolino 1993; Croft 1995, 2007; Kim 1996; Tao 1996; Matsumoto 2000; Park 2002).

Intonation Units are also identified by changes of turn and disfluencies, which influences the size and patterning of Intonation Units in different interactional contexts (Chafe 1994; Park 2002). This suggests that these units are actively used as an interactional resource, because “speakers can manipulate this already available prosodic tool to signal and achieve certain interactional activities or needs” (Park 2002: 673).

Researchers have also identified a correlation between Intonation Units and lexicogrammatical expressions of varying size. For example, studies have found that Intonation Units tend to align with single clauses in spoken English and Japanese (Croft 1995; Matsumoto 2000). The reported emergence and use of Intonation Units as multifunctional units grounded in biology, cognition, and interaction suggests that they may be recognised as communicative moves in both spoken and signed languages (although note that the tendency for signed language expression, i.e. bodily rhythm, movement and facial expression, to be equated to the prosodic properties and contours of spoken language intonation deserves serious re-thinking—see §2.2.4 and §2.3.2).

The literature on cognitive and functional linguistics tends to focus on the interactive ‘Intonation Units as communicative moves’ that are identified as clauses. Various frameworks define these types of expressions in different but related ways. Langacker defines clause constructions as expressions that profile things and the relationships between them (Langacker 2008). That is, nominal expressions profile things, i.e. they are conceptually independent, whereas verbal and clausal expressions profile processes and

the relationships between things, i.e. they are conceptually dependent on each other for interpretation.

In Cognitive Grammar, instantiated clauses are defined as having three scopes of analysis: basic clause type (declarative, imperative, etc), structural organisation (constituent structure and how this organisation relates to human experience), and function in discourse (Langacker 2008: 355). Cognitive linguists have also described clauses as reflecting three main 'image schemas' of human experience (Armstrong et al. 1995). These are actor to action, actor to action to undergoer, and experiencer to state.

Similarly, functional approaches define clause expressions as having three metafunctions: clause as message (theme), clause as exchange (constituent structure), and clause as representation (i.e. construal) (Halliday 1994). Clause expressions are viewed as having all three of these metafunctions at once, although constituency is emphasised for identifying 'structural' patterns of grammar and language use.

Although they differ in a number of respects, cognitive and functional approaches are united in their definition of clauses as: (1) communicative moves that prompt construals; (2) interactive moves that regulate interactions; and (3) housekeeping moves that regulate the flow of narrative and interaction. During this investigation of how signers organise their utterances from a clause-level perspective of analysis, all three aspects were considered.

Recall that the aim of this study is to explore whether signed utterances can be identified and analysed from a clause-level perspective of analysis. Given the discussion presented thus far, it is clear that traditional notions of the clause (e.g. as a structure of fully conventionalised constituents) do not fully incorporate important aspects of signed language ecologies. The identification and analysis of signed utterances necessarily involves considering semiotic resources for both showing and telling meaning. Furthermore, it has yet to be established if the signed utterances identified in these narratives are indeed instances of constructions that correspond to linguistic definitions of 'clause' or if they represent another type of utterance.

For these reasons, all signed utterances (essentially composite utterances) in this study were identified in the first instance as 'clause-like units' (CLUs). CLUs are 'clause level' in the sense that they are units smaller than discourse level that constitute a descriptive category of possible candidates for Auslan-specific constructions, and correspond with various types of communicative moves in face-to-face interaction. They are not 'clause level' in the sense of 'level of analysis where all units are clauses'.

The investigation of clause-like units in this study is two-pronged because it explores: (1) the patterning and type of constituents (traditional or otherwise) in identified clause-like units; and (2) how these identified units are linked hypotactically. All of the ideas discussed in this chapter inform the identification and analysis of clause-like units. However, in terms of their orientation to particular frameworks, many of the resulting patterns from a signed language corpus—the descriptive matter presented in Chapter 5,

§6 and §7—align mostly to ‘structural organisation’ (Langacker 2008) or ‘clause as exchange’ (Halliday 1994). The method for identifying, analysing and annotating clause-like units in the study corpus is detailed in §4.4.3. The next section discusses clause linkage.

3.4.2. Clause linkage

As Langacker says, “not all clauses are created equal” (Langacker 2008: 407). To the extent that instantiated clauses can be characterised and compared, it is difficult to say whether clauses may be truly equal in any sense. However, it is true that some clauses appear to ‘stand alone’ more independently than others, and that some clauses appear to ‘not make sense’ unless they are recognised and interpreted as being related to a construal expressed in a temporally adjacent utterance. As some of the clause-like units identified in the study corpus appear to depend on others in some way for their intended construal, it is necessary to elaborate on the relationships between clauses and how these relations are encoded or implied.

The development of syntactic complexity in languages has been characterised as evolving from simple to complex (e.g. Givón 2009; Heine & Kuteva 2007). Givón describes this trend as evolving from: (a) single words to simple clauses, (b) simple clauses to clause chains (parataxis), and (c) clause chains to complex/embedded clauses (syntaxis, but cf. hypotaxis below) (Givón 2009: 10). This unidirectional development is broadly driven by communicative function and frequency of use, which instigate various processes that are effectively “routes to clause union” (Givón 2009: 61; see also Diessel 2004).

These processes include the grammaticalisation or co-lexicalisation of conventional signs in a clause (see §3.3.1 and §3.3.2 above); event integration, where constructions are united because the referents they construe share the same event reference, event temporality or event location; and nominalisation, where verbal predicate(s) come to be used as nominal arguments. Other discourse-driven processes observed specifically in face-to-face interaction include the use of constructed dialogue (Tannen 1989; Hopper & Thompson 2008) and the framing of constructed action (Cormier et al. 2013; see §3.3.4.2 above).

These processes have been identified and observed in diachronic, synchronic and ontogenic investigations of typologically diverse languages. As the emergence of patterns of syntactic complexity are strongly influenced by discourse function, this means that all relations between clauses must be identified and characterised by interpreting the discourse context in which these units emerge, rather than by identifying forms designated as ‘coordinators’ or ‘subordinators’ (Matthiessen & Thompson 1998).

In considering the metafunction of clause complexes in English, Halliday differentiates the relationship between clauses according to two dimensions: (1) the type of interdependency between clauses; and (2) the logico-semantic relation between clauses (Halliday 1994: 218). Firstly, when faced with determining the relationship between a series of clauses, it is necessary to first determine whether one construction explicitly modifies another using some form of conventional encoding, so that the modified

construction is dependent on the modifier for recognising and interpreting the intended construal of the utterance. If there is a modifying relation, it is a hypotactic relation. If there is no modifying relation and the relation is one of initiation followed by a continuation, it is a paratactic relation. Clauses may be hypotactically complex, paratactically complex, or both.

Secondly, the logico-semantic relation that is identified between clauses may be identified as one of either expansion or projection. Expansion is where one clause expands another by elaborating, extending or enhancing it. Projection is where one clause is embedded in the other as a projection of a locution (i.e. reported speech or constructed dialogue) or an idea (i.e. a thought). The projection of constructed actions in signed and spoken languages may be subsumed here too. Other approaches, including other functional approaches, tend to conflate expansion and projection as subordination (e.g. Heine & Kuteva 2007), but it is important to differentiate them because they differ from each other in both their grammatical organisation and their discourse function (Matthiessen & Thompson 1998: 312).

In the functional approach, clauses and clause complexes are generally identified on the basis of the form and function of their constituents. Identifying the relationship between clauses in written language texts is often facilitated by the availability of punctuation marks, e.g. commas, semi-colons, full-stops, etc. However, identifying the relationship between clauses in spoken language may be difficult if the link is not explicitly encoded. For example, during spoken language interaction, two clauses may be temporally juxtaposed one after the other. In signed language interaction, two clauses may be both temporally and spatially juxtaposed (Johnston 1996)⁹.

Some approaches have considered strategies for linking units as purely linguistic strategies, such as the morphological or lexical encoding of dependency. Others have thought of linkage as manifestations of information structure or prominence, or even simply as paralinguistic gestural communicative devices. The type and degree of conventionalisation of strategies for linking units in each language is an empirical question.

Halliday observes that a lack of explicit encoding between clauses “often makes it difficult to decide, in spoken language, whether they form a clause complex or not; but if the intonation pattern is repeated...and the semantic relationship of elaboration is clearly present, this can be taken as a criterion for treating them as forming a nexus” (Halliday 1994: 226). This suggests that the functional identification and analysis of the relationship between clauses rests upon both what is conventionally encoded in the clauses, and what is implied in the relation between clauses. It also suggests that, in Halliday’s view at least, a conventionally encoded link is not always necessary to identify a relation between two clauses.

⁹ Note that temporal and spatial juxtaposition may also be observed for face-to-face spoken language use if a composite utterance analysis is applied.

Lehmann (1988) conducted a typological survey of clause linkage in order to develop some parameters for identifying and analysing clause linkage that are based on observed patterns of use from diverse languages. While this survey was strictly structured around a traditional definition of the clause as a syntagm containing one predicate, it provides a useful typological overview of how clauses with verbal predicates may be linked (to the extent that the linkage is based on the observation of a form functioning as a verbal predicate).

A beauty of this typological survey is that it characterises clause linkage as gradient, both within and across languages. This means that instantiated clauses and their linkages may be characterised comparatively, according to various gradient parameters, rather than simply categorised as one type or another (as is usually the case in the coordination-subordination dichotomy of clause combining, e.g. Heine & Kuteva 2007, or other functional typologies of clause linkage, e.g. Foley & Van Valin 1984). This recognition of usage-based gradience aligns with the core principles of Cognitive Grammar and usage-based theory outlined in Section §3.3 above.

Lehmann defines clause linkage as either a relation of sociation or dependency between clauses. These relations roughly align with Halliday's notion of parataxis and hypotaxis (Lehmann 1988: 219). Using data from a number of unrelated languages, Lehmann identified a continuum of two functional tendencies of clause dependency/hypotactic linkage. At one end is compression, which is a relation in which two states of affairs are construed as so 'tightly interconnected' that they effectively construe one complex state of affairs. At the other end is elaboration, which is a relation in which two or more clauses construe one state of affairs (Lehmann 1988: 217).

Building on the elaboration-compression continuum, six other continua were identified as characterising additional aspects of clause linkage. These are: (1) downgrading of subordinate clause, i.e. weak parataxis versus strong embedding; (2) syntactic level, i.e. high sentence (large conventional construction) versus low word (small conventional construction); (3) desentialisation, i.e. weak clause versus strong noun; (4) grammaticalisation of main predicate, i.e. weak lexical verb versus strong grammatical affix; (5) interlacing, i.e. weak clauses disjunct (clauses do not share elements of meaning) versus strong clauses overlapping (clauses do share elements of meaning); and (6) explicitness of linking, i.e. maximal syndesis (syntactically explicit linkage, including symbolic indexicals) versus minimal asyndesis (implied linkage) (Lehman 1988: 217)¹⁰. This sixth parameter is particularly relevant to this study (see §4.4.3 and §7.4).

Bybee (2001) also investigated the constituent patterns, lexical encodings and morphosyntactic encodings that link main clauses with pragmatically subordinate clauses (i.e. hypotactic expansion) in examples from various languages. Bybee characterised the main clauses as 'innovative' and the subordinate clauses as relatively 'conservative' with

¹⁰ Note that the continua of these six parameters in this framework also correlate vertically, and that Lehmann (1988) recognises there are usually other factors influencing the manifestation of particular parameters, such as discourse stylistics.

respect to their constituent patterns and conventional encodings. She also reported that the subordinate clauses tended to contain the explicit lexical or morphological expressions that encode the relation more frequently than main clauses.

Bybee (2001) concluded that the relative conservatism of subordinate clauses is partly due to two main discourse-pragmatic and processing constraints. Firstly, that conservative expressions are more entrenched and are therefore explicitly remembered ('stored') as fixed expressions. Secondly, that "subordinate clauses are constructions that are processed in relatively large chunks, which makes their constituents less independent and not so likely to change" (Bybee 2001: 2).

Bybee (2001) also concluded that her examples further support the hypothesis that main clauses change diachronically earlier than subordinate clauses, that they are 'pragmatically richer' with respect to their information focus, and that subordinate clauses are 'pragmatically more even', usually repeating old or enhancing information. However, she also observed that as the constructions used in subordinate clauses often use a different word order and morphology to their main clause, they may be stored independently from the constructions used in main clauses to a high degree of lexical and morphological specificity.

3.5. Evaluation

3.5.1. Summary

The theoretical approach outlined in this chapter draws from the literature on face-to-face interaction, semiotics, cognitive linguistics and functional linguistics. These ideas overlap in many ways and together illuminate complementary aspects of face-to-face interaction and language use. All converge on their agreement that language emerges through use in social interactions.

Chapter §3 began by outlining signed language ecologies, and the lived experience of deaf signers. It then established meaning, not structure, as a foundation upon which to explore the way signers organise their utterances from a clause-level perspective of analysis. It also introduced the notion that speakers and signers use language and other semiotic resources to disambiguate their context, and that this disambiguation is negotiated between interactants during social interactions via ostensive and inferential acts (LaPolla 2003, 2005). This principle is fundamental to this thesis because it incorporates the situated embodiment of human lifeworlds as perceptually contextualised (Merleau-Ponty 1962), and the presumed heuristic of semiotic unity that characterises human experience (Enfield 2009).

Taking the 'communicative move' as a basic unit of interaction for effecting social action, Enfield's semiotic approach to meaning describes how speakers and signers orchestrate a range of semiotic resources during their face-to-face interaction to create unified composite utterances. Composite utterances develop as shared and constantly negotiated symbolic artefacts that are co-constructed between interactants engaging in face-to-face interaction.

This view of meaning as co-constructed through skilled and constantly negotiated interaction is supported by research on the ontological development of communication and language, as well as investigations of how interactants mutually orientate to each other and are mutually influenced by the micro-social interactions of face-to-face communication, including story telling (e.g. Goodwin 1986; Bavelas et al. 2000).

Three different types of signs are used to create composite utterances: conventional signs, non-conventional signs and symbolic indexicals. Instantiations of conventional signs may be tokens of types. Instantiations of non-conventional signs and symbolic indexicals are tokens of singular events, although non-conventional signs may be symbolically indexed in subsequent communicative moves if the standing-for relation remains focally or peripherally active for interactants. The components of composite utterances evolve through use.

As each composite utterance offers up a number of sources of meaning that are available to be interpreted, a distinction is made between sources that conventionally encode meaning, and those that enrich meaning non-conventionally. This distinction is important to the analytical approach for annotating and analysing the clause-level utterances identified in the study corpus, and is discussed further in Section §4.4.3.

Composite utterances emerge enchronically within the spatio-temporal and discourse-pragmatic context of the communicative event. They may be analysed as part of an interaction sequence such as a turn, or more specifically as an instantiation of a type of linguistic utterance, such as an Intonation Unit or clause, as done in this study. Principles of Cognitive Linguistics (Langacker 1987, 2008) and usage-based theory are useful for elaborating aspects of composite utterances as instantiations of types of linguistic utterances.

One principle is that all types of linguistic utterances are ‘constructions’, and that constructions are an emergent property of language that are created and fed by repeated usage events, i.e. frequency of use (Bybee & Hopper 2001; Diessel 2007). The characterisation of composite utterances as emerging enchronically fits in with this principle. Overall, frequency of use is considered to be a primary motivation for the emergence of grammar (and is usually the focus of corpus methods), although it is certainly not the only factor affecting the emergence of lexicogrammar in signed and spoken language ecologies (Diessel 2007).

The Cognitive Linguistics framework is useful for elaborating the components of composite utterances that are investigated as instantiations of types of constructions. In this framework, grammar is characterised as meaningful, symbolic, emergent and gradient (Langacker 1987, 2008). It is meaningful because it allows speakers and signers to negotiate and co-construct symbolic expressions that elaborate conceptualisations of great complexity. This also entails that instantiated constructions are described on the basis of their content, which aligns with LaPolla’s (2003, 2005) characterisation of language as used

to disambiguate context, as well as Enfield's (2009) distinction between encoded and enriched meaning.

Grammar is symbolic and emergent because phonological forms and meanings pair together to form complex expressions that prompt conceptualisations. These expressions arise across varied temporal domains and evolve as abstractions from repeated contextualised usage. Grammar is gradient because these symbolic expressions vary gradiently according to their relative symbolic complexity, schematicity and conventionality, depending on their instantiation in specific usage events.

The lexicogrammar of a language is therefore understood as consisting of form-meaning pairings that vary gradiently according to these three parameters, and all instances of these pairings may be described according to their relative complexity, schematicity and conventionality.

To date, investigations of signed languages have used these parameters to describe small, substantiated tokens of signs, and tokens of singular events, according to degree of lexicalisation and how these different signs are used (e.g. Johnston & Schembri 2010). This has contributed to an understanding of such signs and singular events as varying gradiently from fully lexical, through partly lexical, to non-lexical according to degrees of conventionality, complexity and schematicity. Manual and non-manual signs may be loosely categorised as fully lexical, partly lexical or non-lexical depending on their usage in a given utterance.

This differentiation of sign types maps onto the signs described for composite utterances in §3.2.4 above, yet it foregrounds frequency of use as an analytical parameter more clearly. However, it is slightly problematic in that manual gestures and enactments are discussed as a 'type' of sign, rather than tokens of singular events as defined in §3.2.4. This is something to be mindful of when describing small, substantiated tokens of signs and singular events in the study corpus.

Holistic investigations of spoken and signed languages that have analysed signs according to their relative complexity, schematicity and conventionality have contributed a further aspect of composite utterances as instantiations of types of linguistic utterances: the integration of showing and telling meaning in face-to-face interaction. Both showing and telling strategies are tightly integrated into recurrent patterns of organisation in signed and spoken languages. Together, the elements of telling and showing meaning in composite utterances combine in their organisation so that they are recognised, interpreted and construed as one. These aspects of signed language use are particularly relevant to this study and are discussed further in Chapter §6.

Principles of cognitive and functional linguistics are also useful for elaborating aspects of composite utterances as instantiations of types of linguistic utterances, particularly with respect to how utterances are combined in discourse. This approach tends to focus on interactive 'Intonation Units as communicative moves' that are identified as clauses. Clauses are considered to have a conceptual basis in that they construe relationships

between things and other things, or things and processes, i.e. basic image schemas of human experience.

Beyond this conceptual basis, functional approaches tend to define clause expressions as having three metafunctions. Namely, the textual function, the interpersonal function, and the ideational function (Halliday 1994). These metafunctions are considered to be driven by discourse-pragmatic pressures, which are influenced by biological, cognitive and interactive pressures, and frequency of use, in addition to other aspects of language as a social phenomenon that evolves to do what we need it to do.

Although they differ in a number of respects, cognitive and functional approaches are united in their definition of clauses as: (1) communicative moves that prompt construals (exercising the ideational function); (2) interactive moves that regulate interactions (exercising the interpersonal function); and (3) housekeeping moves that regulate the flow of narrative (exercising the textual function).

Clauses in discourse are linked in different ways. Halliday (1994) differentiates these relationships according to the type of interdependency between clauses (i.e. parataxis or hypotaxis) and the logico-semantic relation between clauses (e.g. projection or expansion). Clause sequences where one clause explicitly modifies another using some form of conventional encoding, so that the modified construction is dependent on the modifier for recognising and interpreting the intended construal of the utterance, are identified as hypotactic relations.

The logico-semantic relation of hypotactically linked clauses may further be characterised as one of projection or expansion. Projection is where one clause is embedded in the other as a projection of a locution (e.g. constructed dialogue) or an idea (e.g. a thought). For example, in the English utterance "*He ran to the village crying: "Wolf! Wolf! There is a wolf catching my sheep!"*", the first clause "*He ran to the village crying*" projects (and frames) the subsequent locution.

Expansion is where one clause expands another by elaborating, extending or enhancing it. For example, in the English utterance "*only two men looked up when they heard the screaming, but they shrugged their shoulders*", the third clause "*but they shrugged their shoulders*" expands on the first and second clauses. Expansion and projection differ in both their organisation and their discourse function.

One weakness of the functional approach is that clauses and clause complexes are generally identified on the basis of the form and function of their constituents. However, to the extent that 'constituent' refers to conventional signs that conventionally encode meaning, this assumes that one can interpret what signs are conventional in a language and what signs are not. This may be difficult to determine for languages that are quintessentially face-to-face, especially signed languages, and any determinations are aprioristic if made without empirical investigations of annotated corpora (see §4.2).

A further weakness is that the relationship between clauses is also theoretically identified on the basis of conventionally and explicitly encoded signs or morphosyntax, even though

it has been observed that intonation patterns and semantic construal (i.e. strategies that are conventionally considered to enrich meaning rather than encode it) may be used as criterion for identifying a relationship of parataxis or hypotaxis. For example, during signed language interaction, two clauses may be both temporally and spatially juxtaposed, with repeated intonation contours (Johnston 1996). Identifying the strategies that languages use to constrain contexts of interpretation by encoding meaning explicitly is an empirical question. This issue is important to this thesis, and is discussed further in §4.4.3.

Another way of characterising clause linkage is to consider the parameters developed by Lehmann (1988) through his typological survey. Lehmann identified a compression-elaboration continuum of two functional tendencies of clause linkage, whereby clauses are related because they are either tightly interconnected and compressed, or because they elaborate a state of affairs over two or more clauses. He also identified six other parameters of linkage tendencies, including explicitness of linking (i.e. explicitly encoded linkage versus implicitly enriched linkage). These parameters can be used to gradiently characterise instantiations of linked clauses both within and across languages.

Instantiations of linked clauses may also be characterised as differing in their susceptibility to diachronic change (Bybee 2010). The continuum of explicitness of linking and the conservatism of subordinate clauses are relevant to this thesis, and are discussed further in Chapter §7.

3.6. Conclusion

Chapter §3 developed a theoretical approach that draws from the literature on face-to-face interaction, semiotics, cognitive linguistics and functional linguistics. This approach forms the basis of this thesis. The crux of this mixed approach is that humans use composite utterances to negotiate, shape and disambiguate each other's context of interpretation during face-to-face interaction. Speakers and signers may draw upon a wide range of semiotic resources to co-create composite utterances, including speech, gesture, intonation and manual signs.

Components of instantiated composite utterances may be analysed according to their emergence and frequency of use, how they are combined to prompt conceptualisations, the type of conceptualisations they prompt (i.e. whether they are clause-like in some way), and how these clause-like utterances may be linked.

This approach facilitates usage-based characterisations of all types of symbolic expressions, regardless of their supposed linguistic status. In turn, this facilitates an investigation of a native signed language that considers the lived experience of deaf signers and the signed language ecologies in which they interact. It also accommodates the range of semiotic resources available to both speakers and signers during their face-to-face interactions, and facilitates comparison between both modalities.

In this way, it is possible to explore whether signed utterances can be identified, analysed and described from a clause-level perspective of analysis. The following chapters describe

how this aim is explored using a signed language corpus, and present findings on the basis of patterns from a signed language corpus.

4. Corpus linguistics, the Auslan Corpus, and the study corpus

There are many surprisingly weak passages in Beethoven. But it is the weak passages that bring out the strong ones. It's like a lawn—if it weren't there, we couldn't enjoy the beautiful tree growing on it.

— Milan Kundera, *Works and Spiders*

4.1. Introduction

The video files analysed in this thesis were first enriched with annotations using a corpus-driven approach, whereby corpus analysis is used to identify any and all language-related phenomena that may not be recognised or covered by existing available frameworks (Biber 2010). The research design for the enriching the study corpus was developed from the literature on corpus linguistics, responses to the issues raised in Chapter §2, and the theoretical framework developed in Chapter §3. It also evolved through trial and error during three years of manually enriching and quantifying data from the Auslan Corpus.

The primary enrichment of the study corpus was developed from the annotation method outlined in the Auslan Corpus Annotation Guidelines (Johnston 2013a). The research design and analytical method used for the primary enrichment of the study corpus is the focus of Chapter §4. A secondary enrichment of the study corpus was developed from the collaborative and iterative method for checking annotation created during the primary enrichment. The research design and analytical method used for the secondary enrichment of the study corpus is the focus of Chapter §5.

In Chapter §4, the research design and analytical method used for the primary enrichment is justified, described and discussed in three sections. Section §4.2 outlines five limitations of non-corpus methods used in linguistics and explains why it is necessary to use a documentary corpus to describe and explore Auslan lexicogrammar. The core principles and practices of modern corpus design, construction and enrichment are explained. This section also elaborates on the partly corpus-driven approach to language description applied in this study. Section §4.3 outlines the Auslan Corpus in relation to the core principles of modern corpus design and compares it to other signed and spoken language corpora.

Section §4.4 outlines the design of the study corpus investigated in this thesis and details the specific method of primary corpus enrichment: the participant metadata and text type, the annotation software, the study corpus files, the tiers used for annotation, the annotations created on each tier, the procedure for annotating and tagging on each tier, revising annotations, and how data were extracted from the study corpus files. In this way, the method for annotating and analysing the study corpus is shown to be a partly corpus-driven approach to linguistic investigation, and the study corpus is contextualised in relation to the Auslan Corpus.

4.2. Corpus linguistics

4.2.1. Limitations of non-corpus methods for language description

Corpus methods for language description are a relatively recent development in the field of linguistics, and have been mostly facilitated by improvements in technology. Linguists have traditionally relied upon non-corpus methods for describing spoken and signed language lexicogrammar. During the latter half of the twentieth century, the field of linguistics was heavily influenced by the generative approach to linguistic theory and structure, particularly the use of non-corpus methods such as the generative experimental model for testing language competency theory (see R. Hodge & Kress 1988 for a historical overview).

The generative approach hypothesises there is a 'human language faculty' that has an underlying hierarchical structure, a 'deep structure' that is universal to all human languages and from which the 'surface structure' of 'the language' is generated. The primary aim of generative linguistics is therefore to identify the rules that govern the interaction of syntactic structures within this deep structure, and the interaction of these rules with other linguistic domains such as the lexical, semantic, prosodic and pragmatic levels of language.

This approach tends to concentrate primarily on language competency and the psycholinguistics of language competency, and less on language use (i.e. *langue* and *parole*, or competency and performance) and the manifestation of communication within the complex interactions that characterise human social groups. As a result, the generative approach idealises the 'native speaker' as the primary resource for investigating language competency.

This hypothesis is used to develop an experimental model that combines introspection with the hypothetico-deductive model of scientific investigation. This model is then used to test what linguists and native speakers find intuitively acceptable in the surface structures of language. Experiments are designed to elicit and test the acceptability or obligatoriness of specific types of words and sentences (and therefore the grammaticality of these items) using a limited number of native speakers.

During these types of experiments, native speakers are often given a selection of examples of their language, and asked to judge each example by responding whether they find it grammatically acceptable or unacceptable. The examples tested during these experiments may range in their contextualisation. Many experiments have relied upon highly decontextualised and disembodied examples, while others have created sophisticated contexts to test specific hypotheses about various phenomena.

Findings from these experiments are often inductively generalised as representative of structures in the language as a whole. These inductive generalisations are then used to support claims regarding the governance of syntactic rules at deep structure (based on evidence from surface structure), and which support arguments for a universal grammar shared by all languages.

Methods such as these have become widely accepted and applied in the field of linguistics, particularly in signed language research. This is partly due to the influence of the generative approach to linguistic theory and analysis. Limited technology in the early days also made it difficult to explore recordings of spoken or signed languages efficiently.

However, the generative experimental model is not the only method for investigating spoken or signed language data. There are a number of alternative approaches to linguistics that conceptualise language differently, and have therefore developed different methods for investigating human languages. For example, functional, cognitive and usage-based approaches emphasise the role of interaction in human communication, and hypothesise that language emerges through use during social interactions (see Chapter §3).

The primary aim of these alternative approaches is therefore to describe the patterns of language use that emerge (insofar that they can be identified), and to compare these patterns within communities and across languages. Such approaches tend to concentrate on documenting language use within social networks, and using this data to analyse and describe characteristics of language use. As a result, it is necessary to investigate language use using a representative sample of a large number of speakers from the language community. However, methods such as the generative experimental model are not well suited to this aim.

The functional, cognitive and usage-based linguistics literature details many reasons why such methods are insufficient for non-generative approaches to describing and analysing spoken and signed language use (e.g. see Givón 1989; Lakoff 1991; Sampson 2007 for spoken languages; and Johnston & Schembri 2010, 2013 for signed languages). With respect to the analysis and description of signed language lexicogrammar, i.e. how signed languages are used during face-to-face interactions, there are a number of reasons why the generative experimental model is problematic for investigating the aims of non-generative approaches.

Non-corpus methods such as the generative experimental model are problematic because: (1) these methods are not easily transferable to non-generative or less structuralist approaches to linguistics that do not hypothesise about deep structure; (2) the reliance on findings generalised from a small number of people makes it difficult to differentiate idiosyncrasies from general patterns of language use that may be shared by a community; (3) it is difficult to generalise such findings to either deep structure or language use when they cannot be representative of either native speakers or language communities; (4) the role of introspection in this model is not very transparent; and (5) as in any investigation, it is problematic to rely on only one scientific method, including the hypothetico-deductive method. These limitations are discussed in more detail below.

Firstly, generative non-corpus methods are not easily transferable to non-generative frameworks or frameworks that take a less extreme stance on structuralism, especially more holistic frameworks that describe human communication as emerging in contexts of

human interaction (see Chapter §3). It is particularly difficult to adapt such methods to usage-based investigations of sociolinguistic variation without making risky assumptions about the nature of variation in language contexts.

Sociolinguists have long argued that analyses resulting from these methods do not constitute an empirical approach to the documentation and description of language use, variation and change (e.g. Labov 2001; Heine & Kuteva 2005; see also Gries 2013). This is partly because the only language that can be tested for acceptability or obligatoriness are examples that the linguist and native speaker introspectively intuit, and these may not necessarily encompass the language that is used by speakers or signers. In other words, what people say they do is very often not the same as what they actually do.

Furthermore, as data from these methods tend to be more decontextualised than data from, say, a multimodal corpus, it is more difficult to afford empirical value to a database of findings from acceptability tasks (Givón 1984). Resulting claims may end up being more prescriptive in nature rather than descriptive. This has serious implications if applied to practical language resources such as sketch grammars and pedagogical tools, not to mention investigations in psycholinguistics, neurolinguistics and applied linguistics.

Secondly, when relying on findings generalised from a small number of people, it is difficult to differentiate idiosyncrasies from general patterns of use shared by a community, even if they are native speakers (Sampson 2007). Even though much of language use is patterned and organised with great regularity, it is also highly personal and idiosyncratic to some extent.

There are many sources of variability, all of which manifest and interact in complex ways (Gries 2013). Each person develops their own individual lexicogrammar throughout the course of their lifetime experiences, in ways that both parallel and diverge from the general patterns used within their language community and social networks. Many researchers are uncomfortable generalising from evidence based on limited numbers of language users because it is difficult to ascertain if patterns are general across a community or if they are specific to an individual.

This is even more problematic in the analysis and descriptions of deaf signed languages, which are used by relatively small groups of social intimates in highly localised face-to-face contexts, most of whom are non-native signers with varying social and educational backgrounds (see §3.2.2). For example, there is an ever-present risk in signed language research that aspects of signed language use that are idiosyncratic to one or two people (perhaps because they know each other, or are even from the same family) are mistakenly generalised as patterns used by the entire language community (see §2.3.1)¹¹.

¹¹ Note that it is often possible to guess at an individual's ecological lineage—their history of interactions—on the basis of how they communicate. While this is arguably true of all language use in general, anecdotally it seems to be heightened within signed language ecologies to the extent that, soon after meeting, it may be possible to guess where an individual went to school, who they went to school with, and who they have spent the most time with since then.

Large-scale sociolinguistic investigations of ASL and Auslan have already shown that the extent of sociolinguistic variation in signing communities cannot be underestimated. For example, investigators have found evidence of language change and regional lexical variation (e.g. Lucas, Bayley & Valli 2001; Lucas, Bayley, Reed & Wulf 2001), phonological variation (e.g. Schembri et al. 2009), and grammatical variation (Wulf et al. 2002) in several unrelated signed languages. These studies suggest that a number of methods are required to differentiate idiosyncrasies from general patterns of use.

Thirdly, a further limitation of generative non-corpus methods is that the role of introspection in experimental design is not very transparent. Introspection is useful and necessary for all scientific investigation and the pursuit of knowledge (see Polanyi 1974: Chapter 1 for examples of the importance of introspection to science throughout history). As such, the use of introspection in any scientific method deserves conscious and careful attention, but this is not generally possible when using methods such as the generative experimental model described above.

Consider a situation where a linguist is designing an experiment to elicit certain types of linguistic structures that he or she believes are relevant to a particular research aim. As this model is based on the hypothetico-deductive method, the linguist will want to think of examples that will preferably result in unambiguous responses from participants that can be verified by hypothesis testing. This means it is probably more likely the linguist will think of extreme examples to be presented unambiguously within the micro-contexts of the experiment, rather than arguably more ambiguous examples that are reflective of contextualised and multimodal language use. The introspective bias present in this method remains opaque and undeclared because there is no way to quantify the extremity (i.e. the conventionality and representativeness) and ambiguity (i.e. the potential for more than one likely interpretation or analysis) of each example. This makes it difficult to assess the empirical validity and generalisability of resulting claims.

Finally, in any scientific investigation, reliance on only a single method is problematic because it only enables one to explore or test aims that are generated within the framework in which the method was developed. For example, the generative experimental model is used to test hypotheses about a hierarchical structure of language using a combination of introspection and the hypothetico-deductive model. However, this method cannot test the foundations of this theoretical approach, because the ideas and hypotheses that lead to the development of the framework cannot be tested using this method alone.

All of these limitations suggest that methods such as the generative experimental model are insufficient for usage-based explorations of signed language lexicogrammar. They also suggest that there is no one single method that will facilitate the investigation and description of signed languages. Rather, a number of methods are required. The approach taken in this study is that corpus methods are necessary for preliminary descriptions of signed language use, and explorations of these analyses, while experimental methods

such as the generative experimental model are more suitable for later testing specific hypotheses that develop as a result of corpus analysis.

The limitations outlined above also suggest that descriptions of signed language lexicogrammar that are based on non-corpus methods should be verified with analyses of extensive corpus data (McEnery & Wilson 2001; Grondelaers, Geeraerts & Speelman 2007; Johnston & Schembri 2007; Mittelberg, Farmer & Waugh 2007; Johnston 2010). The following sections explain why it is necessary to use a documentary corpus in usage-based approaches to language analysis and description, particularly the preliminary exploration and description of Auslan lexicogrammar. It also elaborates how corpus methods address the limitations described above.

4.2.2. Corpus linguistics as a method of analysis and research approach

Corpus linguistics has been described as both a method of analysis (Gries 2009: 1) and a research approach (Biber 2010: 159) to support the empirical investigation and description of the patterns and variations of language use. Corpus linguistics is not a theoretical framework in the sense that Cognitive Linguistics (Langacker 1987), Role and Reference Grammar (Van Valin & LaPolla 1997) or Radical Construction Grammar (Croft 2001) are frameworks. Linguists contribute to the development and enrichment of various language corpora using many different theoretical frameworks.

Corpus linguistics has developed from several intersecting fields that share both research aims and dissatisfaction with the approaches and methods described in Section §4.2.1 above. It is a method particularly well suited to the descriptive aims of documentary linguistics, language typology, sociolinguistics and computational linguistics (Biber et al. 1999; McEnery & Hardie 2012).

While the first corpora were primarily built from written language materials and focussed on descriptive lexicography, many spoken language and multimodal corpora have since been developed. Investigations of spoken language corpora have led to major reassessments of how linguistic frameworks based primarily on written languages can be descriptive of spoken or face-to-face lexicogrammar (e.g. Leech 2000).

Investigations that undertake a usage-based approach to language description ideally involve analyses of documentary corpora. A documentary corpus is a machine-readable collection of primary texts, metadata and annotated data that is somehow representative of a community of language users. It can be presented as a standard reference, and quantitative findings may be generalised as reflective of the language used by the speakers or signers represented in the corpus (McEnery & Wilson 2001; Tognini-Bonelli 2001).

A quality documentary corpus is described as diverse in participants, situations and contexts; preferably multimodal (e.g. video, audio and text); large, distributed, opportunistic and enriched by many people over time; containing source materials that are transparent, preservable, ethical and portable; and ethically built and used (Woodbury 2003: 12). A documentary corpus enables explorations that are quite different to the

hypothesis testing undertaken by non-corpus methods such as the one described in §4.2.1 above, where an outsider is essentially the controller of all investigations and output (Woodbury 2003: 13).

4.2.3. Corpus design, construction and enrichment

4.2.3.1. Corpus design and construction

In order to maximise the generalisability of corpus analyses, documentary corpora must be designed and constructed in such a way that resulting claims may be partly reflective of the language or variety used by the language community. There are several ways corpus linguists try to achieve this when building language corpora (McEnery & Wilson 2001; Tognini-Bonelli 2001; Gries 2009; see Lee 2010 for a summary of how modern corpora have developed).

Gries (2009) differentiates three core attributes of generalisable corpora: (1) the degree to which a corpus is balanced and representative; (2) five defining characteristics by which corpora can be described and compared; and (3) the levels of annotation used in a corpus and their degree of controversy. The quality of corpus development, enrichment and analysis, i.e. the descriptive value of the corpus and the empirical validity with which linguists may interpret and generalise findings resulting from analyses of corpus data, may be partly assessed against these design attributes.

Firstly, a modern corpus aims to be representative and balanced (Gries 2009: 1232). A corpus is representative when a realistic proportion of a given language or language variety is apparent and sampled into the corpus materials. A corpus is balanced when each particular part of the corpus, such as the textual and sociolinguistic distributions of the language represented by the corpus, are reflective of the proportion found in the language or language variety in real life.

However, representation and balance tend to be theoretical ideals rather than realistic practice. Like all methods, corpus design and enrichment are influenced by the theoretical approaches and research questions of the researchers (see §4.2.2). The degree to which a corpus is balanced and representative is subjective and largely dependent on the specific aims of the corpus linguist and the research questions they wish to investigate, as well as the particular framework or theory applied when annotating corpus material (see Lee 2010; McEnery & Hardie 2012 for further discussion).

Aside from making informed assumptions about typical language use, such as that face-to-face conversation is the genesis of language use for both speech and signing communities and is arguably a basic text type, it is not practically possible to determine exactly the different parts of the language or variety that should be represented in the corpus and their relative proportions (see Biber 1990; 1993 for detailed discussion).

For example, one could argue that hash tagging (e.g. #bobthebuilder #representativebalancedcorpora #howlongisapieceofstring) and other Internet-based phenomena constitute emerging construction schemas that may influence the everyday

use of spoken and written English for some users, and should therefore be accorded similar representativeness in a corpus as face-to-face conversation. It is also difficult to determine how a corpus and its parts should be measured. For example, a corpus part 'conversation' could be measured in units of time, utterance units, turns, or many other descriptive units depending on the specific approach and research questions. Thus, it is important to qualify that a corpus is described according to the language use it represents and how it is balanced, not that it is representative and balanced.

Secondly, a corpus can be described and compared by at least five defining characteristics (Gries 2009: 1232-1233). A corpus may be: (a) general or specific, i.e. representative and balanced for a given language community in some way, or restricted to a particular language variety, genre, etc; (b) diachronic or synchronic, i.e. representing how language use changes over time or providing a snapshot of language use at a given point in time; (c) monolingual or parallel, i.e. representing information from one particular language, or representing information from the same text in several different languages (ideally with a degree of 'sentence alignment', although it is debatable to what extent one-to-one sentence or other unit correlation is possible); (d) static or dynamic, i.e. having a fixed size or being extended with new material over time; and (e) raw or annotated, i.e. consisting of files that contain only source material (such as video and/or audio files), or containing a particular linguistic analysis of the source material. Individual corpora may be described and compared according to varying degrees of these five characteristics.

Finally, a corpus can be described and compared according to the levels of annotations used in a corpus and their degree of controversy. The most basic and relatively uncontroversial level of corpus annotation is lemmatisation (Gries 2009: 1234). Lemmatisation is the process of identifying type-token relationships between 'words' or 'signs' in a corpus (i.e. symbolic assemblies that are small and substantive, with varying degrees of conventionalisation; see §3.3.2 and §3.3.3).

Lemmas are form-based rather than meaning-based annotations, and their primary function is to identify and tokenise words or signs in preparation for linguistic analysis. This means they can function as a useful basis for more controversial levels of annotation, such as the identification of parts of speech or types of grammatical units, which tend to be tailored to the specific approach, framework and research questions of the researcher.

As different linguists are guided by different approaches to language, annotations that are specific to particular frameworks tend to be more controversial than annotations that aim to prepare corpus material for general type-token searches, because it is harder to achieve annotations that are unanimous between annotators. Individual corpora may be described and compared according to the levels of annotation they contain, and the degree of controversy of these annotations.

These three differential attributes of corpus design enable linguists to describe and compare the different corpora available for linguistic analysis, and to partly assess the quality of each corpus and the empirical validity with which they may interpret and

generalise findings. However, the quality and empirical validity of a corpus is also assessed according to how it is enriched and analysed by researchers.

4.2.3.2. Corpus enrichment

During construction of a multimodal corpus, the primary source materials (i.e. the digital video, audio and/or text files) are archived with relevant metadata about the participants, contexts and text types represented in each file. The source materials can then be enriched using software that enables the researcher to annotate the source material while simultaneously listening to it and/or viewing it. Innumerable levels of manual or automated annotations can be time-aligned to the source material.

Researchers create annotations in order to tokenise raw corpus material into machine-readable data that can be searched, identified and exported using various processing and analytical software, and/or programming environments. Annotating enables researchers to code their analysis of the source materials in a machine-readable way so that the quantitative data may be retrieved and subjected to further analysis. An annotated corpus is essentially a tool for counting analyses of language—or language that can be counted at least (see Ellis 2012).

Manually annotating a multimodal corpus is a structure-based, introspective and interpretive activity. It is structure-based because the activity of annotating is based on tiers (Figure 4.1 depicts the ELAN annotating view of a selection of the tiers used to annotate the files in the study corpus). Each level of annotation is created on a designated tier. Each designated tier holds annotations that are coded with tier-specific tags. Annotations created on child tiers are dependent on annotations created on their respective parent tier. The tags used on individual tiers may be freely created during annotation or by a controlled vocabulary specified by the user. The number and type of levels of annotation in a corpus are generally determined by the theoretical approach and specific research questions of the researcher.

For example, a frequency analysis of sign types (e.g. Johnston 2012) can be achieved with only one or two levels of annotation of a multimodal signed language corpus, whereas a descriptive analysis of core elements in clause-like units (e.g. Hodge & Johnston 2014) requires many more levels. It is important to qualify that while annotating source materials is a structure-based activity, this does not mean that the source data being annotated are necessarily structure-based. It is possible that the habitual use of structure-based annotation files during the activity of annotating may influence interpretation of the source data and result in structure-based analyses.

Annotating is an introspective and interpretive activity because the researcher codes their personal analysis of the source materials into the corpus files, and this involves committing to acts of interpretation (Consten & Loll 2012; see also Polanyi 1974 on commitment in the philosophy of science). Annotating requires the researcher to: (a) view the source material (often years after it was documented); (b) interpret various aspects of the sign stream as meaningful; (c) analyse their interpretation on the basis of their own

tacit knowledge and theoretical approach (possibly even a specific framework); and (d) annotate their analysis on the basis of this introspective interpretation. This means that annotations are effectively a by-product of an activity that involves introspection, interpretation and analysis.

As explained in §4.2.1 above, the use of introspection in any scientific method deserves conscious and careful attention. The introspective bias involved in the activity of manually annotating a signed language corpus is arguably more transparent than in non-corpus methods, because one can create annotation tags that can be used to quantify aspects of one's interpretive and analytical tendencies. For example, during this study, tags were developed to code the interpreted ambiguity of specific analytical units (i.e. the potential for more than one likely interpretation or analysis). Annotations allow the extremity (i.e. the conventionality and representativeness) and ambiguity of the source material to be quantified and assessed for generalisability.

The structure-based, introspective and interpretive activity of annotating source materials in a signed language corpus provides opportunities to investigate research questions from at least two perspectives. Firstly, annotating a signed language corpus allows researchers to test findings and claims from existing research or theoretical approaches (e.g. Johnston & Schembri 2007). Secondly, it is a method that allows researchers to uncover patterns of language use and variation that may not yet be fully recognised (e.g. Ferrara & Johnston 2014). Both of these opportunities are exploited in this study.

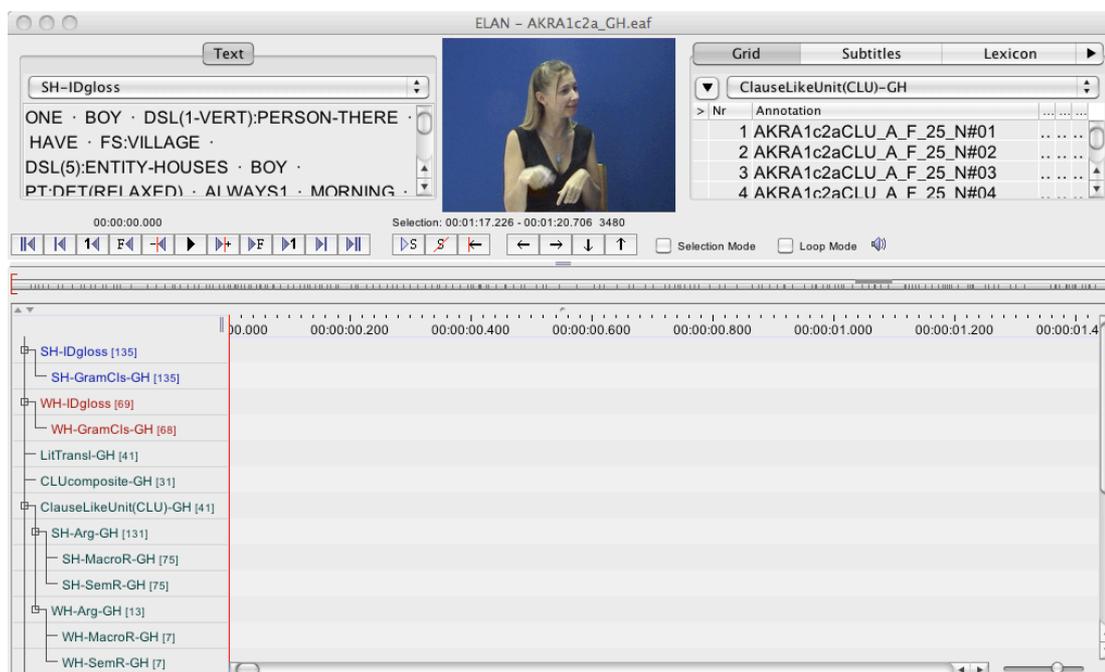


Figure 4.1 ELAN annotating view of a selection of tiers used to annotate the files in the study corpus

4.2.4. Corpus approaches to language description

4.2.4.1. Differentiating corpus-informed, corpus-based and corpus-driven

Corpus methods may be further differentiated according to how linguists depend upon their corpus to investigate their research questions (Biber 2010; McEnery & Hardie 2012). Some linguists describe their method as ‘corpus-informed’, whereby non-corpus methods are supplemented with minor input from corpus investigations. Others describe their method as ‘corpus-based’, whereby language corpora are used to support empirical investigations within the architecture of a particular framework that aligns with the broader theoretical approach of the researcher.

Yet others describe their method as ‘corpus-driven’, whereby corpus analysis is used to identify any and all language-related phenomena that may not be recognised or covered by existing available frameworks (Biber 2010; see also Haspelmath 2007, 2010a, 2010b). These descriptive categories represent a methodological continuum, and linguists identify with the various methods depending on the nature of their approach and specific research questions.

The core principle of corpus-driven approaches to language description is to exploit methodological practices that are known to work in order to find new things. For example, a corpus-driven approach to language description might involve using an annotation template with dedicated tiers, and creating a foundation of lemmatised type-token annotations on which all subsequent annotations are based (two established practices of corpus enrichment that are relatively uncontroversial). It might then use this foundation to identify and annotate aspects of language use that are not yet detailed in current frameworks and for which no similar undertaking has yet been achieved. This would be a novel practice of corpus enrichment that is more controversial because it involves challenging entrenched theoretical—even paradigmatic—ideas about the nature of languages in general, yet is a direct consequence of observing phenomena in the corpus that can or should be identified and annotated.

Corpus-driven approaches to language description have developed from competing arguments regarding the empirical validity of various corpus methods (McEnery & Hardie 2012). An extreme view of a corpus-driven approach holds that language corpora and corpus methods are the only empirically valid method for investigating language variation and use, and are therefore the only way to advance our knowledge the patterning of language structures. This view developed from neo-Firthian ideas that also influenced Halliday and the Prague school of functionalists.

A weaker view suggests that each corpus represents an accessible way for a linguist to get an understanding of the patterns of use in a given language, within the idiosyncratic constraints of each individual corpus. This information may then inform the design of experimental methods such as acceptability judgements, experimental micro-contexts, and so on. As suggested in Section §4.2.2 and §4.2.3 above, this study adopts the weaker view, and actually combines elements of both corpus-based and corpus-driven approaches.

4.2.4.2. The partly corpus-driven approach used in this study

In some respects, this study may be described as corpus-based, whereby corpus analysis is used to support empirical investigations within the architecture of a particular framework that aligns with the broader theoretical approach of the researcher. This is evident in the scope of this investigation, which focusses on identifying and analysing possible clause-level utterances (i.e. a relatively traditional scope of investigation).

In other respects, this study may be described as corpus-driven, whereby corpus analysis is used to identify any and all language-related phenomena that may not be recognised or covered by existing available frameworks. This is evident in the analysis and annotation of clause-like units in the study corpus, because all meaningful activity is considered during the identification of these units.

This aspect of the study represents a departure from convention because it refrains from over-analysing all meaningful activity as conventionally linguistic, or restricting the identification of clause-like units only to activity traditionally recognised as linguistic in the literature. As the approach adopted in this study combines established methodological practices to identify and explore novel units, without strictly applying any one specific framework, it is characterised as partly corpus-driven.

The partly corpus-driven approach developed in this study enabled exploration of two particularly controversial areas of signed language description. Firstly, it facilitated the identification of possible clause-level utterances (in Auslan retellings), and addressed problematic aspects of language theory and research design that were reported in earlier investigations (see §2.3). Despite frequent reporting, these problematic aspects have rarely been explored or tested in subsequent investigations to date. Instead, previous investigations have tended to explore hypotheses that integrate risky assumptions about aspects of signed language use that are taken as axiomatic when perhaps they should not be (e.g. word order and constituent structure). They have also tended to investigate these hypotheses using relatively limited data obtained with experimental methods such as those described in Section §4.2.1 above. The primary enrichment of the study corpus enables exploration of these aspects of language theory and research design.

Secondly, it fulfils an important aim in the development and use of language corpora, whereby a corpus should enable both transparency of analyses and the participation of other people who can check those analyses. This has not often been achieved in previous investigations of clause-level constructions in signed languages. For example, researchers tend to gloss over issues with identifying clause-level constructions (such as ambiguities of interpretation in signed texts) in order to present data that appears to achieve some kind of generalisable description (see §5.2.1). A deeper exploration of these issues is warranted.

The secondary enrichment of the study corpus enables exploration of these issues. During this study, a sub-set of the annotations created during the primary enrichment of the study corpus enrichment were re-interpreted and re-analysed, i.e. 'checked', by two other

annotators (see Chapter §5). This type of exploration has never been reported before in the signed language literature. It resulted in interesting information about the nature of Auslan, as well as the structure-based, introspective and interpretive activity of annotating a multimodal corpus.

4.3. The Auslan Corpus

4.3.1. The Auslan Archive and Corpus

The Auslan Archive is a digital video archive of 256 native and near-native signers in the Australian deaf community, all of who are from signing deaf families or acquired Auslan from their childhood peers before six years of age. Three separate research projects have contributed to the Auslan Archive: (i) the Test Battery of Auslan Morphology and Syntax Project conducted by Adam Schembri (1999-2000); (ii) the Sociolinguistic Variation In Auslan Project conducted by Trevor Johnston and Adam Schembri (2003-2005); and (iii) the Endangered Language Documentation Project conducted by Trevor Johnston with funding from the Hans Rausing Endangered Languages Documentation Program at the University of London (2004-2006). The current Auslan Corpus contains a subset of annotated ELAN files of video clips from all three contributions to the Auslan Archive, with the majority based on the Endangered Language Documentation Project.

During the Endangered Language Documentation Project, twenty individuals each from five urban centres (Adelaide, Brisbane, Melbourne, Perth and Sydney) were filmed in pairs unmatched for any variables except that they have lived in the same location for the last ten years or more and were not a couple. Participants were deliberately balanced for location and ended up roughly balanced for age and gender.

Each signer was requested to complete eleven different activities: (1) fingerspell name and sign name; (2) retell an Aesop's Fable based on text provided one week before the session ('The boy who cried wolf' or 'The hare and the tortoise'); (3) narrate a memorable life event; (4) complete a survey on deafness and disability, parental preferences, new reproductive choices and changes in the deaf community over thirty years; (5) engage in free conversation; (6) view and retell the Warner Bros. Tweety and Sylvester cartoon 'Canary Row'; (7) view and retell the picture book story 'Frog where are you?'; (8) view and retell the Auslan story 'Valentine's day game'; (9) view and describe video vignettes of toys moving (i.e. the Noun-Verb Production task, T. Supalla, Newport, Singleton, S. Supalla, Metlay & Coulter, n.d.) and a man engaging in actions involving inanimate objects; (10) view and describe eighteen pictures of various reversible, non-reversible and locative events/states (i.e. the Volterra picture task, Volterra et al. 1984); and (11) play a game of spot-the-difference using two slightly different pictures.

Each of these activities was designed to elicit as many language functions or registers as possible, e.g. question formation, declaratives, storytelling narrative, natural discourse, conversation and so on (Johnston & Schembri 2006b). Over 300 hours of film were collected. Each participant provided approximately three hours of film. These activities have resulted in over 1,100 video clips (Johnston & Crasborn 2006).

The current Auslan Corpus may be characterised according to the differential attributes outlined in Section §4.2.3 above. The Auslan Corpus is: (a) representative of the native and near-native signed language use of deaf signers who participate in a wider English-based community in Australia. Specifically, it is representative of native and near-native signers who acquired Auslan from their parents, or from their peers at residential schools for the deaf before six years of age. In other words, signers who acquired and use Auslan as their first language in the same way that most hearing people acquire and use their first language. The text types represented in the Auslan Corpus were chosen as representative of the traditional usage of Auslan within domestic and social network ecologies.

The Auslan Corpus is: (b) a synchronic corpus that represents a snapshot of the language use of a partly representative group of signers during a brief period of time in the history of Auslan (the time it was collected, from 2004 to 2008). It is also: (c) a monolingual corpus, representing the primary language (but not the only language) used by these particular signers; and (d) a static corpus in the sense that no new materials have been added since 2008, but a dynamic corpus in the sense that it is continually enriched with new annotations.

Finally, the Auslan Corpus is: (e) richly annotated for various kinds of linguistic analyses in some corpus parts, while other parts are only lemmatised. In terms of the degree of controversy of annotations in the Auslan corpus, most of these annotations may be considered relatively uncontroversial for linguists who value usage-based approaches to language, e.g. those who use cognitive and functional frameworks, and some language typology frameworks. However, the annotations created in the Auslan Corpus are likely to be relatively more controversial for linguists who take a generative or formal approach to language.

The lemmatisation of the Auslan Corpus is supported by the ongoing development of the online lexical database Auslan Signbank¹². The Auslan Signbank was initially developed using existing secondary sources, such as the sketch grammars and dictionaries of Auslan created by Trevor Johnston in the twenty years prior to the documentation project (Johnston 1989, 1997, 1998).

The Auslan Signbank is a descriptive tool for lemmatising the Auslan Corpus. All entries in the Auslan Signbank database have individual identification glosses (IDglosses) that are used to tokenise and identify the source materials in the Auslan Archive. IDglossing constitutes the most basic level of annotation that prepares the file for further enrichment (see §4.2.3.2 above). An IDgloss is assigned to an annotation in a file according to the form of the sign in the video, thereby identifying the sign as a meaningful component in the signed text (Johnston 2010, under review).

These IDglosses are annotated on the Strong Hand (SH) and Weak Hand (WH) IDgloss tiers, i.e. an annotation on the SH and/or WH IDgloss tier indicates the annotator recognised that the signer used his hands to express something meaningful at that time.

¹² <http://www.auslan.org.au/>

After lemmatising the file using the SH and/or WH IDgloss tiers, the sign stream of each participant is further enriched with annotations on other tiers that are aligned to annotations on the IDgloss tiers. This means that all annotations are time-aligned to annotations on the IDgloss tiers.

Time-alignment is necessary to ensure the efficacy of data extraction, particularly when using advanced multi-tier searches or creating annotations by overlaps, where precision of annotation time-alignment is paramount to successful searches. The Auslan Signbank is further developed as annotators enrich the Auslan Corpus with annotations and identify signs for which there is no lemma registered in the lexical database.

All video files in the Auslan Corpus are coded using ELAN digital video annotation software (MPI/LAT Technical Group 2009¹³). The use of ELAN software to annotate video files facilitates exact time-alignment of annotations with the video source on multiple user-specified tiers, and bypasses any need for transcription (Crasborn & Sloetjes 2008). Annotators can create, edit, search and view their annotations using several different methods. Successive annotations increase corpus value exponentially over time. All ELAN annotation files in the Auslan Corpus are created with a specific Auslan Corpus template (ELAN template file 7 in 2013) and the file naming conventions outlined in the Auslan Corpus Annotation Guidelines (Johnston 2013a).

4.4. The Study Corpus

4.4.1. Files in the study corpus

Less than 30% of the video clips in the Auslan Corpus (approximately 5-10% of the total edited hours available in the Auslan Archive) have been tokenised and assigned IDglosses using the ELAN software. This subset of annotated ELAN files constitutes the enriched Auslan Corpus, of which a much smaller subset constitutes the study corpus investigated here. The study corpus contains richly annotated ELAN files of twenty retellings of ‘The boy who cried wolf’ from male and female signers from Adelaide, Brisbane, Melbourne, Perth and Sydney (see Appendix 2 for the written English translation provided to signers for this task). The individual files in the study corpus are listed in Table 4.1 along with relevant metadata for each individual signer.

Table 4.1 File names and metadata for each participant in the study corpus (N=native; NN=near-native)

<i>File name</i>	<i>Location</i>	<i>Gender</i>	<i>Age</i>	<i>Nativeness</i>	<i>Duration</i> (mins)
AJNA1c2a	Adelaide	M	15	NN	1.14
AKRA1c2a	Adelaide	F	25	N	1.41
AMGA1c2a	Adelaide	F	17	NN	1.51

¹³ Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands: <http://tla.mpi.nl/tools/tla-tools/elan/>

AMMA1c2a	Adelaide	M	36	N	1.24
BAOBBIc2a	Brisbane	F	18	N	1.22
BDCBIc2a	Brisbane	M	60	NN	2.13
BFSA1c2a	Brisbane	F	55	N	1.49
BRCA1c2a	Brisbane	M	67	NN	3.06
MBCBIc2a	Melbourne	M	64	NN	1.58
MBHA1c2a	Melbourne	M	49	N	1.28
MCDBIc2a	Melbourne	M	49	NN	2.03
MFKA1c2a	Melbourne	F	55	N	1.3
PDHA1c2a	Perth	F	50	NN	2.22
PDMA1c2a	Perth	M	24	N	1.07
PGMBIc2a	Perth	M	80	NN	1.54
PJHBIc2a	Perth	F	28	N	2.13
SGMBIc2a	Sydney	M	33	N	1.41
SPKA1c2a	Sydney	F	50	NN	3.01
SSNA1c2a	Sydney	M	30	N	1.47
SSSBIc2a	Sydney	F	60	N	1.32
<i>Column totals</i>	-	-	-	-	33.56
Minimum value	-	-	15	-	1.07
Maximum value	-	-	80	-	3.06
Median	-	-	49	-	1.48
Statistical range	-	-	65	-	1.99

Table 4.1 shows that the study corpus is balanced for location (four signers each from Adelaide, Brisbane, Melbourne, Perth and Sydney); and roughly balanced for gender (eleven males and nine females; $n=20$); age (median age is 49 years; youngest signer was 15 and the oldest signer was 80 at the time of documentation; statistical range of 65 years); and nativeness (eleven participants are native signers with at least one deaf parent; nine participants are near-native signers who acquired Auslan before six years of age). The duration of each retelling ranges from 1.07 minutes to 3.06 minutes, with a median of 1.48 minutes and statistical range of 1.99 minutes. The total duration of all retellings is 33.56 minutes.

4.4.2. Limitations of the study corpus

There are four major limitations of the explorations of the study corpus: (1) the representativeness and size of the study corpus; (2) the focus on utterances and units of lexicogrammar that are 'clause level'; (3) the fact that no single specific theoretical framework is applied; and (4) the fact that utterances are identified and analysed on the basis of what only one signer in the interaction is perceived as doing (the narrator).

Firstly, the annotated study corpus is limited in representativeness and size because it is based on only one text type (a single narrative) and twenty signers in the Auslan Corpus. This means it is not a balanced and representative sample of the entire available Auslan Corpus, let alone the heterogeneous community of Auslan signers. However, this text type was chosen because it is similar to the elicited sentences and narratives on which most descriptions of signed language lexicogrammar have been based (see §2.2.1, §2.3.1 and §4.2.1).

A similar text type was chosen for this study in order to compare findings more easily to previous research, as well as to facilitate identification and exploration of language-specific patterns. As the study corpus is very small and restricted to only one text type, findings are only indicative of patterns that may be identified and explored elsewhere in the Auslan Corpus. They are not (yet) representative of any sociolinguistic variables or general language use. Stronger claims regarding general patterns of Auslan lexicogrammar and clause-level constructions will not be available until other text types in the Auslan Corpus (particularly conversation) have been explored and substantiated using additional experimental methods.

The representativeness of the study corpus is limited by its size, especially compared to analyses of spoken language corpora now available. However, it must be said that the annotation of multimodal signed language data takes much longer compared to the manual annotation of unimodal spoken or written language data often reported for corpus studies. Depending on the notation or annotation system used, signed language linguists have estimated transcription or annotation ratios of anywhere between 1:10 and 1:120, i.e. two hours of transcription or annotation to one minute of video (Hanke & Prillwitz 1995: 303). In this study, the 1:120 ratio roughly accords with creating just one tier of annotations (in total, twenty-two tiers were used to investigate the research aim).

Furthermore, the Auslan Corpus is only five years old (b. 2008) and is manually enriched by a small team of trained annotators, whereas many spoken and language corpora are much older and may be enriched both manually and automatically (e.g. via voice-recognition software) by many more people. It is unreasonable to expect comparably annotated signed language corpora at this early stage. The study corpus is still a much larger and more richly annotated multimodal corpus than other data sets used for investigating clause-level utterances in a signed language, and it certainly represents an improvement on data obtained via non-corpus methods.

Secondly, the study corpus is limited by its scope. Part of the aim is to explore how identified clause-level utterances in Auslan are organised and linked, so the investigation is limited to a clause-level perspective of analysis. In other words, the semantic relations or argument structure of utterances that prompt conceptualisations that are propositional (see §3.4). However, the practice of investigating the semantic relations or argument structure of utterances is widespread in many functional-cognitive approaches to describing lexicogrammar. It is viewed as only one step in a long road towards describing how signers or speakers organise and combine their utterances (Givón 2010: 33).

This scope was also shaped by the opportunities that the Auslan Corpus presents for both describing how native signers use Auslan, and for exploring claims in the spoken and signed language literature. Many of these claims stem from traditional views of human language and linguistics, including argument structure and constituent order (see §2.2.1). In order to both explore and describe aspects of Auslan lexicogrammar on its own terms, and to contribute to the existing literature on the lexicogrammar of signed languages, it was necessary to strike a balance between these two requirements.

No claim is made that this perspective of analysis represents the only or final way to proceed with investigations of signed language use. In fact, it looks like further analysis of the Auslan Corpus may result in an updated theoretical approach or framework. This updated framework will likely incorporate aspects of existing cognitive and functional frameworks while making better recourse for modality-specific strategies of the emergence and joint negotiation of face-to-face signed language communication.

Thirdly, the study corpus is limited by the fact that it is not investigated from the perspective of a specific analytical framework such as Cognitive Grammar (Langacker 1987, 2008) or Radical Construction Grammar (Croft 2001). Instead, the investigation and exploration of the study corpus was guided and shaped by key observations from usage-based, cognitive and functional approaches to language and language typology.

Chapter §2 explained that previous studies have tended to investigate signed languages by applying specific frameworks developed from spoken languages, as if the core ideas of these frameworks have already been established as paradigms for signed language research. This has been done on the basis of arguments (consciously declared or not) that signed languages and spoken languages are structured and used in parallel ways. However, this has tended to result in studies that look for evidence of structural encoding in signed language use, and which ignore or conflate other important communicative strategies such as inference.

It was therefore necessary to explore the study corpus by differentiating the semiotic resources and communicative strategies used by signers with caution, rather than assuming that everything meaningful is a type of linguistic encoding. Given that corpus methods are particularly suited to usage-based approaches to language, and that the investigation of signed language lexicogrammar is so exploratory, a decision was made to not constrain this early exploration to a specific analytical framework at this time.

Finally, the study corpus is limited by the fact that signed utterances are identified and analysed on the basis of what only one signer in the interaction is perceived as doing (the narrator). Given the interaction-based and composite utterance approach of the study, this is problematic to some extent. However, the data is from an elicitation task. These retellings are primarily unidirectional with regards to their content (i.e. only one person is providing new information about the story), and it is the content that this study concentrates on. Furthermore, it was often possible to guess how and where an interactant provided some kind of mutual reciprocity because this was in turn reflected by the narrator's ongoing reciprocity.

Despite these four limitations, the analyses of the study corpus presented in this thesis constitute a significant advancement to investigations of clause-level utterances in a signed language. This investigation also hints at promising future comparisons to analyses of multimodal corpora of composite utterances that combine speech-with-gesture, and spoken language lexicogrammar.

4.4.3. Enriching the study corpus

4.4.3.1. Annotation framework

A partly corpus-driven approach to investigating and exploring the study corpus was enabled by: (1) annotating tiers reserved for various aspects of potential clause-level utterances, i.e. composite utterances and multimodal phenomena, so that relationships between relevant phenomena could be investigated by comparing annotations created on different tiers; (2) developing methods for dealing consistently with the various types of identified ambiguities and difficult analyses; (3) regular and consistent revision of annotations; (4) three iterations of checking annotated analyses by two other annotators; (5) revision of annotations in light of the three iterations of checking; and (6) developing methods for quantifying patterns of language use on the basis of analyses extracted from annotated tiers.

This section details the methodological processes developed for the primary enrichment of the study corpus, whereby potential clause-level utterances were identified, analysed, and annotated in the study corpus files. It details the participant metadata and study corpus files, the tiers used for annotation, the annotations created on each tier, the procedure for annotating and tagging on each tier, how annotations were revised, and how annotations were retrieved and extracted for further analysis and evaluation in Excel (Microsoft 2008) and R (R Core Development Team, 2013).

The study corpus ELAN files were annotated using twenty-two different parent and child tiers time-aligned with the source digital video input (see Table 4.2 below). Some annotations in the corpus are more structure/form focussed (e.g. the presence or absence of some bodily articulation such as a head nod, or the orientation of a pointing sign) and some are more function/meaning focussed (e.g. the use of a sign to prompt a process or a participant, or the semantic role of a sign in a usage event).

Though considerations about both form and function are usually involved one way in another in all acts of annotation, it is clear that those strongly at the function/meaning end of the spectrum require acts of interpretation and are thus more open to changes through revision (by the same or other annotators) or disagreement (by other annotators). The types of annotations of relevance to this study are highly function/meaning based and interrelated: clause-like units, grammatical class, argument structure, macro-role, semantic role and hypotactic relations between clause-like units.

When identifying and analysing clause-level utterances using this annotation framework, it is important to ensure that the various levels of annotations distinguish between encoding and implicature. That is, what signers prompt or express by encoding information as linguistically salient aspects of signed language usage, and what they simply imply in their expression. This distinction is necessary in order for the composite utterances (and therefore potential clause-level constructions) to be identified and analysed precisely according to how they emerge in context, and how they are shared and negotiated (Enfield 2009).

As Enfield explains, “in order to understand what is conveyed in total in an interaction, a Gricean distinction between encoded semiotics and defeasible implicature is necessary. Maintaining such a distinction helps to highlight the importance of context-given information and context-derived inference in the overall meanings of linguistic utterances” (Enfield 2009: 26). This kind of distinction is paramount to distinguishing and describing the various strategies used by Auslan signers, so that not everything is over-analysed as linguistic, or modality-specific, as so often has been the case (see §2.3).

Most tiers used in the study corpus are reserved for annotating those aspects of clause-level utterances in the study corpus that are ‘encoded semiotics’. Almost none are reserved for annotating aspects of ‘defeasible implicature’. Two notable exceptions are the tiers used for annotating constructed action and dialogue, and the tiers used for annotating the primary expression of relations of hypotaxis between those clause-like units identified as linked hypotactically. Both of these annotation levels allow for the possibility of annotating information that is inferred implicitly rather than coded explicitly via typical linguistic strategies. However, this is clearly laid out in the annotation procedure and the tags used to annotate these observations, so there is no confusion when data is extracted and analysed.

All annotations were repeatedly revised and reanalysed during multiple passes of relevant tiers over a period of three years until fewer and fewer changes were made and the annotations became relatively stable. Clustered random samples of the analyses of potential clause-level constructions identified in this study corpus were also re-interpreted and re-analysed, i.e. ‘checked’, by two other annotators who are good signers and who were specifically trained for the exercise (see Chapter §5).

During the course of this study, many patterns emerged relatively organically during observation and annotation of the study corpus, as the annotator became familiar with the

dataset and began to recognise repetitions of patterns from observations of actual usage events. However, the majority of linguistically salient patterns only emerged after retrieving, searching and sorting analyses, or after statistical analyses of patterns to identify possible language internal and external factors that may be significant for this particular data set. These patterns were then explored to increasing levels of specificity, and findings were mapped onto each other to get an increasingly richer overview.

Table 4.2 Parent (bold type) and child tiers (marked ↪) annotated in the study corpus

<i>Tier name</i>	<i>Description of tier function</i>
ID-gloss	Strong Hand (SH) and Weak Hand (WH) lemmas of all tokens of manual and non-manual signs, e.g. BOY, PT:PRO ISG, G(NMS):YES, G(5-DOWN):PHOOEY
↪ GramCls	Tentative grammatical class of SH and WH IDglosses according to specific usage event, e.g. Verb: Locating, Noun: Depicting, etc
CLUcomposite	Groups annotations of clause-like units as either standing alone or as linked via hypotactic relation(s), e.g. Single, Embed, Depend, DependEmbed; subjective uncertainty of identification tagged with a ? symbol, e.g. Depend?
ClauseLikeUnit (CLU)	Identifies chunks of signing as clause-like units; contains label with file name, metadata (location_gender_age_nativeness) and CLU number, e.g. PGBM1c2aCLU_P_M_80_NN#01
↪ Arg	Overt expression of SH and WH core argument(s) and predicate(s), i.e. the main participants in a clause-like unit that are overtly expressed with a fully lexical, partly lexical or non-lexical sign; numbered according to order of appearance, e.g. A, A1, V, V1, nonA, etc ¹⁴
↪ MacroRole	Tentative macro role of SH and WH overt core argument(s) and predicate(s), e.g. PROCESS, ACTOR, UNDERGOER, CARRIER, ATTRIBUTE ¹⁵
↪ SemRole	Tentative semantic role of SH and WH overt core argument(s) and predicate(s), e.g. PROCESS, AGENT, PATIENT, EXISTENT, EXPERIENCER
CLUwithinCLU	CLUs that are part of a relation of embeddedness; tagged according to order of appearance, i.e. Pre-container, Contained or

¹⁴ Others may recognise the term ‘core argument’ as referring to semantically-identified arguments that can undergo voice and valence adjusting operations, but not obliques (see Payne 1997). However, it is not assumed that these annotations of semantic relations yet point to the existence of grammatical relations in Auslan morphosyntax.

¹⁵ Macro-role and semantic role tags are used to explore the semantic relations of the signs identified as core elements of clause-like units. For example, CARRIER is used to tag the core argument ‘identified’ by another sign, while ATTRIBUTE is used to tag the core argument functioning as the ‘identifier’. See Johnston 2013a for more details of the tags used for annotating the Auslan Corpus.

	Post-container
↳ OvertEmbeddedType	Type of overt or semi-overt primary expression of a relation of embeddedness, i.e. Lexis, Intonation, Juxtaposition or Other
CLUcomplex	Clause-like units that are part of a relation of dependency; tagged according to expansion (dependency), i.e. Independent or Dependent
↳ OvertDependencyType	Type of overt or semi-overt primary expression of a relation of dependency, i.e. Lexis, Intonation, Juxtaposition or Other
CA	Demonstrations of constructed action (CA) or dialogue (CD); tagged according to character role of enactment, e.g. CA:BOY, CD:VILLAGERS
↳ Arg	Core argument(s) and predicate(s) that are only expressed through CA or CD; numbered according to order of appearance, e.g. A, A1, V, V1, nonA, etc.
↳ MacroRole	Tentative macro role of core argument(s) and predicate(s) that are only expressed through CA or CD, e.g. PROCESS, ACTOR, UNDERGOER, CARRIER, ATTRIBUTE
↳ SemRole	Tentative semantic role of core argument(s) and predicate(s) that are only expressed through CA or CD, e.g. PROCESS, AGENT, PATIENT, EXISTENT, EXPERIENCER
LitTrans	Literal translation of annotated CLU
Comments	Comments and relevant details of individual analyses

4.4.3.2. Clause-like units

The candidate clause-level constructions annotated in this study were identified on the basis of meaning and form. They are meaningful symbolic composite utterances that assert something about the world by using one element in that utterance to predicate something about another element (Johnston 2013a: 50). They are utterances that are (all at once): (1) propositions, i.e. communicative moves that prompt and express information about the world; (2) interactive moves, i.e. communicative moves that regulate signer interactions; and (3) discourse housekeeping moves, i.e. communicative moves that regulate the flow of narrative (Halliday 1994; see §3.4).

Most identified clause-like units tend to prompt a conceptualisation of a relation between things and processes, or between things and other things (Langacker 2008). For example, one element of an utterance might predicate something about another element in that utterance, thus prompting a conceptualisation that might be described (in functional terminology) as a relation between a nominal argument and a verbal predicate. They also tend to be units that have unified intonation contours that help to delineate them into

chunks that function as basic units of language at what we call the 'clause level' (Bolinger 1983; Croft 2001; Langacker 2001; Croft & Cruse 2005; see §3.4).

It has yet to be established if the signed utterances identified in these Auslan retellings are indeed instances of constructions that correspond to linguistic definitions of 'clause' or if they represent another type of utterance. It has also yet to be established the extent that these constructions are specific to Auslan or whether they are used in other signed and/or spoken languages. Thus, all utterances are identified in the first instance as 'clause-like units' (CLUs). CLUs are 'clause level' in the sense that they are units of analysis smaller than discourse level that constitute a descriptive category of possible candidates for constructions that may or may not be specific to Auslan, and that correspond with various types of communicative moves in face-to-face interaction. They are not 'clause level' in the sense of 'level of analysis where all units are clauses'.

In order to maintain the distinction between encoded semiotics and defeasible implicature during the identification and annotation of CLUs, it was necessary to consider whether each token CLU is: (a) bounded by intonation, sequence and context only; or (b) conventionally encoded in some way, such as through constituent order or lexical expressions. The annotation framework for tagging identified CLUs and the elements within CLUs in this way is essentially based on the Role and Reference Grammar (RRG) definition of a clause.

RRG defines a clause as a semantic relation between a predicate and its arguments (Van Valin & LaPolla 1997). In the RRG clause, two preliminary contrasts are considered: (1) predicating vs. non-predicating information; and (2) arguments of predicates vs. non-arguments of predicates. Primary clause constituents are the nucleus (containing the predicate(s), i.e. some type of symbolic unit that profiles a process, activity, state or event) and the core (the nucleus and any core arguments semantically related to the predicate, i.e. symbolic units that profile things or attributes of things). Non-arguments of core predicates (such as circumstances of time, manner or location) constitute the periphery.

Together, content (semantic relations, image schemas) and perceived form (including intonation contours of hand and body rhythms, facial movements and enactments) suggest that certain signs, gestures and expressions in a given usage event are intended to be conceptually linked as a meaningful CLU. Of course, the interpretant can only interpret what the interpreter intended to convey, and it is impossible to always know the extent to which the interpretation mirrors that intended by the interpreter.

The role of visual intonation (i.e. facial expressions, body movements, etc) in identifying and delineating CLUs is similar to the strong isomorphic mappings of various constructions and intonation contours in spoken languages that have been identified by linguists (Chafe 1994; Croft 1995, 2007; Matsumoto 2000; Park 2002; see also Johnston 2013b for further discussion with respect to Auslan).

Perceived intonation contours help annotators to delineate CLUs (e.g. to delineate temporally adjacent utterances as one CLU or two CLUs). The recognition, identification

or even the ambiguity of a contour is implicit in the CLU delineation and the tag assigned to that annotation (e.g. CLU composites tagged as uncertain). However, the specific properties of intonation contours have not yet been annotated in the Auslan Corpus. The first step is to identify contours perceptually, and then explore their unified properties. It is a further research question as to the nature of these identified contours.

It is also a further research question if these identified CLUs are constructions that linguists would readily identify as clauses according to formal and semantic criteria, or if they are some other kind of communicative unit in signed languages. The corpus analysis presented here may help to find out if these identified CLUs represent utterances that are grammaticalised to some extent. It will also facilitate later comparison to explore whether the CLUs identified in other text types are constituted in this way, or in a novel way due to factors specific to signed languages.

4.4.3.3. Core elements of CLUs

After identifying the CLUs, the next phase in the annotation was to attempt to identify the core ‘constituent’ elements of each CLU token. During this procedure only overtly expressed core argument (A) and predicate (V) elements are annotated on their respective Strong Hand (SH) and Weak Hand (WH) Argument tiers. If there is more than one core argument or predicate, tags are numbered according to order of appearance in the CLU. For example, if there is more than one predicate in a CLU (either a serial predicate construction that expresses a sequence of activities or that prompts an elaborate construal of one activity), the first predicate is tagged V1, the second is tagged V2, and so on. Non-core elements are also annotated on the Argument tiers, but are tagged as nonA because the current investigation focusses only on the overtly expressed core elements of the CLU as a whole and not (yet) phrasal or constituent analysis or verbal or nominal expressions.

Only the ‘head’ of a nominal unit is identified and tagged as a token of a core argument. For example, consider an utterance translated as “*the big bad wolf comes*”, bounded by a distinctive intonation contour and/or pausing, and reflecting the English text of the narrative stimulus. In this case only the *wolf* element is tagged as A—the elements *the big bad* are tagged as nonA. Elements tagged as nonA are either: (i) part of a nominal phrase that is a core argument of a CLU; (ii) part of a verbal phrase that is a core predicate of a CLU; or (iii) part of some other unit expressing peripheral information.

An example of an annotated CLU can be viewed in Video PGMB1c2aCLU#1. This video shows how the tiers used for identifying and analysing this CLU were tagged. In this identified CLU, the signs PT:PRO1SG, TALK and WOLF all function as core elements in this CLU and are tagged as A1, V and A2 respectively. The signs ABOUT, FS:BIG and BAD all function as non-core elements in this CLU and are all tagged as nonA.

The current study is limited to investigating how CLUs are organised with respect to their overtly expressed core elements. It is necessary to investigate and quantify how the overt core phenomena are organised before investigating how the covert (i.e. implied) core and any non-core phenomena are organised. This means the current study is by no means a

comprehensive multimodal analysis—it is simply the foundation on which to build a multimodal analysis of composite utterances in a signed language.

4.4.3.4. Relations of hypotaxis between Clause-Like Units

Although CLUs are identified as units that are propositional, CLUs are not completely independent and understandable when taken out of context because there is always something that links one CLU to the ones around it. After all, the CLUs are part of a ‘text’, a discourse that has thematic coherences. The CLUs identified in these retellings unfold one after the other. Nonetheless, some CLUs appear to be more or less complete, stand-alone utterances that make sense in themselves. These CLUs are categorised as Single on the CLUcomposite tier. An example of a Single CLU composite is shown in Video BDCB1c2aCLU#30.

However, other identified CLUs do not meaningfully stand alone as single CLUs to this extent. These CLUs do not make sense by themselves because they are semantically, prosodically and/or morphosyntactically linked to one or more other CLUs around it. This linkage results in a sequence of CLUs that express hypotactic relations of embeddedness, dependency or both (see §3.4.2). The CLUs identified as hypotactically linked are grouped together and categorised as complex CLU composites on the CLU composite tier, e.g. Embed, Depend and DependEmbed CLU composites. Signers may use various strategies to express this complexity, including manually encoded morphology and lexis, sequencing (temporal mapping and/or spatial juxtaposition) and intonation contours (Johnston 1996).

CLUs linked via relations of hypotaxis are further annotated for embeddedness and/or dependency relations. Embeddedness is identified when one CLU is contained within another, such as where one CLU appears to be an argument of a predicate in the other CLU, or because one CLU appears to be embedded within the other and adds, specifies or modifies an element in that other CLU. For example, by projecting a locution or idea that constitutes another CLU. Embeddedness is annotated on the CLUwithinCLU tier. An example of an Embed CLU composite can be viewed in Video AMMA1c2aCLU#32.

Dependency relations are identified when one coherent idea is expressed across two or more CLUs, and where at least one of these CLUs shows some kind of morphosyntactic or prosodic indication of a relationship of dependency with respect to the other. These types of hypotactic relations are annotated on the CLUcomplex tier. An example of a Depend CLU composite can be viewed in Video AMMA1c2aCLU#11.

After identifying CLUs linked via hypotactic relations, it remained to be seen whether the strategies used to express relations of embedding and/or dependency in the study corpus ‘encode’ information in a conventionally language- or modality-specific way, or whether it is simply the best contextual interpretation of the juxtaposed CLUs. Additional tiers were developed to investigate the primary ways that the perceived dependency is encoded or enriched by signers in each specific CLU composite. In other words, whether relations of embeddedness and/or dependency are primarily expressed via morphosyntactic

strategies of encoding, inferred via intonation and juxtaposition, or indicated via some other strategy as yet unobserved.

Two child tiers were created to investigate this aspect of complex CLU composites. The *OvertEmbeddedType* tier is used for tagging primary expression of embeddedness, i.e. CLU composites with annotations on the *CLUwithinCLU* tier. The *OvertDependencyType* tier is used for tagging primary expression of dependency, i.e. CLU composites with annotations on the *CLUcomplex* tier. These tiers are tentatively defined as used for tagging the type of overt or semi-overt primary expression of a relation of hypotaxis in a CLU composite.

Both tiers are tagged with the following controlled vocabulary: (a) *Lexis* (defined as a manual sign that explicitly encodes a linkage); (b) *Intonation* (defined as an intonation contour that unifies two or more CLUs; note that some contours may be conventionalised to some extent, while others may not be conventionalised); (c) *Juxtaposition* (defined as an invitation to infer a relation of dependency between two or more CLUs—and therefore interpret them analytically as a certain type of utterance—because they are located in either the same signing space or in spaces nearby to each other); and (c) *Other* (a spare CV tag that can be used if none of the other tags are suitable).

The aim of tagging for type of hypotactic linkage is to further differentiate tokens of CLU composites according to how they are explicitly or implicitly linked in ways that are not explained by the temporal sequence of utterances, i.e. temporal iconicity (Haiman 1985). For example, Video AMMA1c2aCLU#32 was identified as an *Embed* CLU composite that contains a relation of embeddedness. The linkage between these two CLUs is primarily expressed via the lexical sign *KNOW* in the first CLU. The *Pre-container* unit tagged on the *CLUwithinCLU* tier was therefore tagged as *Lexis* on the *OvertEmbeddedType* tier. The *Contained* unit tagged on the *CLUwithinCLU* tier was not tagged on the *OvertEmbeddedType* tier. This convention makes it possible to quantify how identified relations of embeddedness are primarily expressed in these tokens of CLU composites (i.e. via *lexis*, *intonation*, *juxtaposition* or some other strategy).

It may be observed that CLUs linked via relations of hypotaxis bear a resemblance to what are often described as ‘matrix clauses’ in written and spoken languages (e.g. Van Valin & LaPolla 1997; Payne 1997). However, the CLUs identified as linked via relations of hypotaxis in the study corpus are not described as matrix clauses, because this would presume that the regularities of clause structure in Auslan are already known, including degrees and expression of finiteness and non-finiteness. As these studies are exploratory, the study corpus is not analysed or discussed in terms of matrix clauses and matrix-encoding strategies.

4.4.3.5. Enactments

Enactments are identified by recognising demonstrations of actions, utterances, thoughts, attitudes and/or feelings of a referent other than the narrator (Cormier & Smith 2011). Signers combine bodily movements, postures and eye gazes to construct actions and

dialogue, shifting skilfully between narrated and demonstrated roles (Metzger 1995). Enactments are annotated on the Constructed Action tier according to the two sub-types constructed action (CA) or constructed dialogue (CD), along with the character role of the enactment. For example, enactments of the boy, the sheep, or the villagers are annotated as CA:BOY, CA:SHEEP or CD:VILLAGERS as the case may be.

If the enactment provides the only overt expression of a core element in its identified CLU, it is tagged as such on the CA-Arg parent tier and child tiers. An example of this kind of annotation can be viewed in Video MCDB1c2aCLU#27. In this identified CLU, the CA tier is tagged as CA:BOY and the CA-Arg tier is tagged as A. As this enactment was identified as primarily expressing the character role of the boy as actor and experiencer, the CA-MacroRole and CA-SemRole tiers are tagged as ACTOR and EXPERIENCER respectively. This enables us to quantify where the sole expression of a core element is shown and inferred via enactment rather than ‘told’ explicitly via manually encoded morphology (e.g. modified direction and location of signs) and lexis.

Enactments can be further identified according to the number of articulators recruited for the enactment, which manifests as perceptual strength (Cormier & Smith 2011). However, the strength of instantiated enactments and the aspects of their articulation have not yet been annotated in the study corpus (although see Ferrara & Johnston 2014 for a recent investigation of CA and CLUs in Auslan retellings of ‘Frog, where are you?’).

4.4.3.6. Ambiguity in the study corpus

Variation and disfluency are inherent in all language use and signed languages are no exception (see §3.2.2 and §4.2.1). Variation, signer idiosyncrasies and/or disfluency can sometimes lead to both structural and semantic ambiguity if the variation concerns the obligatoriness of constructional schemas or the morphosyntactic coding.

During the annotation of the study corpus, two types of ambiguity were identified: (1) the uncertain identification and delineation of CLUs; and (2) the indefinite analysis of semantic relations (i.e. annotations of core elements) in identified CLUs. These two types of ambiguity are not inherently problematic aspects of signed language use; they only become problematic during linguistic analysis. Annotation conventions are used to categorise CLUs as uncertain or indefinite, until such a time when further annotation of other tiers and further revision and checking of files may (or may not) help to disambiguate the analysis, at a structural level.

The first type of ambiguity relates to the uncertain identification and delineation of chunks of signing as CLUs. In the annotation of the study corpus, uncertainty manifests in the retellings where an annotator is faced with two or more likely possibilities for delineating a CLU, and is uncertain about which option represents the most appropriate analysis. For example, there may be uncertainty as to whether to delineate an utterance as one CLU or as two CLUs. CLUs identified with uncertainty are tagged with a question mark symbol on the CLU composite tier.

An example of this uncertain identification can be viewed in Video MFKA1c2aCLU#29. This utterance was interpreted as having two possible CLU delineations. This utterance may be analysed as one Single CLU composite (i.e. *“he is a big wolf with sharp scary teeth”*) or as two Single CLU composites (i.e. *“he is a big wolf. he has sharp scary teeth”* or *“he is a big wolf. he snarled viciously”*). In this case, the first analysis was considered more appropriate on the basis of similarities with other CLUs, but an element of subjective uncertainty remained for the annotator.

In the annotation of the study corpus, uncertainty also manifests in the retellings where an annotator is faced with two or more likely possibilities for linking CLUs, and is uncertain about which option represents the most appropriate analysis. For example, there may be uncertainty whether to group a chunk of signing as either one single CLU or as two CLUs linked via a relation of embeddedness, because the relation between the CLUs is inferred semantically or juxtaposed spatially rather than explicitly encoded via lexis or morphology.

An example of this type of uncertainty can be viewed in Video SGMB1c2aCLU#17. This utterance was interpreted as having two possible CLU analyses. This utterance may be analysed as two CLUs linked via a relation of embeddedness (i.e. *“the villagers stood realising: “there’s no wolf at all”*”), or as two single CLUs (i.e. *“the villagers stood realising. (they said) “there’s no wolf at all”*”). In this case, the first analysis was considered more appropriate, mostly because the depicting sign persists throughout the chunk of signing and may be interpreted as supporting an interpretation of two CLUs linked via intonation or lexis.

The second analysis is also possible because it is difficult to decide if the meaning is not simply inferred from the sequence of unfolding CLUs and/or the context. Tagging this CLU composite as uncertain captures that an element of subjective uncertainty remained for the annotator. This particular uncertainty is also partly due to there being very few examples like this in the study corpus.

In addition to CLU delineation and linkage, this type of uncertainty may also result from the impossibility of applying structural, CLU-based analyses to some instances of signing. This may be because the signers appear to be using textually-sensitive strategies (such as introducing the narrative) or strategies that challenge the application of the developing framework (perhaps because the interacting signers know each other so well and can get away with inferring more and explicitly encoding less).

Tagging these types of CLU composites as uncertain effectively quarantines them from more confident analyses, and flags the utterance for potential resolution later on (perhaps after identifying similar utterances in other text types). Over time, practice with delineating and analysing CLUs increases exposure to different types of utterance units, thereby increasing the possibility of identifying similar types of uncertainty that may facilitate comparison and a more certain re-analysis.

For example, tagging CLUs as uncertain enables annotators to create clusters of CLU composites that can be re-interpreted and re-analysed, i.e. checked, by other annotators (see §5). As it happens, the utterance in Video MFKA1c2aCLU#29 was checked by another annotator during the first round of checking annotations in the study corpus (see §5.3.1). This annotator could not yet decide which delineation was more appropriate either. For now, this CLU is analysed separately to CLUs that have been analysed with greater certainty, but analysis of other text types such as conversation may resolve some of this analytical ambiguity at a later date. In the study corpus, the CLUs at the start of each retelling that establish the topic and title of the story are usually tagged as uncertain.

The second type of ambiguity identified in the study corpus is indefiniteness. Indefinite analyses manifest in CLUs where an annotator has delineated the CLU with relative confidence, but is faced with two or more equally likely possibilities for interpreting and analysing the semantic relation between the core elements of the delineated CLU, e.g. as either a predicate-argument [A V] or carrier-attribute [A1 A2] relation.

An example of this type of ambiguity can be viewed in Video SSSB1c2aCLU#48. In this case, two possible analyses have been annotated for the core elements of the CLU in Video SSSB1c2aCLU#48. In the first analysis, this utterance is interpreted as *“well, he is always playing and joking”* and the core elements of the CLU are analysed and tagged as a sequence of [A V1 V2]. In the second analysis, this utterance is interpreted as *“well, he is always playing a joke”* and the core elements of the CLU are analysed and tagged as a sequence of [A1 V A2]. Both analyses are likely in this case because there are no explicitly encoded semiotics to suggest that one analysis is more appropriate than the other. In such cases, both possible analyses are annotated on the relevant Argument tiers with an underscore separating the two alternatives of each constituent, e.g. the core elements of the CLU in Video SSSB1c2aCLU#48 are tagged as [A_A1 V1_V V2_A2].

For now, it would be true to say that these indefinite CLUs appear to lack clearly defined structure at this level with respect to the analytical categories used in this analysis. If this indefiniteness carries through into deeper analyses, it may be necessary to consider the possibility that in some cases it does not matter which is the ‘real’ structure of the CLU, because semantically one simply understands that some quality or characteristic (or characteristic as process) is being associated with some referent.

For example, a pattern X Y may be understood as “X was Y” (carrier-attribute; tagged as [A1 A2]) or “X Y-ed” (argument-predicate; tagged as [A V]). Such specific differentiations—elsewhere in various frameworks apparently appropriate for describing argument structure—may not be made in all identified CLUs in which some quality or characteristic is associated to some referent. It may be enough that either or both predicating or attributive relations are prompted in the minds of interactants. That is, rather than the signer using a structure-based strategy for interpretation, it is up to the interactants to constrain the usage event with what seems the best interpretation given the developing context (see §3.2).

The tiers for macro-roles (MacroRole), semantic roles (SemRole), and grammatical class (GramCls) hold annotations (tags) that specify further information of the sign types identified as core and non-core elements of CLUs. These tiers use sets of controlled vocabulary (CV) tags. These CV tags are used to tentatively identify the macro-role, semantic role and grammatical class of signs in the study corpus. For example, consider a strong-handed, partly lexical pointing sign that is used to index an imagined referent previously indicated in a specific loci of the signer's signing space, and which is interpreted as indexing the main participant of an utterance. If this sign is identified as functioning as the core argument of a CLU, it may be tagged as A on the SH-Argument tier, Noun:Locating on the GramCls tier, ACTOR on the MacroRole tier and AGENT on the SemRole tier. Table 4.2 above contains additional examples of the CV tags used for annotating these tiers (see also Johnston 2013a).

Many of these CV tags are based on terminology adapted from functional-cognitive frameworks (Croft 2001; Van Valin & LaPolla 1997) and have been frequently attested cross-linguistically. However, it is important to note that the use of tags modelled on existing frameworks, especially those dealing with grammatical class, are simply starting blocks with which to start tagging data. They are considered neither definitive nor exhaustive. Whether the categories are relevant to describing how Auslan users organise their morphosyntax remains an empirical question. Tags can (and frequently are) overridden during annotation passes as new patterns emerge. The appropriateness of various tags are constantly re-assessed and adapted through corpus enrichment.

In this way, two types of analytical ambiguity are annotated in the study corpus (uncertain identification and delineation of CLUs, and indefinite analysis of core elements of CLUs). It is difficult (if not impossible) to differentiate between ambiguity that arises from the acts of interpretation required of annotators as they identify and tag corpus data at this structural level, and ambiguity that may have been perceived and experienced by interactants in the discourse event as it occurred in real time (Consten & Loll 2012).

The annotation and revision of CLUs is largely inductive. It is not an objective exercise but a subjective one in which the annotator perceives, reasons and speculates on the meaning intended by the signer, the delineation of this interpretation, and the way in which the composite utterance as a whole encodes, depicts and infers meaningful aspects of the interpreted and supposedly intended meaning.

During annotation of the Auslan Corpus, annotators often mentally and physically scan back and forward through the multimodal documentation, looking for patterns in the ways that the discourse unfolds for the signers in question. Annotators may also compare parts of discourse expressed by one signer with parts of discourse expressed by other signers that have been previously analysed by the annotator, especially when annotating narratives that have been retold by a number of signers. Annotators may also consider how similar meaning may be semiotically encoded and/or inferred using English. This interpretation is essentially a literal translation of the Auslan utterance unit, and is annotated on the LitTrans tier.

4.4.3.7. Indeterminacy in the study corpus

In addition to identifying structural or semantic ambiguities in the study corpus, the annotation framework also facilitates the identification of chunks of signing that may be indeterminate due to unclear signing or poor video quality, signer disfluency, or because none of the current argument structure labels and annotation tags appear able to be meaningfully applied. While these chunks of signing are tagged as CLUs, they are not tagged as having a particular analysis on the Argument tier(s). Instead, the CLU is tagged as INDETERMINATE on the SH-Argument tier.

4.4.4. Extracting annotations as data

There are a number of strategies for searching and counting annotations on multiple tiers in ELAN. This study relied upon ELAN functions to extract annotations from the study corpus via the Annotations Overlaps Information function (i.e. File > Export Multiple Files As > Annotation Overlaps Information). This information was exported as tab-delimited text files, and imported into Excel spreadsheet software and RStudio for further analysis.

4.5. Evaluation

4.5.1. Summary

Chapter §4 outlined the research design and analytical method used for the primary enrichment of the study corpus. It argued that corpus methods represent a significant improvement on non-corpus methods such as the generative experimental model for language description, and explained why multimodal documentary corpora are especially necessary for explorations of signed language lexicogrammar. The core principles of modern corpus design, construction and enrichment were then discussed, and the Auslan Corpus and study corpus were described in relation to these principles.

The analytical method for enriching and analysing the study corpus was then defined as a partly corpus-driven approach. The specific method for enriching and analysing the study corpus constitutes a partly corpus-driven approach to exploring and describing signed language lexicogrammar because it incorporates aspects of established and novel corpus methods to explore old ideas and discover new information.

There is one final observation regarding the revision of study corpus files during the primary corpus enrichment. During the three years of this project, the individual annotations on the twenty-two tiers in the twenty ELAN annotation files in the study corpus were revised between seven and eleven times. Each revision pass was undertaken in the same order every time, beginning with the first file listed in Table 4.1 and finishing with the final file. This has undoubtedly had some influence on the types of patterns that were identified and annotated in each file in the study corpus.

4.6. Conclusion

The partly corpus-driven approach outlined above means that any aspects of clause-level composite utterances (i.e. the various semiotic resources for telling and showing meaning, as well as various types of structural and semantic ambiguity) could be identified and

quantified in the study corpus without needing to prematurely assign labels or linguistic status to particular aspects of these identified units. It also means that these clause-level composite utterances can be explored with regards to sequence, the ordering of identified core elements, their articulation with the strong or weak hand and any co-occurrence with enactment.

As most existing linguistic frameworks assume that constituents of language-specific constructions are fully lexical, this is particularly crucial for investigating the use of partly lexical and non-lexical core elements of clause-like units in a signed language. Put differently, if a signer appears to intentionally and meaningfully produce gestures, depictions or enactments in their signing, there is no reason for excluding these aspects of usage events from the identification and annotation of possible clause-like units.

In fact, exclusion of these strategies from annotation of possible clause-level constructions is highly problematic as it involves making aprioristic assumptions about the linguistic status of individual signs (which are not all of the same type anyway). It also means that analyses must later accommodate and explain gaps resulting from this exclusion (if the signer was engaging in some kind of meaningful expressive activity at the time). An approach that includes some semiotic strategies but not others is insufficient because important aspects of the lived experience of deaf signers and the way signers use their signed language are effectively ignored (see Chapter §3).

5. Checking annotations in the study corpus

The most fatal thing a man can do is try to stand alone.

— Carson McCullers, *The Heart is a Lonely Hunter*

5.1. Introduction

The video files analysed in this thesis were first enriched with annotations using the partly corpus-driven approach and analytical method described in Chapter §4. Chapter §5 describes the secondary enrichment of these annotations. During the final year of this project (after annotations had become more stable through repeated revisions), a proportion of these annotations were re-interpreted and re-analysed by two other annotators. The aim was to ascertain percentage rates of disagreement, to possibly resolve some problematic analyses, and to identify subjective differences in the interpretation, annotation and analysis of clause-like units in the study corpus.

This ‘cross-interpretation’ constituted a secondary enrichment of the study corpus. Findings from this secondary enrichment are used to characterise the analyses resulting from the primary enrichment of the study corpus with respect to the analytical preferences of three annotators (First Checker, Second Checker, and myself, the original annotator).

The research design, analytical method and findings from this secondary corpus enrichment are the focus of Chapter §5. This exploration of the study corpus is justified, described and discussed in three sections. Section §5.2 explains why it was necessary for other annotators to re-interpret and re-analyse—i.e. ‘check’—the annotations created during the primary enrichment of the study corpus. It also outlines the development of a collaborative and iterative method that facilitated two rounds of checking from one annotator and one round of checking from the other annotator, and draws parallels between this method and the iterative process used in design research.

Section §5.3 describes the quantitative and qualitative findings resulting from three iterations of this method. Section §5.4 evaluates these findings and discusses them in relation to the study. In this way, my preferences for annotating and analysing the study corpus retellings during the primary corpus enrichment are framed in relation to the analytical preferences of two other annotators. This exploration of the secondary enrichment of the study corpus highlights the importance of cross-interpretation for investigating signed languages, and demonstrates the improved transparency that this process can contribute to linguistic analysis.

5.2. Research design

5.2.1. Reasons for checking annotations in the study corpus

There are several reasons for having other annotators check the annotations created during the primary enrichment of the study corpus. In Chapter §2, it was established that the linguistic analysis of signed language texts is still very much exploratory (see §2.3.2). It was established that real data are messy, that investigations of real data result in analyses

that range from straightforward to problematic, and that messy data and problematic analyses are not simply 'noise' (see §2.3.1). These claims support the idea that it is important to consider problematic analyses resulting from messy data in context of the range of analyses evidenced in a given data set, rather than focussing solely on non-problematic analyses and demoting problematic analyses as irrelevant or anomalies.

Chapter §2 also reiterated the criticism that very few signed language linguists have made recourse to check their data (in the sense used here), or at least have not reported on this aspect of their investigations in great detail (see §2.3.1; although see also §2.2.3.2 for a summary of Fenlon et al. 2007, who incorporated checking methods into a perceptual study of two unrelated signed languages).

Chapter §4 explained that most researchers describing signed languages aim to achieve analyses that are generalisable in some way and tend to present their analyses as generalisable across specified language ecologies (see §4.2.1). As the range of analyses resulting from messy data impacts directly on the generalisability of analyses, under-reporting of messy data or problematic analyses presents a challenge for assessing the generalisability of reported analyses (Johnston et al. 2007). For example, if there is under-reporting of the messy data or problematic analyses evidenced in a data set, then the generalisability of reported findings is called into question because these findings cannot be assessed in context of the full range of data and analyses evidenced in that set.

These issues are arguably characteristic of all linguistic analysis. In order to explore the study corpus carefully, it was necessary to develop strategies for dealing with these issues. Some of these issues may be partly addressed by presenting one's analyses of documented data along with a fully accessible version of the data, which improves the transparency and integrity of the research (McEnery & Wilson 2001). This approach is considered especially necessary for analysing and describing native signed languages (Johnston 2010; Johnston & Schembri 2013; see also Crasborn, Mesch, Waters, Nonhebel, van der Kooij, Woll & Bergman 2007).

For this reason, the analyses discussed in this study are supplemented with a dedicated video library of examples used to illustrate specific analyses, along with copies of the study corpus ELAN annotation files and the digital video clips of each retelling (see §1.6 and Appendix 1). This kind of accessibility enables other researchers to critically engage with the reported data and analyses, and to explore them more independently than if this access was not provided.

Other issues may be partly addressed by developing methods for annotating (and therefore quantifying) the range of analyses evidenced in a given data set (see §4.4.3). Many of the analytical units explored in this study (i.e. CLUs and CLU composites) have been coded with respect to three types of problematic analyses that were identified during the primary enrichment of the study corpus.

Annotation methods were developed to tag: (1) uncertain analyses, where there is more than one possible delineation for a chunk of signing, e.g. one CLU or two CLUs; (2)

indefinite analyses, where there are two or more possible core element analyses of an identified CLU; and (3) indeterminate analyses, where it is not appropriate to analyse a chunk of signing due to unclear signing or poor video quality, signer disfluency, or because none of the tag labels appear to be meaningfully applied. The coding conventions for annotating these types of problematic analyses are described in detail in Section §4.4.3.6. These conventions enable each type of problematic analysis to be consistently quantified throughout the study corpus, which in turn prepared the study corpus for cross-interpretation.

The secondary enrichment involved having the annotated analyses created during the primary enrichment checked by other annotators. This second enrichment represents an additional method for addressing the issues discussed above. The interpretation and analysis of any data is a learned activity that is relatively subjective and personal (Polanyi 1974). Checking annotations facilitates the identification of subjective differences of interpretations and analyses, and the possible resolution of some problematic analyses.

This enables the researcher to consider other perspectives on the interpretation of specific analyses, including those that are problematic in some respect. It also enables the researcher's personal tendencies for interpreting and analysing data to be characterised in terms of how they compare with those of other annotators. These comparative characterisations may assist with interpreting and generalising overall findings.

For example, as the two other annotators became familiar with the study corpus during the secondary enrichment, both observed that my CLU composites tend to be 'shorter' than theirs. Along with the quantification of problematic analyses mentioned above, observations such as these show that this study resulted in a range of analyses, and that there are subjective and consistent divergences in the way annotators interpret, annotate and analyse clause-level utterances in the study corpus. These differences likely affect the overall findings (see §5.4). It is important to annotate, quantify and explore the reasons for this subjective tendency, and to consider how this tendency may impact the interpretation of overall findings.

In summary, not only is it necessary to report on the full range of data and analyses evidenced in a given corpus and to present analyses with accessible versions of the data, it is also necessary to have all or some proportion of these analyses checked by other annotators, and to evaluate all analyses in light of this checking. Other eyes and opinions are invaluable for assessing the appropriateness of annotating a given analysis, for indicating where there is more or less agreement between annotators, for possibly resolving problematic analyses, and for suggesting what might be causing different analytical preferences.

5.2.2. Participants for checking annotations in the study corpus

So whose eyes and opinions should be involved in creating or checking analyses? To answer this question, it is necessary to consider the role of native signers in signed

language research, the type of analysis undertaken, and to evaluate linguistic analysis with regards to the language competency of researchers.

There are a number of criticisms against relying upon the ‘idealised native speaker or signer’ in linguistics, particularly for experiments that elicit grammaticality judgements and generalise these to claims about deep structure (see §4.2.1). However, this critical discussion is not to deny that native signers must certainly be the object of study in the first instance, or to deny that they should be involved in all aspects of research (see Harris, Holmes & Mertens 2009 and Zeshan & de Vos 2012 for discussion of the empirical and cultural value afforded to the participation of native signers in signed language research; see Hale 1972 and Ameka 2006 for discussion of the role of native and non-native speakers in spoken language research).

The role of native signers in signed language research is paramount. Native signers should be involved in signed language research at the very outset (e.g. data collection, IDglossing, translation) preferably as the researcher themselves or at least as co-researchers. Most signed language linguists agree that input of native signers for interpreting and analysing signed language data is very important, but this is not often borne out in practice. Very few investigators are native signers themselves or recruit native signers who can share valuable insights into the interpretation and analysis of the data. Unfortunately, the input of native signers is not considered to be a compulsory aspect of signed language analysis when it most certainly should be.

This current state of affairs is problematic for a number of reasons. Shared signing ecologies tend to be extremely heterogeneous with regards to the nativeness of signers interacting within these ecologies (see §3.2.2). It is necessary to first describe native signed language use in order to differentiate and describe the signed language used by the full range of signers (Johnston 2003). However, most signed language researchers are not native signers themselves and many do not participate fully within signing ecologies. Different researchers are likely to have varying levels of signed language competency, and will therefore contribute differently to the interpretation and analysis of signed languages. Analytical contributions from poor signers are unlikely to reflect native use of the language in question.

In addition to the role of native signers in signed language research, the type of analysis undertaken must also be considered. When it comes to identifying and analysing clause-level utterances, there are two important aspects of analysis. Not only is it necessary to understand ‘what does this utterance mean’, it is also necessary to understand ‘how does this meaningful utterance encode meaning linguistically’. While nativeness is prerequisite for understanding the secondary enrichment of the study corpus, it is not necessarily prerequisite for analysing the latter. For the latter, one needs both signed language competency and analytical expertise. In this case it is not enough for one to be a native signer; it is also necessary to be a native signer with analytical expertise.

However, while native signers with analytical expertise are to be preferred in signed language research, it is also important to collaborate with a variety of signers, all of whom can provide analytical perspectives to the data (see Ameka 2006). Analysis is improved by incorporating the eyes and opinions of signers who at least partly reflect the heterogeneity of the ecologies being investigated, and who are able to both understand the data and analyse it. The value of analytical contributions from native signers increases with the inclusion of contributions from non-native signers. The more eyes that subjectively view one's analysis, the better understanding one has of how one's interpretations and analyses align with those of other signers in heterogeneous signing ecologies, and the greater the potential for addressing the issues in signed language research described above.

Auslan is a primary signed language of at least two hundred years depth which has been acquired in several instances by up to five generations of signers as a first and native language. The Auslan Corpus was designed to first establish how native signers use Auslan with each other in naturalistic situations, with the aim of adding non-native deaf and hearing signers at a later date (Johnston & Schembri 2006b). Research on the Auslan Corpus has so far been undertaken with the input of native signers at all stages. For example, native signers have been involved in data collection, IDglossing and translation, and have also been researchers or co-researchers. Four native signers were responsible to varying degrees for almost all of the IDglossing annotations currently available in the corpus.

The annotations for identifying and analysing clause-level utterances investigated in this particular study were initially created and revised by myself, a non-native moderate-to-profoundly deaf signer with ten years signing experience who has studied aspects of the annotation method and analytical framework used with the Auslan Corpus and further developed during this study ('original annotator').

A proportion of these annotations were checked by a hearing non-native signer with ten years signing experience who is a Level 2 Auslan paraprofessional interpreter and who has studied aspects of the annotation method and analytical framework used in this study ('First Checker').

A proportion of these annotations were also revised and checked by a hearing native signer (my thesis supervisor¹⁶) with sixty years signing experience who originally developed the annotation method and analytical framework used with the Auslan Corpus and further developed during this study ('Second Checker').

The study presented in this thesis has therefore received some type of input from at least one native signer at every stage of analysis. It has also received input from two other types of signers. Readers should evaluate the analyses presented here with respect to the signing competency and analytical expertise of these contributors, while also recognising that the bulk of the annotations and analysis were undertaken by a non-native signer who is able to both understand the data and analyse it. The findings resulting from the iterative and

¹⁶ Dissertation advisor; Chair of Advisory Committee.

collaborative method for checking annotations described in this chapter will assist with this evaluation.

5.2.3. Collaborative and iterative method for checking annotations in the study corpus

The secondary enrichment of the study corpus involved the development of a collaborative and iterative method for checking a proportion of the CLU composites that were annotated during the primary enrichment of the study corpus. Both First Checker and Second Checker collaborated with the original annotator during the secondary corpus enrichment.

This method is collaborative because it draws upon the language competency and analytical skills of three different signers who have a background in linguistics. It enlists their subjective agency to agree or disagree with the analysis of specific tokens of CLUs or CLU composites, to possibly resolve some problematic analyses, and to reveal other perspectives on the range of data and analyses that emerged during the primary enrichment of the study corpus.

This method is iterative because several ‘rounds’ of checking were undertaken, and each round resulted in quantifications of disagreement and extensive discussions regarding the annotation method and the developing analytical framework. The quantitative and qualitative ‘products’ of each round then fed into and influenced consequent revisions of the study corpus and further checking of analyses from the study corpus. This method unfolds through n iterations of seven steps (see Figure 5.1). Each iteration involves:

1. **Extracting** tokens of identified CLU composites from each ELAN file in the study corpus;
2. **Organising** this list of tokens into clusters according to their CLU composite type (i.e. Single, Embed, Depend, or DependEmbed) and the subjective certainty with which the unit was identified by the original annotator (i.e. Certain or Uncertain), and then randomising the list of tokens in each cluster;
3. **Checking** (by other annotators) a proportion of the tokens in each randomised cluster. Each token is re-interpreted and re-analysed by other annotators in its context using specified tiers in its ELAN file, and tagged as ‘agree’, ‘disagree’ or ‘unsure’ in that file (often with comments and alternative analyses annotated);
4. **Discussing** (between annotators) the analysis of checked tokens;
5. **Reanalysing** (by original annotator) the checked tokens in each cluster. Each checked token is re-analysed and tagged as ‘revised agreement’, ‘maintained disagreement’, ‘indefinite reanalysis’, or ‘new analysis’;
6. **Incorporating** (by original annotator) suggested changes and alternatives resulting from analysis and discussion of checked tokens into the ‘live’ master copies of the study corpus files, ready for the next revision;

7. **Revising** (by the original annotator) the master copies of the corpus files in consideration of the analyses and discussions resulting from this iteration.

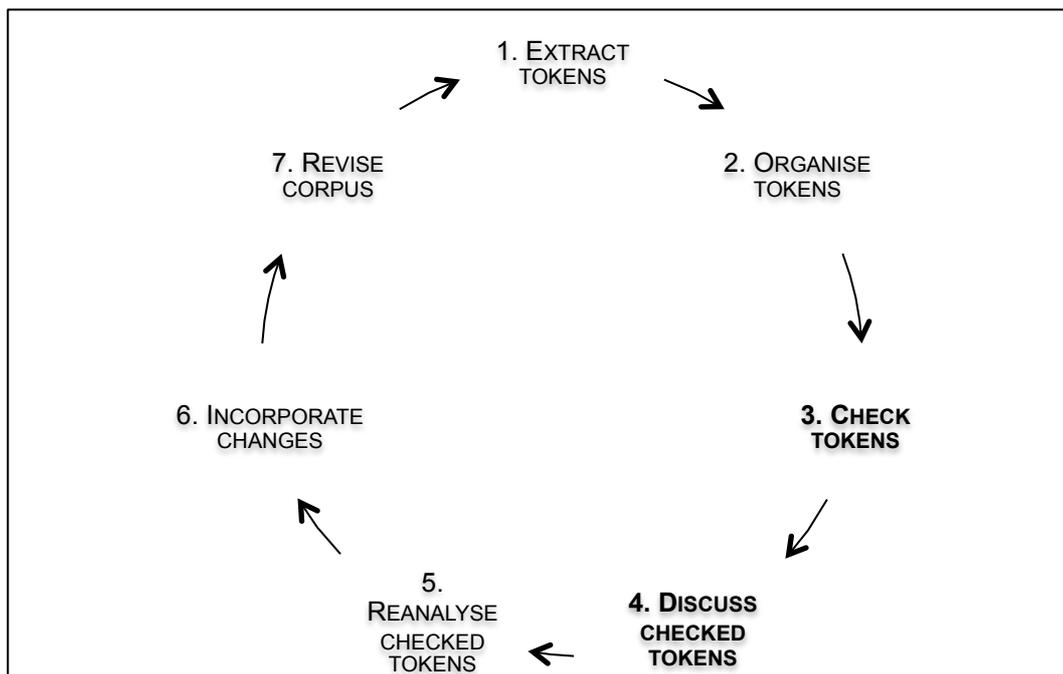


Figure 5.1 The collaborative and iterative method for checking tokens of analysis (bolded steps indicate steps of direct collaboration with the original annotator)

Given that the research questions of this study were explored by identifying and analysing possible clause-like units, and investigating how these units are linked via relations of hypotaxis, two types of tokens of analysis were prioritised during the secondary enrichment of the study corpus: CLUs and CLU composites.

Over one thousand CLUs were identified during the primary enrichment of the study corpus using the enrichment method outlined in Chapter §4 (see §4.4.3 and also §6.3). All of these CLUs were also grouped into CLU composites on the basis of their relationship to surrounding CLUs, i.e. whether they ‘stand alone’ (as a Single CLU composite) or whether they are linked via relations of hypotaxis (e.g. as an Embed or Depend CLU composite; see §4.4.3.4 and also §6.3).

Each annotated CLU composite is therefore one token of a potential clause-level utterance that can be checked by other annotators, a number of which contain more than one CLU. Thus, CLU composites are the tokens of analysis that were checked by two other annotators using the iterative method developed here. If a CLU composite contained more than one CLU, the other annotator checked all of the CLUs in this CLU composite, and the CLU composite as a unified utterance.

This iteration method was first applied after the original annotator had undertaken several revisions of all annotations in all files during the primary enrichment of the study corpus. At the start of each round, all tokens of annotations on the CLU composite, CLU and Comments tiers in the master copy of the study corpus ELAN files were extracted as

tab-delimited text. The text file was then imported into an Excel spreadsheet so that one column was dedicated to each tier.

All tokens of annotations from the CLU composite tier were then organised into clusters according to their type and subjective certainty. Tokens in each cluster were organised using the Sort function in Excel. This organisation of clusters established a framework of clusters in which the identification and analysis of these units could be checked consistently by the other annotators. It was easy to organise tokens of CLU composites according to these parameters because this information was tagged in the annotations of each CLU composite during previous revisions of the study corpus. As there was not enough funds or time to check all tokens, only a proportion of each cluster could be checked. Tokens in each cluster were randomised using the RAND() function in Excel to ensure that any sampling bias would be computer-generated.

Sorting resulted in eight clusters of CLU composite tokens that were moved into separate spreadsheets for easy checking. Six of these clusters were clear categories of tokens identified as Single Certain (e.g. Video PDMA1c2aCLU#32), Single Uncertain (e.g. Video BRCA1c2aCLU#3), Embed Certain (e.g. Video PDHA1c2aCLU#32), Embed Uncertain (e.g. SGMB1c2aCLU#17), Depend Certain (e.g. AKRA1c2aCLU#6), or Depend Uncertain (e.g. AMGA1c2aCLU#53).

However, there were also several tokens that did not fit into any of these clusters. These were CLU composites in which more than one relation of hypotaxis was identified, i.e. CLU composites identified as containing both embedding and dependency, or embedding within embedding. An example of this type of CLU composite can be viewed in Video BRCA1c2aCLU#96. This utterance was translated as *“even if the boy said: “I’m telling the truth!”, the villagers would still doubt him”*. In this token, the utterance was analysed as containing a relation of dependency (annotated as a Depend CLU composite) and a relation of embedding (annotated as an Embed CLU composite). Together they are tagged as one token of a DependEmbed Certain CLU composite.

Another example can be viewed in Video BAOBB1c2aCLU#45. This utterance was translated as: *“well the villagers said, “phooey! we know you’re joking us! phooey!”*”. In this token, the utterance was analysed as containing two relations of embedding (annotated as Embed CLU composites). Together they are tagged as one token of an EmbedEmbed Certain CLU composite.

As there were so few tokens of CLU composites with more than one relation of hypotaxis, and even fewer tokens of these CLU composites with the same combination and arrangement, these CLU composites were organised into two clusters of DependEmbed Certain and DependEmbed Uncertain CLU composites. Most of the tokens in these two clusters of complex CLU composites were eventually checked by First Checker and/or Second Checker at some point during the secondary corpus enrichment.

To check CLU composites, a single spreadsheet containing the randomised lists of CLU composite tokens was sent to the other annotator, along with copies of the study corpus

files to be checked. Assisted by the Auslan Corpus Annotation Guidelines (Johnston 2013a), the other annotator systematically worked through each list and recorded each token as 'agree', 'disagree', or 'unsure' after consulting the relevant ELAN file. Explanatory comments or alternative analyses were often recorded using dedicated tiers in the ELAN files. To analyse checked CLU composites, the original annotator viewed each checked token in the relevant ELAN file and recorded additional comments in the ELAN files and spreadsheet. At the end of checking each cluster, the collaborating annotators discussed their observations of specific examples and general tendencies.

At the end of each round, the original annotator then manually incorporated the tags created by the checker into the relevant master copy file, along with relevant comments. The study corpus files were then revised by the original annotator, in consideration of the disagreements quantified during checking, and in light of the discussions resulting from checking. In this way, subsequent revisions of the master copies of the study corpus files were undertaken with direct access to the disagreements and comments from the other annotators.

Three rounds of this method were achieved during the secondary corpus enrichment. First Checker completed two rounds on annotations dating from March 2012 (Round 1) and March 2013 (Round 2). Prior to Round 1, First Checker received further training in annotating files from the Auslan Corpus using a 2011 version of the Auslan Corpus Annotation Guidelines (Johnston 2011), and identifying CLUs and CLU composites using the analytical framework developed during this study (see §4.4.3). First Checker practiced annotating and checking CLUs and CLU composites using an ELAN file of an unrelated personal narrative from the Auslan Corpus.

During Round 1 and Round 2, First Checker checked randomised samples of eight clusters of CLU composites from two versions of the annotated study corpus approximately twelve months apart. About twenty hours of the funded quota (120 hours) were used for training First Checker (i.e. learning the Auslan Corpus Annotation Guidelines and practice annotation and checking activities), while seventy hours were used for Round 1 and thirty hours were used for Round 2. Round 2 required less time and proceeded more quickly than Round 1. This suggests that given enough iterations of this method, one's analyses may increase in stability and analytical confidence as consequent iterations result in fewer changes.

During Round 3, Second Checker checked one complete file from the study corpus (AMMA1c2a.eaf) and a list of ninety-five tokens of CLU composites with problematic post-Round 2 analyses dating from April 2013. The AMMA1c2a.eaf file used in Round 3 was selected for checking because this signer is perceived as a fairly typical native Auslan signer, and because this file contains almost all types of CLU composites and several types of problematic analyses. It had received multiple revisions by the original annotator, and a number of tokens were checked by First Checker during Round 1 and Round 2. The list of tokens of CLU composites used in Round 3 were all identified as highly problematic by both the original annotator and First Checker during Round 1 and 2.

5.2.4. The iterative method and design research

The collaborative and iterative method developed during this study is similar to the iterative design process used in design research, e.g. the frameworks of Design Research (e.g. E. Zimmerman 2003) or Research through Design (e.g. J. Zimmerman, Stolterman & Forlizzi 2010).

The iterative design process has been described as a “cyclic process of prototyping, testing, analysing and refining a work in progress” (E. Zimmerman 2003: 176). This process encourages designers to continuously interact with the ‘work in progress’ (e.g. a gaming system, a product, or in this case, an analytical framework), working out what works and what does not. This experience both informs and guides the development of the work over successive iterations. Work resulting from the iterative process is arguably more robust, and makes better use of development resources, than work resulting from a non-iterative process that leaps straight from planned gestation to realisation.

Crucially, the iterative design process very often reveals questions that may not otherwise have been considered, thereby generating knowledge as the designer engages with the questions that emerge—although this knowledge “can be implicit; residing almost entirely within the resulting artefact” (J. Zimmerman et al. 2010: 310).

These aspects of the iterative process as used in design research bear strong parallels to the development and enrichment of language corpora, including the exploration of analyses that range from straightforward to problematic. It certainly reflects how the checking of annotations in the study corpus unfolded here. The iterative and collaborative method developed in this study essentially provides a means for filtering out—or at least spelling out—personal bias and problematic subjectivity.

In this respect, corpus enrichment is a type of design research that is fundamentally an inquiry process that can be used to approach “messy situations with unclear or even conflicting agendas; situations that are not well suited to other methods of inquiry” (J. Zimmerman et al. 2010: 310; see also §4.2). The use of the iterative process as a research method is becoming increasingly formalised in emerging fields such as Human Computer Interaction (J. Zimmerman et al. 2010).

5.3. Findings

5.3.1. Round 1

Round 1 was undertaken on study corpus files dating from March 2012, from which a total of 904 tokens of CLU composites were extracted. Figure 5.2 below displays the percentage proportion of CLU composites extracted for Round 1. The total CLU composites in each cluster varied, but Single CLU composites were overwhelmingly the largest type of CLU composite identified in the March 2012 files of the study corpus. Total tokens of CLU composites decrease in the following order: Single, Embed, Depend, DependEmbed.

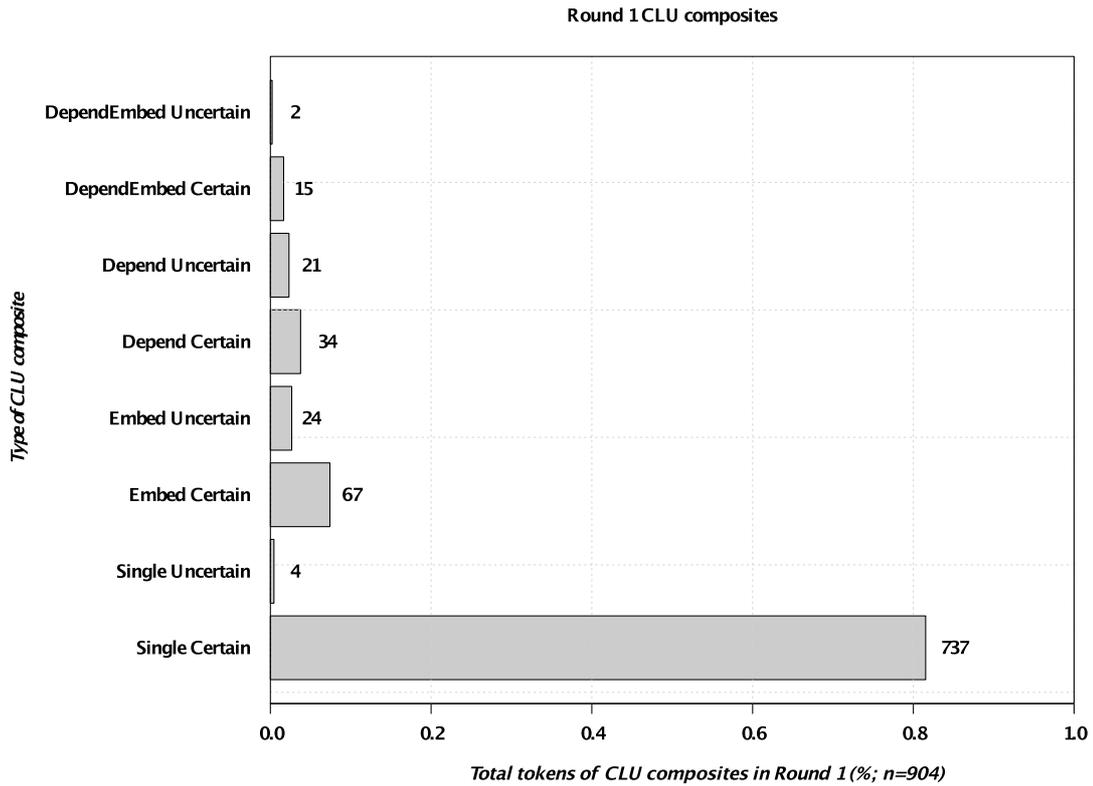


Figure 5.2 Total CLU composites in Round 1

First Checker aimed to check between 10–20% of these total CLU composites, starting with the largest cluster of Single Certain CLU composites ($n=737$) and working through to the smallest and comparably more problematic cluster of DependEmbed Uncertain CLU composites ($n=2$). The minimum target was to check 10% of each individual cluster. By the end of Round 1, approximately 12% of Single Certain CLU composites had been checked, and between 20% and 100% of the remaining clusters had been checked. A total of 146 tokens were checked in Round 1. Figure 5.3 below displays the percentage proportion of CLU composites in each cluster that were checked during Round 1.

Each cluster of checked CLU composites was analysed and discussed one by one. Discussions centred on aspects of problematic analyses detailed in Section §5.2.1 above, as well as other aspects of the data and analyses that First Checker questioned as he developed his own approach to re-interpreting and re-analysing these CLU composites.

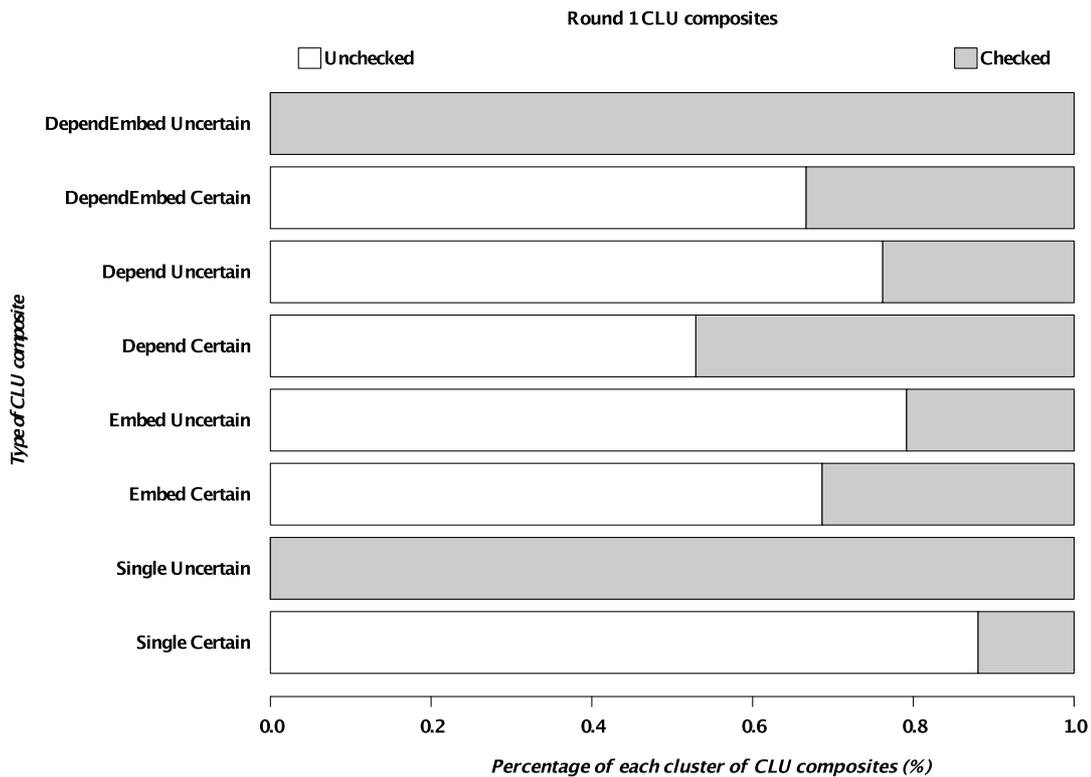


Figure 5.3 Percentage proportion of unchecked and checked CLU composites in each cluster during Round 1

Checked CLU composites were analysed to ascertain the rate of disagreement r for each cluster checked during Round 1. Table 5.1 below displays the raw totals of agreement and disagreement, and shows that First Checker agreed with approximately 75% and disagreed with approximately 25% of the 146 tokens checked in Round 1. The lowest rate of disagreement was 19.32% for the largest cluster of Single Certain CLU composites, for which 12% of tokens were checked ($n=88$). The highest rate of disagreement was 50% for the smallest cluster of DependEmbed Uncertain CLU composites, for which all tokens were checked ($n=2$).

Approximately 50% of the disagreements in Round 1 resulted from the identification of CLU composites, i.e. the delineation of the chunk of signing within the retelling. The other 50% resulted from the analysis of CLU composites, i.e. the analysis of core elements within an identified CLU composite.

Table 5.1 Total agreement and disagreement in Round 1 ($n=146$); r =rate of disagreement (%)

Type	Agree	Disagree	r
Single Certain	71	17	19.32
Single Uncertain	4	0	0.00

Embed Certain	13	8	38.10
Embed Uncertain	4	1	20.00
Depend Certain	12	4	25.00
Depend Uncertain	4	1	20.00
DependEmbed Certain	3	2	40.00
DependEmbed Uncertain	1	1	50.00
<i>Total</i>	<i>112</i>	<i>34</i>	<i>23.29</i>

Given that these checked clusters differ significantly in size (compare Figure 5.2 and Figure 5.3), it was necessary to explore the rates of disagreement with respect to sample size. This was done by calculating the standard deviation of the rates of disagreement for each cluster, i.e. the likelihood that the rates of disagreement for each cluster are representative of each cluster given their sample size.

Figure 5.4 below shows the percentage proportion of initial agreement and initial disagreement for each cluster of checked CLU composites in Round 1. Each cluster is overlaid with error bars that are based on standard deviations of the rates of disagreement for each cluster. The error bars indicate the margins of error for 95% confidence interval for each cluster, and should be interpreted in relation to the sample size of each checked cluster.

For example, the sample size of the cluster of Single Certain CLU composites is significantly greater than the other clusters, and has a comparatively much smaller margin of error (in the rate of disagreement) than the cluster of DependEmbed Uncertain CLU composites. This suggests three things. Firstly, the likelihood of identifying a representative range of analyses in the large cluster of Single Certain CLU composites through random checking is higher than for the smaller clusters that have larger margins of error.

Secondly, the likelihood that this rate of disagreement is representative for the total observations of Single Certain CLU composites extracted for Round 1 is higher than for the smaller clusters. Thirdly, the margins of error for each checked cluster in Round 1 suggest that the likelihood of identifying a representative range of analyses in the smaller clusters increases the more analyses that are checked in these clusters, therefore as many analyses as possible should be checked in these smaller clusters in future iterations.

The clusters with the smallest margins of error are Single Certain ($r=19.32\%$), Embed Certain ($r=42.86\%$) and Depend Certain ($r=25\%$). Thus, there is a greater likelihood that: (i) the random checked tokens are representative of all observed tokens in each of these clusters, (ii) the rates of disagreements are representative for each for the total observations of each cluster extracted for Round 1, and (iii) comparably less tokens of these clusters can be checked in future iterations (so that more tokens of the other clusters

can be checked instead). We decided upon a critical threshold of 15% rate of disagreement, above which indicated fertile ground for further exploration. Given the rates of disagreement for Round 1, it was clear that the tokens in these clusters needed to be analysed further to find out why these rates of disagreement are so high.

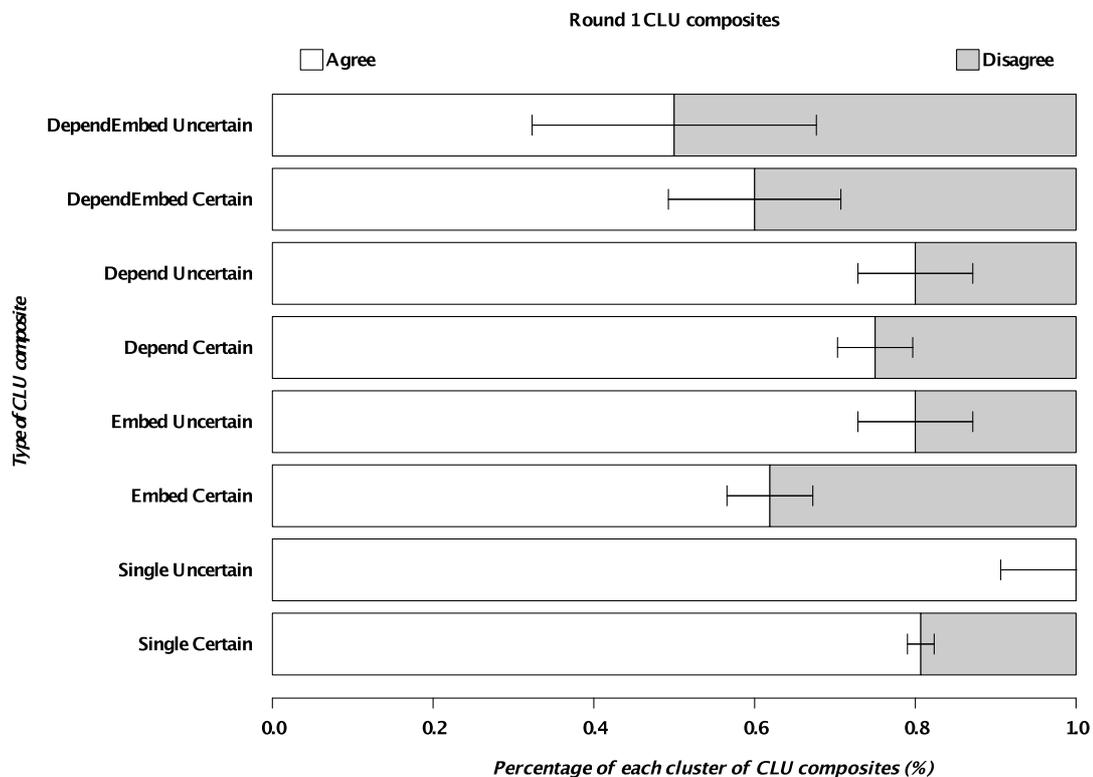


Figure 5.4 Percentage proportion of agreement and disagreement in each cluster of checked CLU composites during Round 1 (error bars are based on the standard deviations of the rates of disagreement and indicate the margins of error for 95% confidence interval)

The first iteration of this developing method, Round 1, took approximately nine months to complete. By November 2012, First Checker had spent seventy hours checking approximately 16% ($n=146$) of the total CLU composites extracted from the March 2012 study corpus files. This met the original aim of 10–20% of the total. On average, each token took approximately half an hour for First Checker to view, re-interpret, re-analyse, tag agreement or disagreement, annotate suggested re-analyses if necessary, and record observations or questions.

Following the checking stages of Round 1, all checked tokens were revised and re-analysed by the original annotator. All checked tokens were tagged as ‘revised agreement’, ‘maintained disagreement’, or ‘indefinite reanalysis’. Three types of re-analysis were coded as ‘revised agreement’: (1) First Checker agreed with analysis and this agreement was maintained during revision; (2) First Checker disagreed with analysis and suggested an alternative analysis which was then accepted by the original annotator

during revision; or (3) First Checker and original annotator negotiated a different analysis during discussion.

'Maintained disagreement' was coded if First Checker disagreed with the analysis and suggested an alternative, but which was later rejected by the original annotator (probably in favour of the original analysis). 'Indefinite reanalysis' was coded if First Checker either agreed or disagreed with the analysis, and suggested an alternative, which was later accepted in addition to the original analysis because it was not appropriate to preference one analysis over the other at that stage of the investigation.

In other words, the coded observations of 'revised agreement' represent the checked analyses that First Checker agreed with initially, as well those that received greater attention because First Checker suggested an alternative that was later accepted by the original annotator. The coded observations of 'maintained disagreement' represent the checked analyses that First Checker disagreed with initially and suggested an alternative, but where the alternative was rejected and the disagreement was maintained.

The coded observations of 'indefinite reanalysis' represent the checked analyses that First Checker either agreed or disagreed with initially, but also suggested an alternative analysis, which was then accepted in addition to the original analysis (meaning that the checked token now has at least two possible analyses). This additional coding enabled changes resulting from collaboration during Round 1 and subsequent revision of all checked tokens to be quantified.

The rates of disagreement changed as a result of the previous steps of Round 1 of the iterative method. Figure 4.5 below shows that after the final reanalysis and revision of all checked analyses from Round 1 (a revision undertaken with the benefit of First Checker's suggested alternatives and our extensive discussions), we continued to agree with approximately 73% of the checked CLU composites ($n=107$), and to disagree with approximately 3% of the checked CLU composites ($n=3$). Intriguingly, approximately 25% of the checked CLU composites resulted in indefinite reanalyses where it was not considered appropriate to preference one analysis over another at this stage of the investigation.

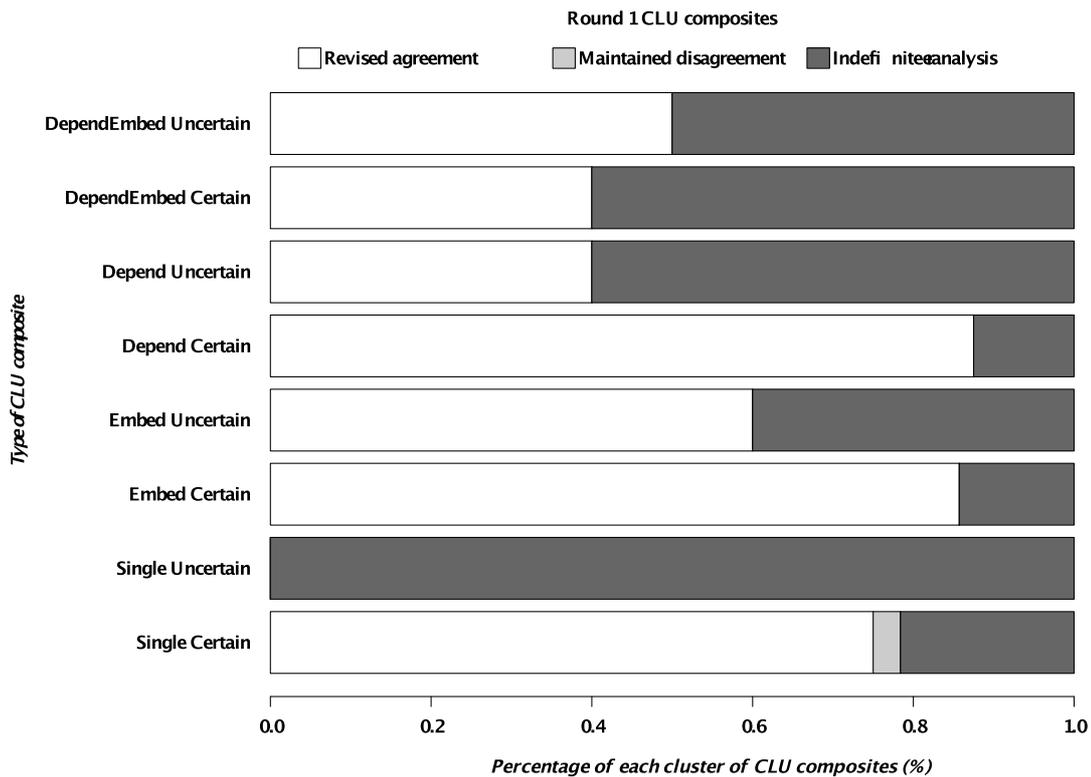


Figure 5.5 Percentage proportion of revised agreement, maintained disagreement and indefinite reanalysis of checked CLU composites in each cluster during Round 1 ($n=146$)

The re-analysis of checked CLU composites as indefinite could be due to two reasons. Firstly, the overall stage of corpus analysis and exploration may have meant that we were not yet familiar enough with the composition, or the pattern, evidenced by a particular token in order to be able to confidently preference one analysis over another. It was possible that these indefinite analyses may be resolved with deeper analysis and annotation of other aspects of CLU composites such as macro-role and semantic role (see §4.4.3.3). Secondly, re-analysis of checked CLU composites as indefinite could indicate reluctance on my part to completely relinquish my original analysis in favour of a new one offered by First Checker.

After the CLU composites in Round 1 were checked, discussed, re-analysed and revised, all accepted changes and alternatives were manually incorporated into the master study corpus files, thereby updating these files with the supposed improvements resulting from Round 1. Firstly, each checked CLU composite was identified in the master files, and annotated with a tag on the Comment-GH tier to the effect that First Checker had initially agreed or disagreed with the CLU composite analysis in Round 1. Secondly, each checked CLU composite was annotated with a summary of particular issues that were discussed during Round 1.

This was done so that the Round 1 work of First Checker would be recorded in the master copy of the corpus files and would persist through future iterations of checking and

revision (note that commenting is vital for reminding annotators of previous analyses they may have annotated, then changed, then re-annotated again). This also meant that the Round 1 checked CLU composites could still be traced even if the CLU numbers changed during subsequent revisions of the master copy (which happens during each revision of files when the annotations on the CLU tier are updated and relabelled).

While First Checker had been checking tokens during Round 1, the original annotator continued to concurrently revise the master copy of the study corpus files throughout 2012. In October 2012, the ELAN template for the Auslan Corpus was adapted to investigate how relations of hypotaxis between CLUs are primarily expressed (see §4.4.3.4). Two new tiers (`OvertEmbeddedType` and `OvertDependencyType`) were annotated in the master copy of the study corpus files.

In this way, by the end of December 2012, the master copy of the study corpus files contained: (i) all revisions throughout 2012, including new annotations on new tiers, (ii) the codes from the initial checking stage of Round 1, and (iii) all the re-analyses resulting from the checking and reanalysis stages of Round 1.

5.3.2. Round 2

Round 2 was undertaken on study corpus files dating from December 2012, from which a total of 1,042 tokens of CLU composites were extracted. Figure 5.6 below displays the percentage proportion of CLU composites extracted for Round 2. As with the Round 1 clusters, the total CLU composites in each cluster varied, but it is clear that Single CLU composites were again overwhelmingly the largest type of CLU composite identified in the December 2012 files of the study corpus. Total tokens of CLU composites decrease in the following order: Single, Embed, Depend, DependEmbed.

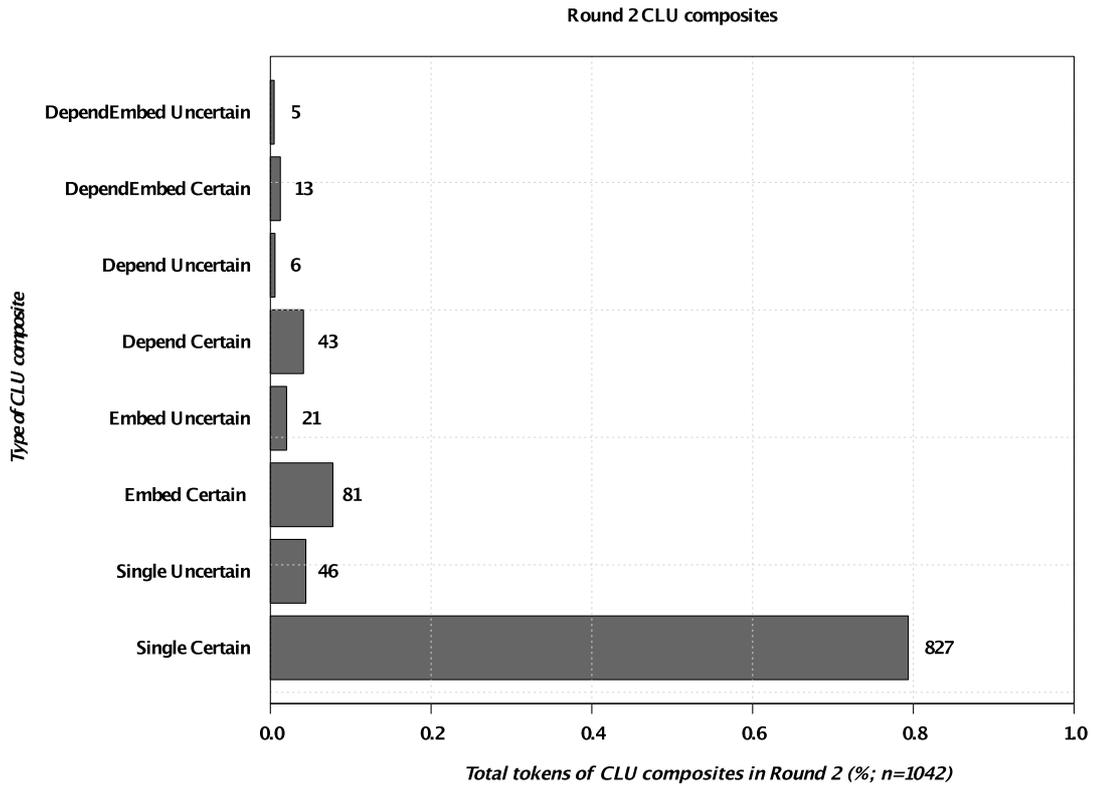


Figure 5.6 Total CLU composites in Round 2

Figure 5.7 below compares the percentage proportion of each cluster of CLU composites extracted for Round 1 ($n=904$) and Round 2 ($n=1,042$). Notably, the checking, re-analysis and revisions undertaken during the ten months between March 2012 and December 2012 lead to a 15.3% increase in the total CLU composites annotated in the master copy of the study corpus files. Figure 5.7 shows that the proportion of Single Certain CLU composites in Round 2 was less than in Round 1, while the number of Single Uncertain, Embed Certain and Depend Certain CLU composites was greater in Round 2 than in Round 1. This partly indicates the effect that the changes instigated through the Round 1 checking and concurrent revisions throughout 2012 had on the overall distribution of CLU composites in the study corpus.

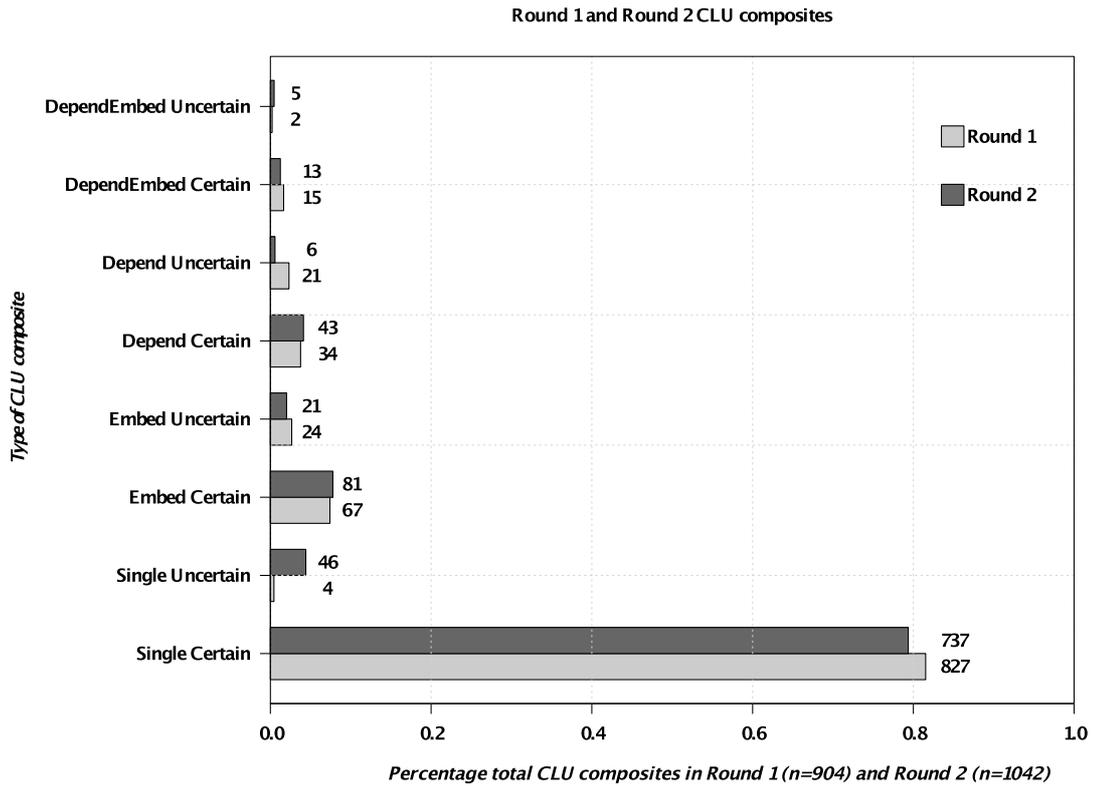


Figure 5.7 Percentage proportion of total CLU composites in Round 1 ($n=904$) and Round 2 ($n=1,042$)

In order to facilitate comparison of the rates of disagreement from Round 1 and Round 2, First Checker aimed to check a similar proportion of each cluster in Round 2 as was checked in Round 1. For example, if First Checker checked 12% of the Single Certain CLU composites during Round 1 ($n=89$), he aimed to check 12% of the Single Certain CLU composites during Round 2 ($n=100$). Table 5.2 below displays the checking goals for each cluster during Round 2, which are based on the percentage proportion of annotations checked in each cluster during Round 1.

Table 5.2 Checking goals for Round 2 (n) based on percentage tokens checked in Round 1

CLU composite	Round 1 checked (%)	Round 2 total (n)	Round 2 goals (n)
Single Certain	12.06	827	100
Single Uncertain	100.00	46	46
Embed Certain	31.34	81	25
Embed Uncertain	20.83	21	4
Depend Certain	45.71	43	20
Depend Uncertain	23.81	6	1
DependEmbed Certain	33.33	13	4

DependEmbed Uncertain	100.00	5	5
Column totals	16.24	1,042	206

During Round 2, First Checker followed the method outlined for Round 1 and also checked the new annotations on the new OvertEmbeddedType and OvertDependencyType tiers. A total of 127 tokens were checked in Round 2, which is a 13% decrease from the total tokens checked in Round 1. Only 3.6% of Single Certain CLU composites were checked by the end of Round 2. Obviously this was far short of the goal of checking 12% of the Certain Single CLU composites in Round 2 (see Table 5.2).

However, recall that the cluster of Certain Single CLU composites were checked heavily during Round 1, and the rates of disagreement for Certain Single CLU composites were lower than any other cluster in Round 1 ($r=19.32$). For these reasons it was preferable during Round 2 to prioritise checking more of the smaller clusters in order to ascertain a representative range of analyses for these clusters. Between 19% and 100% of the remaining clusters were checked by the end of Round 2. Figure 5.8 below displays the percentage proportion of CLU composites in each cluster that were checked during Round 2.

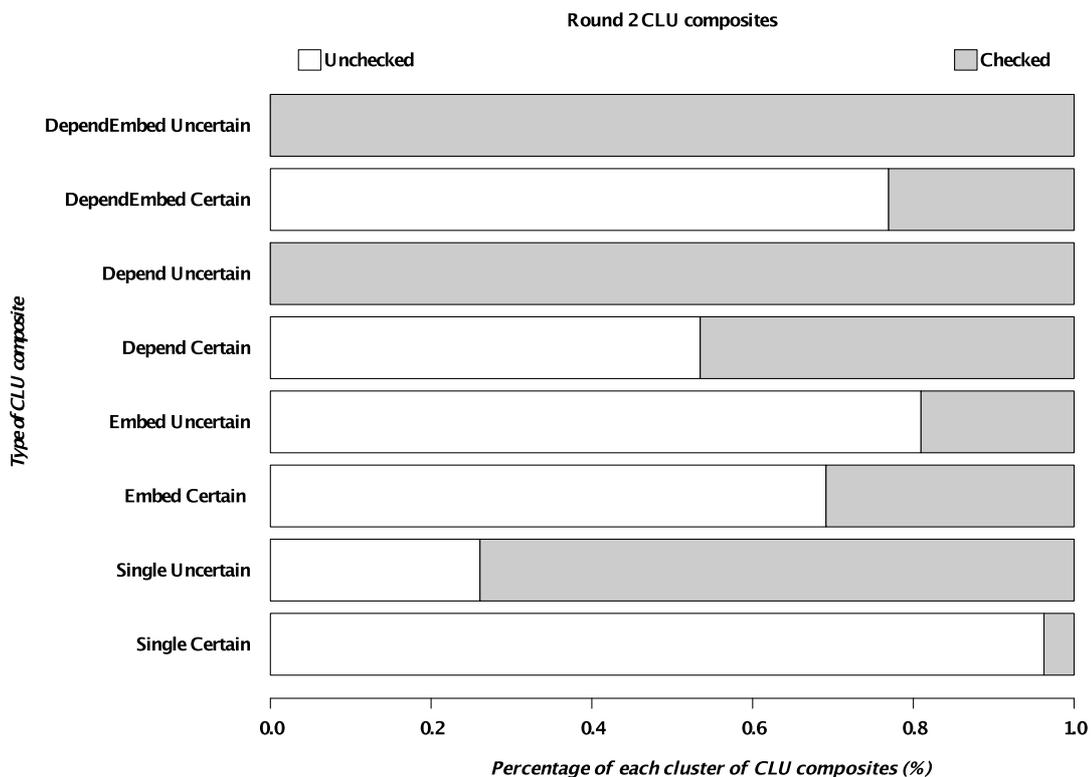


Figure 5.8 Percentage proportion of unchecked and checked CLU composites in each cluster during Round 2 ($n=127$)

Checked CLU composites were analysed to ascertain r rates of disagreement for each cluster checked during Round 2. Table 5.3 below displays the raw totals of agreement and disagreement, and shows that First Checker agreed with approximately 75% and disagreed with approximately 25% of the 127 tokens checked in Round 2. This is strikingly similar to the proportion of agreement and disagreement for the CLU composite analyses checked during Round 1 (see §5.3.1). It seemed that despite the re-analysis and revision of the study corpus retellings following Round 1, the approximate proportion of initial agreement and disagreement remained unchanged.

However, there are cluster-specific differences in disagreement between Round 1 and Round 2. In Round 2, the lowest rate of disagreement was 0% for the smallest cluster of DependEmbed Uncertain CLU composites, for which 80.0% tokens were checked ($n=5$), whereas the lowest rate of disagreement for Round 1 was the Single Certain CLU composites. In Round 2, the highest rate of disagreement was 66.67% for the third smallest cluster of DependEmbed Certain CLU composites, for which 30.77% of tokens were checked ($n=2$), whereas the highest rate of disagreement for Round 1 was the DependEmbed Uncertain CLU composites.

Approximately 90% of the disagreements in Round 2 resulted from the identification of CLU composites, i.e. the delineation of the chunk of signing within the retelling. This increase from Round 1 was largely due to the jump in Single Uncertain CLU composites. The remaining 10% resulted from the analysis of CLU composites, i.e. the analysis of elements within an identified CLU composite.

Table 5.3 Total agreement and disagreement in Round 2 ($n=127$); r =rate of disagreement (%)

<i>CLU composite</i>	<i>Agree</i>	<i>Disagree</i>	<i>Total</i>	<i>r</i>
Single Certain	26	4	30	13.33
Single Uncertain	18	16	34	47.06
Embed Certain	21	4	25	16.00
Embed Uncertain	2	2	4	50.00
Depend Certain	17	3	20	15.00
Depend Uncertain	4	2	6	33.33
DependEmbed Certain	1	2	3	66.67
DependEmbed Uncertain	5	0	5	0.00
<i>Total</i>	<i>94</i>	<i>33</i>	<i>127</i>	<i>24.66</i>

As in Round 1, the size of the Single Certain cluster in Round 2 was significantly greater than the other clusters, and had the smallest margin of error (compare Figure 5.4 and Figure 5.9). It was a good decision to prioritise checking the smaller, less representative

clusters, even though the Single Certain cluster contained the most tokens. This is an example of the iterative design process both informing and guiding the revision and exploration of the study corpus through successive iterations.

The clusters with the smallest margins of error in Round 2 are similar to those in Round 1. The smallest margin of error is for Single Certain CLU composites ($r=13.33$), which is lower than for Round 1 ($r=19.32$). The next smallest is for DependEmbed Uncertain CLU composites ($r=0.00$), which is lower from Round 1 ($r=50.00$). The third smallest is for Depend Certain CLU composites ($r=15.00$), which is also lower than for Round 1 ($r=25.00$). The rates of disagreement for the checked clusters with the three smallest margins of error in Round 2 are all lower than for Round 1, suggesting the overall rate of disagreement for these clusters decreased between Round 1 and Round 2.

However, the Single Uncertain, Embed Uncertain, Depend Uncertain and DependEmbed Uncertain clusters in all have comparably larger margins of error, and all have greater r than Round 1. This suggests there is less likelihood that the random checked tokens in each cluster are representative of all observed tokens in each cluster, and that there is less likelihood that the rates of disagreements are representative for each cluster. Considering the uncertain delineation of these utterances in the first instance, the higher rates of disagreement for these clusters are unsurprising.

Regardless, given that we decided that a reasonable rate of disagreement is between 10–15% for each cluster, it was clear that the tokens in these clusters needed to be analysed to find out why these rates of disagreement are so high. The differences between Round 1 and Round 2 in the rates of disagreement in all clusters (when the size effects are considered) provides some indication of the effect of the Round 1 collaboration on Round 2.

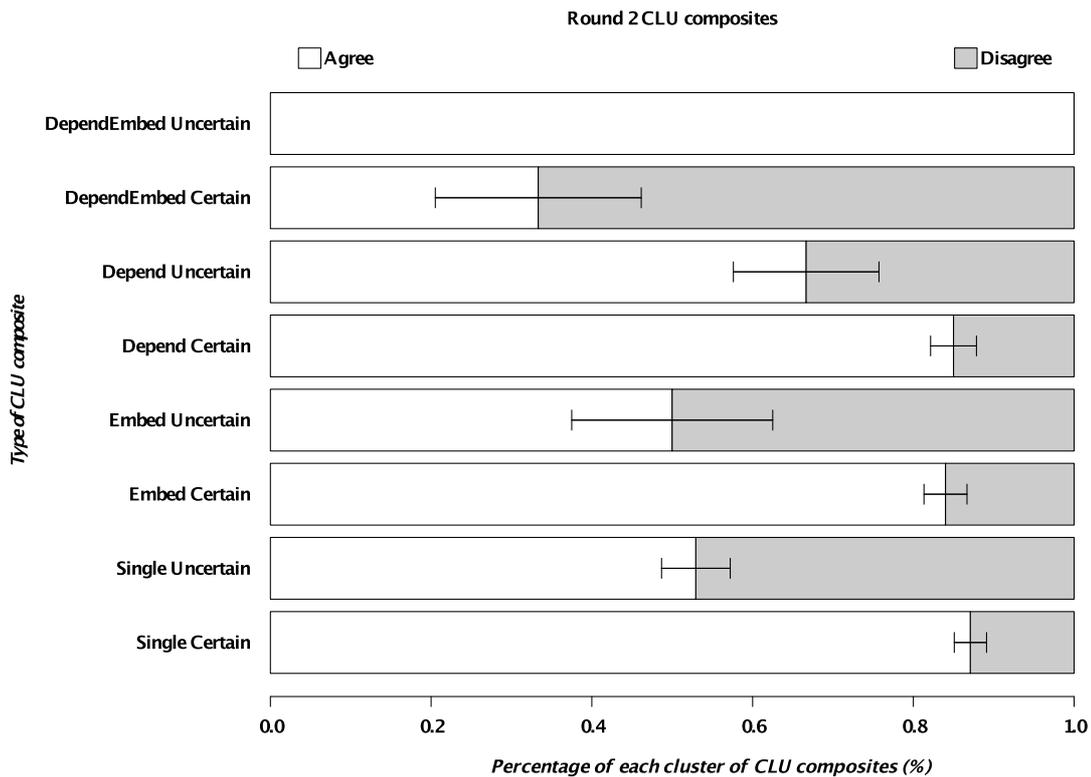


Figure 5.9 Percentage proportion of agreement and disagreement in each cluster of checked CLU composites during Round 2 (error bars are based on standard deviations of rates of disagreement and indicate the margins of error for 95% confidence interval)

The second iteration of this developing method, Round 2, took approximately three months to complete. By February 2013, First Checker had spent thirty hours checking approximately 12% ($n=127$) of the total CLU composites extracted from the December 2012 study corpus files. This fell within the original aim of checking 10–20% of the total, but was still much less than the goal of 19% established on the basis of the proportion of tokens in each cluster checked in Round 1 (see Table 5.2; note that the Round 2 goal is higher than the 16% checked during Round 1 because the Round 2 sample size was larger).

On average, each token in Round 2 took approximately fifteen minutes for First Checker to view, re-interpret, re-analyse, tag agreement or disagreement, annotate suggested re-analyses if necessary, and record observations or questions. In other words, roughly half the time it took in Round 1. Furthermore, 25% ($n=32$) of the tokens checked in Round 2 were previously checked in Round 1. Successive iterations improve speed of checking as well as informing and guiding the method and analysis.

Following the checking and discussion steps of Round 2, all checked tokens in each cluster were re-analysed by the original annotator using the method described in Section §5.2.3 above. It was necessary to create an additional tag ‘new analysis’ in order quantify where the revision resulted in a completely new analysis of the chunk of signing due to: (a) re-

evaluation of annotations in the study corpus during Round 2, and/or (b) re-interpretations, re-analyses and discussions with my supervisor during the early months of 2013 (see §5.3.3). Thus, the coded observations of 'new analysis' represent the checked analyses that were re-analysed in a new way that may or may not have been influenced by the two iterations of checking annotations and concurrent discussions with my supervisor.

As in Round 1, the rates of revised disagreement for Round 2 changed as a result of the earlier steps of the iterative method in Round 1 and Round 2. Figure 5.10 below shows that after the final reanalysis and revision of all checked analyses from Round 2 (a revision undertaken with the benefit of First Checker's suggested alternatives and our extensive discussions from Round 2), we continued to agree with approximately 61% of the checked CLU composites ($n=77$). This is strange because revised agreement was expected to increase between Round 1 and Round 2, but instead it decreased. However, First Checker continued to disagree with approximately 2% of the checked CLU composites ($n=2$), which is similar to the rate of maintained disagreement in Round 1. This suggests that despite the decrease in revised agreement, there was no corresponding increase in the rate of revised disagreement.

This is partly because approximately 16% of the checked and reanalysed CLU composites resulted in indefinite reanalyses where it was not considered appropriate to preference one analysis over another at this stage of the investigation ($n=21$). This is less than the proportion of indefinite reanalyses from Round 1 (25%). As in Round 1, these indefinite reanalyses may be due to the stage of analysis in this investigation, but there were still less of them than in Round 1. This is possibly because the Argument tiers were rigorously revised during 2012 with respect to their tentative macro-role and semantic role, a stage of analysis that was not present in the tokens extracted for Round 1. This might explain the decrease in the proportion of checked CLU composites that resulted in indefinite reanalyses in Round 2. Alternatively, the indefinite reanalyses could be due to persistent reluctance on my part to completely relinquish my original analysis in favour of a new one offered by First Checker.

It is also partly because approximately 21% checked and reanalysed CLU composites resulted in completely new analyses ($n=27$). Between First Checker's completion of Round 2 and the original annotator's revision of these checked tokens, there were shifts in the way the original annotator analysed CLU composites. These shifts further demonstrate the exploratory nature of identifying and analysing potential clause-level constructions in the study corpus retellings (see §5.2.1).

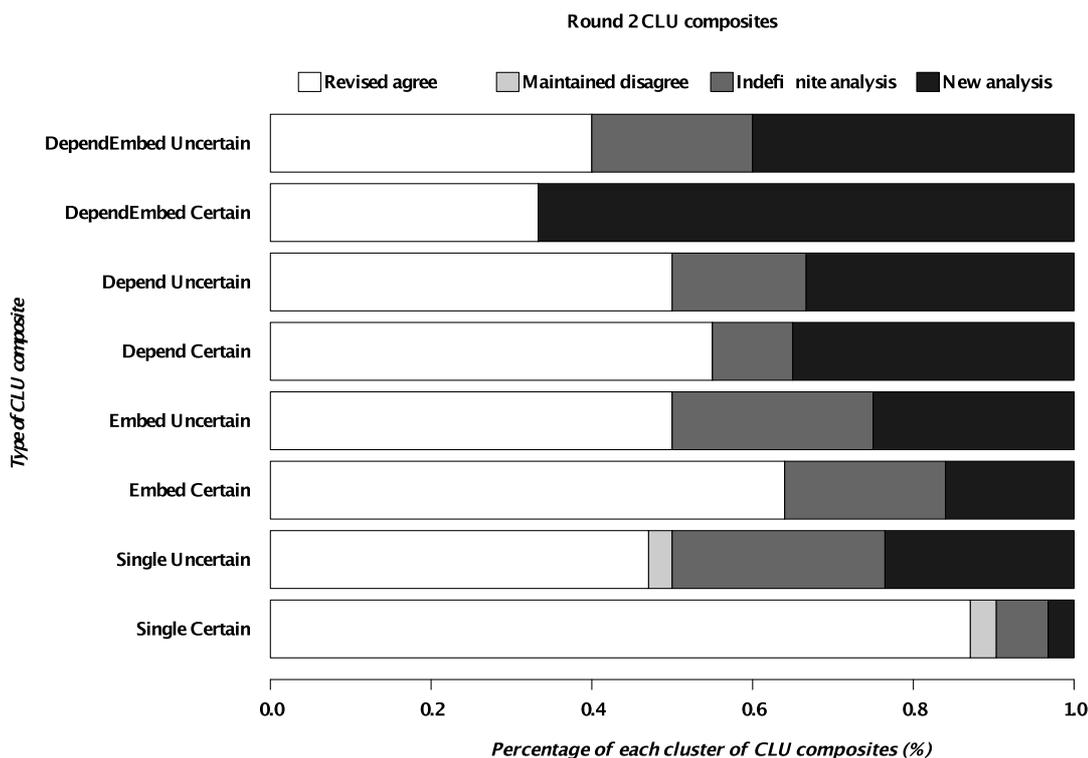


Figure 5.10 Percentage proportion of revised agreement, maintained disagreement, indefinite reanalysis and new analysis of checked CLU composites in each cluster during Round 2 ($n=127$)

After the CLU composites in Round 2 were checked, discussed, re-analysed and revised, all accepted changes and alternatives were manually incorporated into the master study corpus files, thereby updating these files with the supposed improvements resulting from Round 2. In this way, by the end of February 2013, the master copies of the study corpus files contained: (i) all revisions throughout 2012, including new annotations on new tiers, (ii) the codes from the initial checking stage of Round 1 and Round 2, and (iii) all the re-analyses resulting from the checking and reanalysis stages of the Round 1 and Round 2. By the end of April 2013, the annotations in the study corpus files were also more internally consistent than the earlier iterations—a direct result of the collaborative and iterative process described here.

5.3.3. Round 3

In order to ascertain the rate of disagreement within one complete retelling (rather than across a sample of randomised tokens), a third round of checking was conducted with Second Checker. This iteration involved checking one single ELAN annotation file in the study corpus (AMMA1c2a.eaf) and a list of CLU composites that the original annotator considered to contain problematic analyses. Second Checker checked the delineation and analysis of the CLU composites in these two data sets. Checking of the AMMA1c2a file

was done during a face-to-face meeting with the original annotator. Disagreements were tagged on the Comments tier and later recorded in the spreadsheet.

The aims of Round 3 were to ascertain a rate of disagreement between Second Checker and the original annotator, and to possibly resolve some of the more problematic analyses that persisted through the multiple revisions of the study corpus and the Round 1 and Round 2 iterations.

Figure 5.11 below displays the percentage proportion of CLU composites in the AMMA1c2a file ($n=48$) and the list of CLU composites with problematic analyses ($n=96$). As with the Round 1 and Round 2 clusters, the total types of CLU composites in these data sets varied, but Single Certain CLU composites were again the largest type of CLU composite identified both the AMMA1c2a file and the list of CLU composites with problematic analyses. There were no observations of Embed Uncertain or DependEmbed Uncertain CLU composites in the AMMA1c2a file. There were two observations of Single CLU composites with Indeterminate analysis in the AMMA1c2a file, but none in the list of CLU composites with problematic analyses. Total tokens of CLU composites again decrease in the following order: Single, Embed, Depend, DependEmbed.

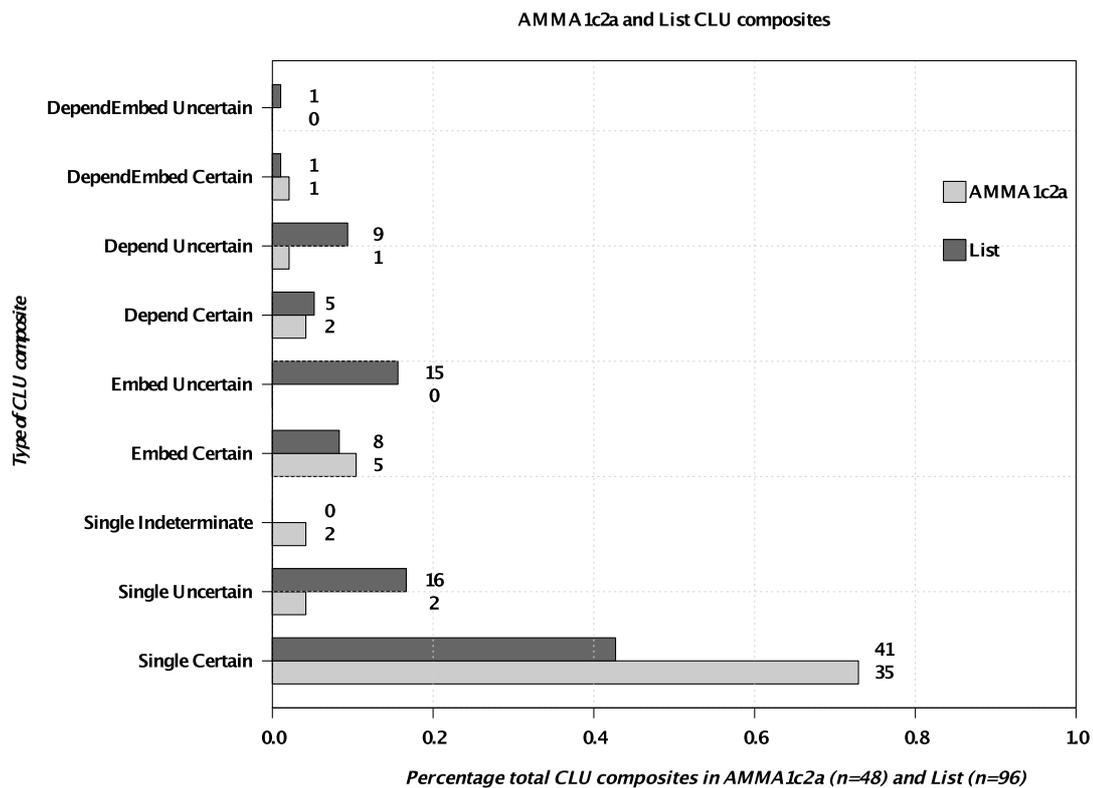


Figure 5.11 Percentage proportion of total CLU composites in the AMMA1c2a file ($n=48$) and the list of problematic analyses ($n=96$) in Round 3

Figure 5.12 below compares the percentage proportion of each cluster of CLU composites extracted for Round 1 ($n=905$), Round 2 ($n=1,042$), the AMMA1c2a file ($n=48$) and the list of CLU composites with highly problematic analyses ($n=96$). Figure 5.12 shows that the

proportion of Single Certain CLU composites in the AMMA1c2a file and the list of tokens with problematic analyses are less than Round 1 and Round 2. The AMMA1c2a file also contains two Single CLU composites tagged as Indeterminate, a distinction that was not made for categorising clusters in Round 1 and Round 2, e.g. all CLU composites with certain delineation and Indeterminate core element analysis were grouped as Certain.

The list of tokens with problematic analyses contains more Single Uncertain, Embed Uncertain, Depend Certain and Depend Uncertain CLU composites than in Round 1, Round 2 or the AMMA1c2a file, suggesting that the original annotator felt there was a higher representation of tokens with problematic analyses in these clusters than in the Single Certain or Embed Certain CLU composites.

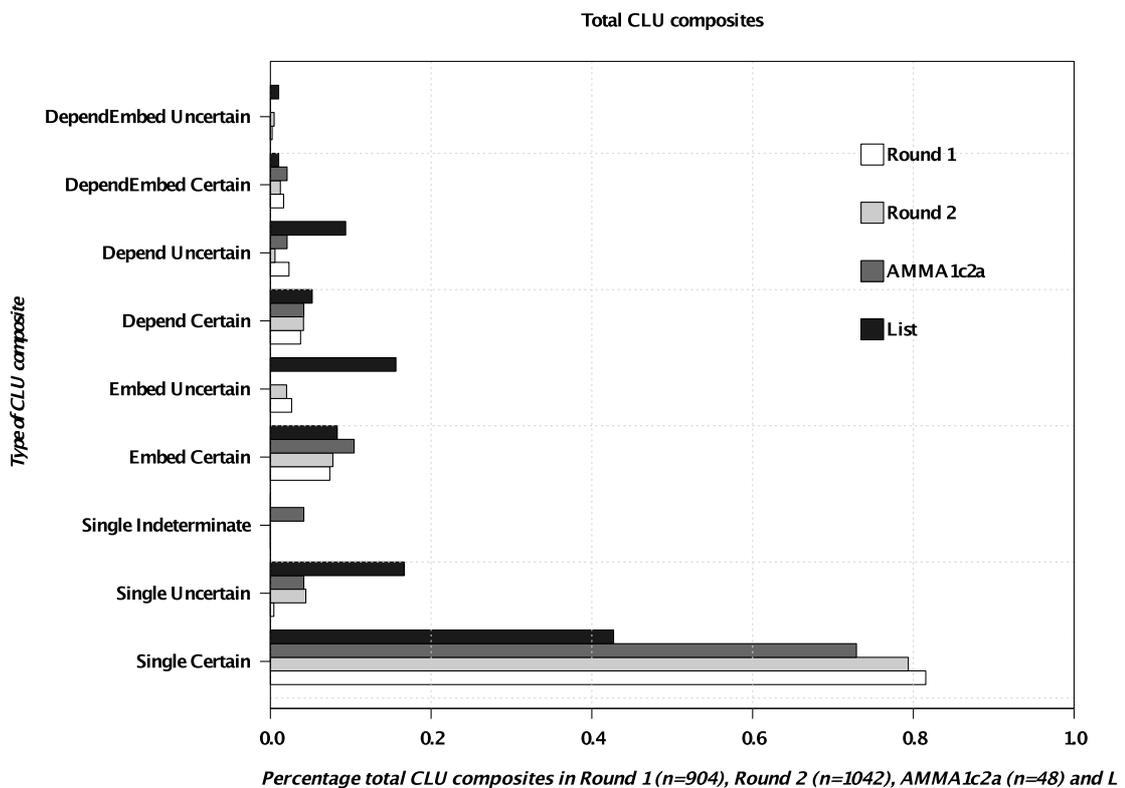


Figure 5.12 Percentage proportion of total CLU composites in Round 1 ($n=904$), Round 2 ($n=1,042$) and Round 3 (the AMMA1c2a file ($n=48$) and the list of problematic analyses ($n=96$))

Table 5.4 below displays the raw totals of agreement and disagreement in the AMMA1c2a file, and shows that Second Checker agreed with approximately 80% and disagreed with approximately 20% of the total tokens in this file. This rate of disagreement is slightly lower than the overall rate of disagreement of 25% in Round 1 and Round 2, which may be explained by the particular retelling that was checked, n sample size effects, the annotators and/or chance.

There are also cluster-specific differences between the AMMA1c2a file, Round 1 and Round 2. In the AMMA1c2a file, the lowest rate of disagreement was for the smallest

cluster of DependEmbed Uncertain CLU composites ($r=0$). Compare this to Round 1, where the lowest rate of disagreement was the Single Certain CLU composites ($r=19.32$), and Round 2, where the lowest rate of disagreement was the DependEmbed Uncertain CLU composites ($r=0$).

In the AMMA1c2a file, the highest rate of disagreement was for the smallest clusters of the Depend Certain and Depend Uncertain CLU composites ($r=100.0$). Compare this to Round 1, where the highest rate of disagreement was for the DependEmbed Uncertain CLU composites ($r=50.0$), and Round 2, where the highest rate of disagreement was for the DependEmbed Certain CLU composites ($r=66.67$).

Margins of error for clusters of CLU composites in the AMMA1c2a file were not calculated because this sample was not randomly selected, and all observations in this file were checked and included in the analysis. Approximately 65% of the disagreements in the AMMA1c2a file resulted from the identification of CLU composites, i.e. the delineation of the chunk of signing within the retelling. The remaining 35% resulted from the analysis of CLU composites, i.e. the analysis of elements within an identified CLU composite.

Table 5.4 Total agreement and disagreement in the AMMA1c2a file ($n=48$); r =rate of disagreement (%)

<i>CLU composite</i>	<i>Agree</i>	<i>Disagree</i>	<i>Total</i>	<i>r</i>
Single Certain	30	5	35	14.29
Single Uncertain	2	0	2	0.00
Single Indeterminate	2	0	2	0.00
Embed Certain	4	1	5	20.00
Embed Uncertain	0	0	0	NA
Depend Certain	0	2	2	100.00
Depend Uncertain	0	1	1	100.00
DependEmbed Certain	1	0	1	0.00
DependEmbed Uncertain	0	0	0	NA
<i>Total</i>	<i>39</i>	<i>9</i>	<i>48</i>	<i>18.75</i>

Table 5.5 below displays the raw totals of agreement and disagreement in the list of CLU composites with problematic analyses. It shows that Second Checker initially agreed with 50%, disagreed with approximately 43%, and was unsure about approximately 7% of the total tokens in this list. This rate of disagreement is much higher than the overall rates of disagreement in Round 1, Round 2 and the AMMA1c2a file. This rate reflects the fact that the list contained a concentration of tokens with problematic analyses, and confirms that analysis of these tokens was indeed problematic (for the original annotator at least).

There are also cluster-specific differences between this list, the AMMA1c2a file, Round 1 and Round 2. In this list, the lowest rate of disagreement was for the second largest cluster of Single Uncertain CLU composites ($r=18.75$). Compare this to the AMMA1c2a file, where the lowest rate of disagreement was the DependEmbed Uncertain CLU composites ($r=0$), Round 1, where the lowest rate of disagreement was the Single Certain CLU composites ($r=19.32$), and Round 2, where the lowest rate of disagreement was the DependEmbed Uncertain CLU composites ($r=0$).

In this list, the highest rate of disagreement was for the DependEmbed Certain and DependEmbed Uncertain CLU composites ($r=100.0$). Compare this to the AMMA1c2a file, where the highest rate of disagreement was for the smallest clusters of the Depend Certain and Depend Uncertain CLU composites ($r=100.0$), Round 1, where the highest rate of disagreement was for the DependEmbed Uncertain CLU composites ($r=50.0$), and Round 2, where the highest rate of disagreement was for the DependEmbed Certain CLU composites ($r=66.67$). Margins of error for clusters of CLU composites in the list of CLU composites with problematic analyses were not calculated because this sample was not randomly selected, and all observations in this list were checked and included in the analysis.

Approximately 60% of the disagreements in the list of CLU composites with problematic analyses resulted from the identification of CLU composites, i.e. the delineation of the chunk of signing within the retelling. The remaining 40% resulted from the analysis of CLU composites, i.e. the analysis of elements within an identified CLU composite.

Table 5.5 Total agreement, uncertainty and disagreement in the list of CLU composites with problematic analyses ($n=96$); r =rate of disagreement (%)

<i>CLU composite</i>	<i>Agree</i>	<i>Unsure</i>	<i>Disagree</i>	<i>Total</i>	<i>r</i>
Single Certain	24	2	15	41	36.59
Single Uncertain	11	2	3	16	18.75
Embed Certain	2	0	6	8	75.00
Embed Uncertain	3	2	10	15	66.67
Depend Certain	3	1	1	5	20.00
Depend Uncertain	5	0	4	9	44.44
DependEmbed Certain	0	0	1	1	100.00
DependEmbed Uncertain	0	0	1	1	100.00
<i>Total</i>	<i>48</i>	<i>7</i>	<i>41</i>	<i>96</i>	<i>42.71</i>
Percentage	50.00	7.29	42.71	100	-

Round 3 took approximately two weeks to complete. Following reanalysis of the checked tokens in the AMMA1c2a file, Second Checker and the original annotator agreed with the analysis of all of the checked CLU composites ($n=48$), i.e. direct face-to-face collaboration in checking a single file lead to 100% revised agreement and 0% maintained disagreement.

Following reanalysis of the checked tokens in the list of CLU composites with problematic analyses, Second Checker and the original annotator agreed with the analysis of approximately 85% of the checked CLU composites, and disagreed with 0% of these tokens. Approximately 15% of the checked tokens in the list were reanalysed as indefinite (see Figure 5.13 below). No new analyses were offered. Between Second Checker's completion of Round 3 and the original annotator's revision of these checked tokens, there were shifts in the way the original annotator analysed CLU composites.

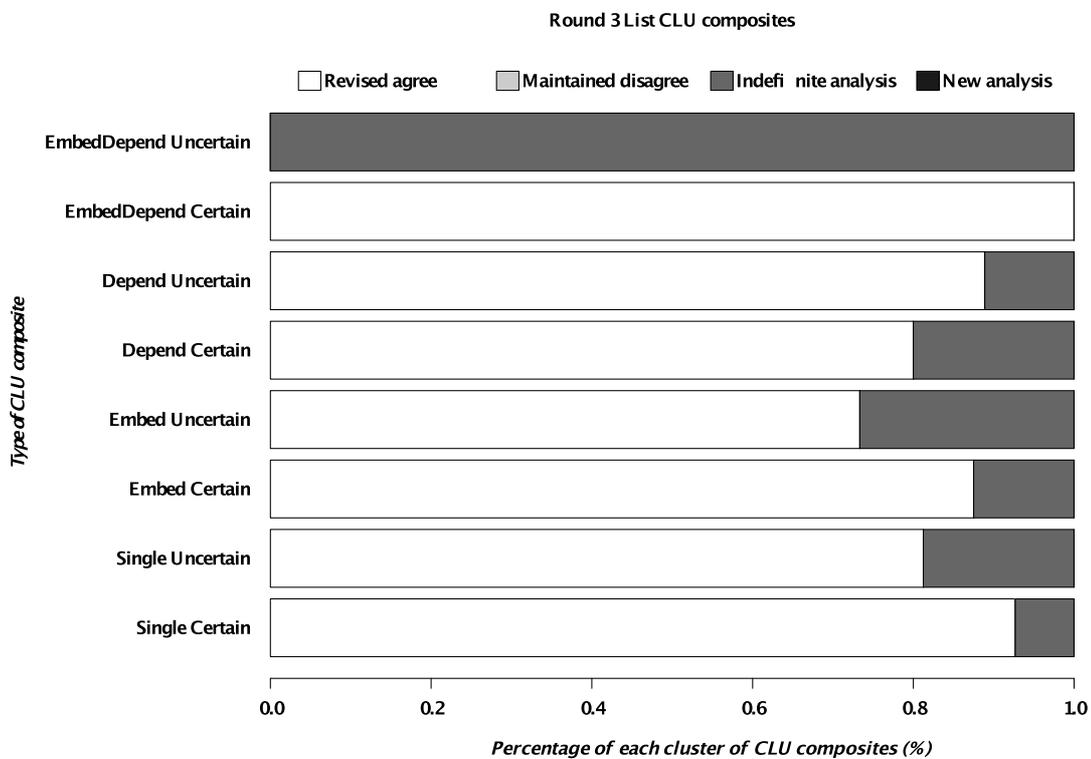


Table 5.6 Percentage proportion of revised agreement, maintained disagreement, indefinite reanalysis and new analysis of checked CLU composites in each cluster of the list of CLU composites with problematic analyses ($n=96$)

5.3.4. Characterising disagreements in Round 1, Round 2 and Round 3

As the three rounds of checking progressed, some disagreements emerged as a result of error, while others emerged as analytical tendencies of the annotators. Overall, the way that each annotator understands and analyses the data in the study corpus became more transparent through successive iterations of checking the study corpus files. Seven main types of disagreements were identified through qualitative analysis of the checked tokens in each round. Each type of disagreement is detailed below with examples.

1. **Tagging errors or unidentified signs** in a chunk of signing. For example, prior to Round 1, the sign glossed as BIG in Video MFKA1c2aCLU#29 was tagged as A1, but First Checker observed that the sign glossed as WOLF should be tagged as A1 because it is the ‘head’ of the possible ‘noun phrase’ (see §4.4.3.3). Prior to Round 3, the sign glossed as DO-THERE in Video BAOBB1c2aCLU#24 was not yet tagged. Instead, it was analysed as a modification of the depicting sign DSM(5-DOWN):ANIMALS-MOVE. Second Checker later identified DO-THERE as a separate sign, which consequently lead to changing the analysis of the core elements in this CLU composite.
2. **Misidentification of constructed action or dialogue** in a chunk of signing. For example, prior to Round 1, the sign glossed as G(5-DOWN):PHOOEY in Video BAOBB1c2aCLU#45 was not yet identified as part of the enactment. First Checker later re-analysed this sign as part of the Constructed Dialogue, thereby changing the delineation of CLUs in this Embed CLU Composite.
3. **Misidentification of core versus non-core elements** within the CLUs in a CLU composite. For example, prior to Round 1, the sign glossed as PT:PRO1SG in Video PDHA1c2aCLU#47 was not analysed as a core predicate. First Checker’s identification of this sign as part of the Constructed Dialogue lead to re-analysis of this sign as functioning as a core predicate. Prior to Round 3, the utterances in Video SGMB1c2aCLU#1 were analysed as three Single Certain CLU composites. Second Checker later re-analysed the first two CLUs as elaborate adverbials of location that are part of one Single CLU composite. Prior to Round 3, the sign glossed as SUPPOSE2 in Video MBHA1c2aCLU#14 was analysed as a full verb. Second Checker later re-analysed it as a non-core adverbial, thereby changing the analysis of core elements in this CLU.
4. **Misidentification of CLUs and CLU composites.** For example, prior to Round 1, the utterance in Video BDCB1c2aCLU#30 was analysed as two Single CLU composites. First Checker later re-analysed it as one Single CLU composite. Prior to Round 2, the utterances in Video SPKA1c2aCLU#11 were analysed as one Depend CLU composite. First Checker later re-analysed the sign glossed as PUT as part of the following Single CLU composite. Prior to Round 3, the utterances in Video SGMB1c2aCLU#10 were analysed as an Embed Uncertain CLU composite, as it contains the sign glossed as YELL2, which functions as verb of saying, followed by the sign WOLF, which is the verbiage. Second Checker later re-analysed this CLU composite as a Single Certain CLU composite.
5. **Inappropriate analysis of elements in identified CLU composites.** For example, prior to Round 1, the utterance in Video AMMA1c2caCLU#11 was analysed as a Single Certain CLU composite, with the sign glossed as FINISH.GOOD analysed as a coordinative “and-then”. First Checker later re-analysed this sign as a conjunctive “then-finished” and therefore a Depend Certain CLU composite. Prior to Round 3, the utterance in Video BDCB1c2aCLU#13 was analysed as a Single Uncertain CLU

composite with indefinite analysis, i.e. two possible analyses. Second Checker later re-analysed the signs glossed as EAT and LOOK as functioning in the same way as if they were ‘non-finites’ (“to eat”) or gerunds (“eating”), which are predicated as boring. Even though Auslan has none of the morphology to code these signs as either non-finite or gerunditive, EAT and LOOK are effectively ‘named’ processes, i.e. “*eating and looking is boring*”. The re-analysis of CLU composites like this was a major contribution of Second Checker.

6. **Over-analysis of CLUs as linked via relations of hypotaxis.** For example, prior to Round 1, the utterances in PDHA1c2cCLU#36 were analysed as an Embed CLU composite. First Checker later re-analysed it as a Single Uncertain CLU composite. Prior to Round 3, the utterance in Video AMMA1c2aCLU#12 was analysed as an Uncertain Single CLU composite, as it was interpreted as possibly expressing embeddedness. Second Checker later re-analysed it as Single Certain CLU composite with two possible analyses, either DO NOTHING as an object-like relation to BOY BORED, or with a serial V1 V2 V3 analysis. This example particularly shows how the delineation of CLUs can influence decisions of analysis.

Prior to Round 3, the utterances in Video AJNA1c2aLHCLU#14 were analysed as Depend Certain CLU composite. Second Checker later suggested it is better analysed as Uncertain because it is expressing an adversative coordination, supported by intonation, sequence and context, rather than unambiguously encoded dependency. The re-analysis of CLU composites like this was a major contribution of Second Checker, and enabled further semantic differentiation of the types of relations of hypotaxis identified in the study corpus.

7. **Uncertain analysis of CLUs at the start of the story.** For example, prior to Round 3, the utterances in Video BFSA1c2aCLU#1 were analysed as an Embed Uncertain CLU composite. Second Checker later suggested the CLUs at the start of the retellings that elaborate on the title of the story be analysed separately to other Embed CLU composites, because they are problematic to compare alongside the other types of CLU composites found elsewhere in these retellings. These types of early utterances were subsequently tagged as (Type)E CLU composites (i.e. E=early) and analysed as a separately to other utterances (see §7.3.3).

5.3.5. Framing analytical preferences

The different types of disagreements that emerged through three rounds of checking help to frame the analytical tendencies of the original annotator in relation to the two other annotators. Early on, both First Checker and Second Checker commented that the original annotator tended towards shorter CLUs than they did. That is, I tended towards a ‘proliferation of CLUs’, an observation that led to greater awareness regarding this tendency in successive iterations.

This sensitivity was evident by the second iteration (despite the fact that the total number of CLU composites had increased), because First Checker commented that there seemed to

be a reversal of some analytical preferences when he was checking the Round 2 tokens. He commented that the newly revised longer CLUs seemed to reflect his earlier preferences and my non-preferences, while he now tended towards my earlier preferences. He also observed that the method of checking a random sample of CLU composites better enabled him to compare like CLU composites with like.

During Round 3, Second Checker observed that the original annotator tagged a number of tokens as Embed CLU composites, when they are simply utterances that contain a verb of saying with some kind of verbiage that is Constructed Dialogue, with no embedded information. This divergence occurred because I had tagged all types of projected locutions as Embed CLU composites in order to count them, and then later realised this was unnecessary because there were other ways of extracting that information.

Second Checker also observed that the original annotator tagged a number of tokens as Depend Certain CLU composites, when these tokens all expressed adversative consequence, and it was not unambiguously clear whether these tokens are explicitly linked because the relation of consequence is implied through intonation, sequence and context, and not encoded lexically. This divergence occurred because I recognised a type of intonation pattern that occurred repeatedly, and wanted to include them as possible constructions to investigate further.

This observation suggests a tendency for the original annotator to over-identify and over-analyse CLUs as linked via relations of hypotaxis that are expressed primarily via intonation (in addition to those expressed primarily via lexis). This is possibly a consequence of influence from literature regarding the use of intonation in spoken and signed language structure (see §2.2.3). These types of CLU composites were all re-analysed as Depend Uncertain CLU composites.

Overall, the findings resulting from checking the study corpus suggests that the analyses of Single Certain CLU composites presented here are relatively reliable and consistent, whereas analyses of the other CLU composites are less so. This restricts the generalisability of findings based on explorations of these non-Single CLU composites.

During the course of the secondary corpus enrichment, my perspective shifted from the naïve aim of Objectivist validation to one of practiced exploration, where the exploration is informed by the practice of what we are doing, which is informed by who we are. On this note, it is important to add that while these findings and analytical tendencies are the result of a collaborative and iterative method for checking annotations, the checking framework was still 'designed' by me. This design is framed by the way that I analysed and organised tokens of CLU composites according to type and subjective uncertainty. Thus, while First Checker and Second Checker certainly collaborated in the cross-interpretation of these CLU composites, they participated largely on my terms.

The collaborative and iterative method developed here is essentially a practice-led method that is framed by the personal beliefs, doubts and preferences for interpreting and annotating the study corpus files in the first instance.

5.4. Evaluation

5.4.1. Summary

Chapter §5 outlined a number of reasons to justify the secondary enrichment of the study corpus. It pulled together arguments regarding the exploratory nature of signed language analysis, the nature of real data as messy and often resulting in problematic analyses, and claims that this kind of checking is rarely reported in the literature. It summarised several strategies for addressing these issues, such as presenting one's analyses along with full accessible versions of the data, and developing methods for quantifying the range of analyses evidenced in the data set.

It explained how these strategies help to prepare the corpus for a secondary enrichment, whereby other annotators check (i.e. re-interpret and re-analyse) a proportion of the analyses resulting from the primary enrichment of the study corpus. It outlined a collaborative and iterative method for checking analyses, and also suggested that it is preferable for both native and non-native signers who have analytical expertise to collaborate in this checking.

The collaborative and iterative method described here enabled a fruitful and preliminary exploration of the study corpus files, even though it was a complicated and time-consuming exercise. In collaboration with two other annotators, three iterations of this method ascertained percentage rates of initial disagreement and maintained disagreement. These iterations also revealed quantitative and qualitative tendencies regarding the range of messy data and analyses of CLU composites that were identified during the primary enrichment of the study corpus.

While these findings offer a number of qualifications to the findings presented in Chapter §6 and §7, the results from the secondary corpus enrichment are still very useful and informative. The three iterations revealed aspects of the data that were not deeply questioned prior to undertaking the iterative process for checking analyses. In this way, the collaborative and iterative method for checking annotations helped to generate new knowledge and understanding of the data and analyses in the study corpus. It highlighted issues with linguistic analysis in general, and issues with CLUs and CLU composites as units of analysis in particular.

With respect to the study corpus, the rates of disagreement for the clusters of CLU composites in each round of checking suggest that some signed utterances can be confidently identified and analysed from a clause-level perspective of analysis, but certainly not all. In fact, these rates of disagreement possibly suggest that CLUs and CLU composites (or at least my CLUs and CLU composites) are not a good unit of analysis for investigating how signers orchestrate and co-construct their signed utterances.

However, the application of this analytical framework for investigating possible clause-level composite utterances in a signed language does represent an improvement on previous constituent or sentence-based frameworks, in part because these disagreements are quantified and analysed. CLUs and CLU composites certainly are effective in helping

to identify utterances that do not fit the characterisation of a 'traditional clause'. And because these apparently different utterances can now be identified, we have a basis upon which to explore whether they are best described as some other type of communicative move or utterance unit in a signed language (see §3.2.4).

Overall, the three iterations lead to:

1. Little change between the overall proportion of initial agreement and disagreement in checked annotations (roughly 3:1), but marked changes between the proportion of revised agreement, indefinite reanalyses, and new analyses. These marked changes reflect the range of problematic analyses addressed in each iteration and how these were or were not resolved;
2. The contribution of new analyses that indicate an evolution (over many months, iterations and revisions) in the way the same source materials are interpreted and analysed, thus also reflecting the productiveness of the collaborative and iterative method for generating new knowledge;
3. The resolution of some problematic analyses and the non-resolution of others, in keeping with the characterisation of the investigation as an exploratory exercise that aims to avoid 'forced' analyses; and
4. The re-evaluation and framing of the subjective analyses of the original annotator in relation to the analytical preferences of two other annotators. This method facilitated consistent checking of identified tokens, thereby affording greater transparency and informed generalisability to these analyses than if they were not checked at all.

5.5. Conclusion

A collaborative and iterative method for checking analyses of signed language data such as the one developed here is indispensable to corpus exploration. It contributes invaluable insights on how corpus findings can and should be interpreted in context of the range of data and analyses evidenced in a data set, as well as insights into the subjective nature of analysing messy data.

By the end of May 2013, the master copies of the study corpus files contained all revisions of the study corpus, and the analyses and comments manually incorporated from Round 1, Round 2 and Round 3. These are the files used in the two explorations of the study corpus described in Chapter §6 and §7.

6. First exploration: Single CLU composites

One day, he decided to play a little game.

— Aesop, *The Boy Who Cried Wolf*

6.1. Introduction

The video files analysed in this thesis were first enriched with annotations using the partly corpus-driven approach and analytical method described in Chapter §4. A proportion of these annotations were then checked using the iterative and collaborative method described in Chapter §5. All annotations were revised a number of times during the study. Chapter §6 presents the first of two explorations of these annotations.

The aim of this exploration was to explore patterns of analysis of the clause-like units identified during the revisions of the primary enrichment of the study corpus that are not linked hypotactically, i.e. Single CLU composites. The Single CLU composites identified in the study corpus are quantified according to the patterning of: (1) the subjective certainty with which they were identified as a type of CLU composite; (2) core elements, with respect to handedness, sequence, grammatical class, macro-role, semantic role and sign type of core elements; and (3) co-occurrence with enactment. Findings from this exploration are used to characterise the analyses resulting from the primary enrichment of the study corpus with respect to their identified regularities of organisation.

This exploration of the study corpus is justified, described and discussed in three sections. Section §6.2 outlines the quantitative methods used for analysing the annotations extracted from the study corpus files, i.e. frequency of occurrence and dispersion (Biber et al. 2009; Gries 2008, 2010b). An analysis of three major sign types (fully lexical, partly lexical and non-lexical signs) in the study corpus is also presented in order to frame the study corpus in relation to the Auslan Corpus, and to frame individual signers in the study corpus in relation to each other.

Section §6.3 outlines the architecture of the study corpus analysis. It identifies the analytical units that were annotated in the study corpus, i.e. the CLUs and CLU composites. The frequency and distribution of all types of CLU composites are described with respect to whether they stand alone or whether they are linked via relations of hypotaxis, and with respect to the subjective certainty with which they were identified.

Section §6.4 and §6.5 presents the quantitative and qualitative findings resulting from analysis of all Single CLU composites. Section §6.6 evaluates these findings and discusses them in relation to literature on spoken and signed languages, as well as the analytical method described in Chapter §4.

This exploration resulted in the identification of regular patterns of organisation in the study corpus that are either shared by all signers in the study corpus, or specific to one or two signers. Many patterns appear to constitute clause-like units that may be identified and explored elsewhere in the Auslan Corpus. Some patterns appear to constitute

emergent strategies of co-construction that suggest symptoms of grammaticalised structure rather than conclusive evidence of it. Yet other identified patterns appear to constitute units that are primarily by-products of the linguistic analysis undertaken during this study. This exploration also demonstrates a corpus-driven approach for investigating and describing signed language lexicogrammar.

6.2. Quantitative measurements of analysis

6.2.1. Frequency of occurrence and dispersion

There are two main quantitative measurements of corpus data: (1) frequencies of occurrence of a given phenomenon (i.e. how often a particular item occurs in a corpus); and (2) frequencies of co-occurrence of two or more phenomena (i.e. collocations of particular items that occur with other items, or concordances of particular items within a user-specified context) (Gries 2009b: 7-18).

There are a number of conventions for reporting frequency data. Frequency data are typically reported as normalised (relative) frequency counts (e.g. frequency of occurrence per 1,000 or 100,000 words) that can be used to compare the frequency of various phenomena in the same or different samples. They are also often transformed into percentages that can reflect proportional use (but not frequency). Mutual information scores (an index based on the probability of observing two items together compared to the probability of observing each independently) may also be used to assess the strength of collocational associations (Biber et al. 2009: 39-40). Richer quantitative methods of frequency analysis incorporate statistical investigations such as dispersion (Gries 2008; 2010b); significance testing, multifactorial analysis, and probabilistic modelling (Baayen 2008; Gries 2009b; 2010a); negative evidence (Stefanowitsch 2006); and other ways of counting language (see Ellis 2010).

This study uses two main measurements: absolute and relative frequency of occurrence (i.e. how often a phenomena x is observed in the study corpus), and dispersion of occurrence in corpus parts (i.e. if and how often x is observed in each individual retelling in the study corpus). Integer ratios and relative entropy values are also employed at times. The primary measurement is the absolute and relative frequencies of occurrence across all signers in the study corpus.

It is important to consider a number of measurements because frequency counts can be misleading and are insufficient for inferring generalisations when reported on their own (Gries 2008). Variation in the way that individual speakers and signers use their language is to be expected, and not all language users draw from the same semiotic resources all of the time. This is particularly the case for native signed languages, which emerge in language ecologies characterised by close social intimacy and restricted communicative domains, yet also evolve in heterogeneous ecologies with a non-native majority, sustained immersion in English, and quickly expanding communicative domains (see §3.2.2). While findings based on all signers in the study corpus are relevant, it is also important to

explore and compare the patterns identified for individual signers, especially when analysing a relatively small corpus of twenty signers.

To address this issue, measurements of integer ratios and dispersion of observations across corpus parts are reported in addition to absolute and relative frequencies of occurrence (one corpus part=one retelling=one signer; $n=20$). Integer ratios derived from relative frequencies are used to tentatively explore the relative proportions of quantifiable phenomena within and across corpus parts. Measurements of dispersion are computed to investigate whether a frequency of occurrence pattern is shared by all signers in study corpus, or whether the frequency of occurrence is idiosyncratic to one or two signers in the study corpus (Gries 2008; 2010b). Differentiating the study corpus as a whole from individual corpus parts facilitates a more precise indication of how to infer and interpret the frequencies of occurrence that arise from corpus analysis.

6.2.2. Framing the study corpus

To help the reader differentiate the study corpus as a whole from individual corpus parts, this section presents an analysis of three major sign types (fully lexical, partly lexical and non-lexical signs) in the study corpus. This analysis serves to frame the study corpus in relation to the Auslan Corpus, and individual signers in the study corpus in relation to each other. This will help the reader contextualise the study corpus in relation to its parts and better understand the signed language data on which the analyses in Chapter §6 and §7 are based.

Chapter §4 explained that language corpora are assessed and compared according to how they are representative and generalisable. Describing a corpus according to the criteria for corpus design, construction and enrichment facilitates comparison between the parts in a single corpus. It also facilitates comparison between different corpora, whereby corpora can be contextualised in relation to each other according to their shared characteristics.

The study corpus and Auslan Corpus were compared according to their design and construction (including corpus size, text types, number and type of annotations) in Section §4.4. These corpora can also be compared according to findings resulting from corpus enrichment, particularly the relative frequencies of occurrence of quantifiable observations.

One type of observation both relevant to this study and available for comparison is the frequency and dispersion of fully lexical, partly lexical and non-lexical sign types (see §3.3.4.1). Relative frequencies of occurrence and the dispersion values of sign types in the study corpus and the Auslan Corpus can be used to frame the study corpus in relation to the much larger Auslan Corpus, and to frame the individual parts of the study corpus in relation to each other.

6.2.3. Sign types in the Auslan Corpus and the study corpus

Section §3.3.4 explained that not all signs used in native signed languages are of the same type. It is useful to explore signs according to degree of lexicalisation and how these

different sign types are used. Signs vary gradiently from fully lexical, through partly lexical, to non-lexical according to degrees of conventionality, complexity and schematicity (Johnston & Schembri 2010; Johnston & Ferrara 2012).

This section reports on the observed relative frequencies (per 1,000 tokens) of sign types in the study corpus, Auslan Corpus and Auslan Corpus narratives. It compares these observations across the three corpus sets. It also reports on several measures of dispersions of each sign type across all twenty parts of the study corpus. This information is used to compare: (a) the study corpus to the Auslan Corpus; (b) the study corpus to narratives in the Auslan Corpus; and (c) individual signers in the study corpus to each other.

The IDglossing conventions used to annotate the Auslan Corpus essentially lemmatise the digital video data by sorting tokens of signs into different types that are defined by their degree of lexicalisation (see §3.3.4.1 and §4.4.3). Each individual IDgloss represents one sign, i.e. a symbolic assembly of form and meaning (see §3.3.2). IDglosses are continually developed and stored in the lexical database Auslan SignBank. This information can be used to investigate the lexical frequency of the Auslan Corpus and corpus parts (e.g. Johnston 2012).

For example, the IDgloss BOY1 is used to tag all observed tokens of signs that are produced with a lateral 1 handshape moved horizontally back and forth while touching the chin (a token of BOY1 can be viewed in Video SGMB1c2aCLU#1). If one is interested in the frequency and distribution of this particular sign, all one has to do is search for BOY1 in the ELAN files of the Auslan Corpus that have been enriched with annotations of IDglosses on the Strong Hand and Weak Hand IDgloss tiers. If one is interested in the frequency and distribution of BOY1 with respect to other identified signs in the corpus, one can retrieve a list of IDglosses ordered according to their lexical frequency counts, with BOY1 listed with the number of counts and ordered in the list relative to the counts of all other IDglosses.

It is also possible to retrieve lexical frequency lists that count not just the identification of tokens of IDglosses, but how each token of each IDgloss is used in the context in which it was observed and annotated. This is done by quantifying the overlap of annotations on the IDgloss tiers with annotations on its respective Grammatical Class child tier. This facilitates the categorisation of individual IDglosses according to their degree of lexicalisation.

To date, there has been only one published corpus-based investigation of the frequency and distribution of sign types in a signed language. This was conducted as part of a lexical frequency study of Auslan (Johnston 2012). Lexical frequency studies have also been published for New Zealand Sign Language (McKee & Kennedy 1998, 2006), and American Sign Language (Morford & MacFarlane 2003). However, the Auslan lexical frequency study has been the only one based on a machine-readable corpus created using IDglossing conventions.

The Auslan lexical frequency study revealed that the majority of annotations on the Strong Hand IDgloss tier in the Auslan Corpus ($n=63,436$) identify fully lexical signs (65.0%). A significant proportion of annotations identify partly lexical pointing signs (12.3%) and partly lexical depicting signs (11.0%). A small proportion of annotations identify non-lexical gestures and fragments (6.5%). A small proportion were also identified as fully lexical fingerspellings (5.0%) and fully lexical name signs (0.2%). These published figures are based on corpus data dating from late 2011.

As of August 2013, the Auslan Corpus contains 96,000 tokens of annotations on the Strong Hand IDgloss tier: 65.32% identify fully lexical signs; 14.39% identify partly lexical pointing signs; 7.63% identify partly lexical depicting signs; 7.32% identify non-lexical gestures or fragments; 5.18% identify fully lexical fingerspellings; and 0.16% identify fully lexical name signs. Thus, while the proportion of fully lexical signs, fingerspellings and name signs in the Auslan Corpus appear to be relatively stable, the proportion of partly lexical pointing signs, partly lexical depicting signs and non-lexical gestures appears to be more sensitive to corpus size. This is probably due to text type. However, the global rankings of these six classes and sub-classes of sign type appears to be consistent.

Table 6.1 below reports the observed relative frequencies (per 1,000 tokens) of all annotations on the Strong Hand IDgloss tier in the three datasets: the Auslan Corpus, the Auslan Corpus narratives and the study corpus narratives. The figures for the Auslan Corpus and Auslan Corpus narratives were reported in the Auslan lexical frequency study (Johnston 2012, i.e. the late 2011 figures), while the figures for the study corpus narratives were reported in an earlier study of sign types and core elements in Single CLU composites (Hodge & Johnston 2014).

These normalised frequencies indicate that tokens of fully lexical and non-lexical signs are more frequent in the study corpus narratives than in the Auslan Corpus and Auslan Corpus narratives, while tokens of partly lexical depicting signs are less frequent. Tokens of partly lexical pointing signs in the study corpus are less frequent than in the Auslan Corpus, but more frequent than in the Auslan Corpus narratives. Intuitively, these differences between the study corpus and the Auslan Corpus and Auslan Corpus narratives could be due to the smaller size of the study corpus and the fact that it is represented by retellings of only one story, 'The boy who cried wolf'.

Furthermore, the higher normalised frequency of tokens of non-lexical signs (specifically manual gestures and enactments) in the study corpus narratives may relate to the 'dismissal' events by the villagers of the boy. Signers often enacted the villagers' dismissal of the boy after he had cried wolf too many times. This enactment was often performed using a sign identified using the IDgloss G(5-DOWN):PHOOEY (a token of G(5-DOWN):PHOOEY can be viewed in Video MBCB1c2aCLU#28). The higher normalised frequency of partly lexical depicting signs in the Auslan Corpus narratives may also be due to the narratives of 'Frog, where are you?' and, to a lesser extent, 'The hare and the tortoise', or due to chance.

Table 6.1 Observed relative frequencies (per 1,000 tokens) of six classes of sign types across three corpus data sets; relative entropy value for each distribution*

Sign Type	Auslan Corpus (<i>n</i> =63,436)	Auslan Corpus narratives (<i>n</i> =23,401)	Study corpus narratives (<i>n</i> =3,686)
Fully lexical (incl. numbers)	650	607	705
Fully lexical (fingerspelling)	50	51	45
Fully lexical (name signs)	2	0	0
Partly lexical (pointing/indexical, incl. possessives and buoys)	123	74	90
Partly lexical (depicting)	110	214	62
Non-lexical (gestures and enactments, incl. fragments/false starts)	65	54	98
Column totals	1,000	1,000	1,000
Relative entropy (H_{rel})	0.63	0.71	0.62

*NB: Study corpus narratives are a subset of Auslan Corpus narratives; study corpus narratives and Auslan Corpus narratives are subsets of the Auslan Corpus. Only tokens of signs annotated on the Strong Hand IDgloss tier were counted in each corpus. Only 5.8% of non-lexical signs in the study corpus were identified as fragments or false starts (*n*=21).

As an additional measure of comparison for these three data sets, Table 6.1 also presents the relative entropy values (H_{rel}) of the three major classes of sign type (fully lexical, partly lexical, non-lexical) for each corpus distribution. A relative entropy value is the average amount of uncertainty of a random variable for each distribution. The uncertainty of predicting a given sign or type of annotation in each corpus distribution can be partly captured by comparing the relative entropy values for each distribution: “the larger the [entropy] H or [relative entropy] H_{rel} the more random a distribution and the more difficult it is to predict an element’s occurrence” (Gries 2010: 8). The relative entropy values can be used to compare entropy of different *n* samples¹⁷.

The H_{rel} values for the three corpus data sets reported in Table 6.1 suggest that the average relative uncertainty for the distribution of the major classes of sign type in the study corpus narratives (H_{rel} =0.62) is similar to the Auslan Corpus (H_{rel} =0.63), but less than the Auslan Corpus narratives (H_{rel} =0.71). That is, the distributions of tokens of signs classed according to perceived degree of lexicalisation in each corpus data set indicates both similarities and differences between each data set. Overall, the distribution of sign types in the study corpus narratives has similar predictive uncertainty to that of the Auslan

¹⁷ Entropy values were computed using Gries’s dispersions2 script (Gries 2008, 2010b). Source: <http://www.linguistics.ucsb.edu/faculty/stgries/research/dispersion/dispersion2.r>

Corpus. Both of these data sets have much less predictive uncertainty than the Auslan Corpus narratives. It is more difficult to predict the occurrence of sign types in the Auslan Corpus narratives than in the other two corpus data sets.

Without measures of the dispersion of sign types in each data set, this only suggests the randomness of sign types in the study corpus distribution is similar to the Auslan Corpus on the whole, and less than the Auslan Corpus narratives. It would be more difficult than not to predict the occurrence of a particular sign type in all three corpus data sets. The greater predictive uncertainty for the Auslan Corpus narratives could be reflective of the variety of narratives in this data set (as opposed to just one story). As these narratives are varied and vary in how they were elicited (e.g. translated from written English or interpreted from a picture book), this corpus data set is likely to contain much greater range of the semiotic strategies that signers draw upon to both show and tell particular narratives.

The dispersion of sign types in the study corpus can be explored using some general statistics that are often used to infer dispersion. Table 6.2 below reports two measures of the dispersion of the observed frequencies of the three major classes of sign types in the study corpus: the means and the coefficients of variation (C_v) of the observed frequencies of each sign type.

Table 6.2 General measures of dispersion for the distribution of three classes of sign type in the study corpus

<i>Measure of dispersion</i>	<i>Fully lexical</i>	<i>Partly lexical</i>	<i>Non-lexical</i>
Observed frequency	2768	554	364
Mean	138.4	27.7	18.2
Variation coefficient (C_v)	0.324	0.524	0.480

The second row of Table 6.2 reports the observed frequency of each sign type in the study corpus. The third row of Table 6.2 reports the mean of each sign type. As the means of each sign type are markedly dissimilar, the standard deviations cannot be used to compare the dispersion of each sign type in the study corpus. Instead, the variation coefficients (i.e. standard deviation of each sign type divided by mean of each sign type) can be used to compare the dispersion of sign types in this distribution (Gries 2009b: 203).

The third row of Table 6.2 reports the coefficients of variation for each sign type. A higher coefficient of variation suggests a higher variance. These variation coefficients suggest that the distribution of partly lexical sign types in the study corpus is more heterogeneous than the distributions of non-lexical and fully lexical sign types. It also suggests that the distribution of non-lexical sign types is also more heterogeneous than the distribution of fully lexical sign types.

Conversely, the distribution of fully lexical sign types is more homogenous than the distributions of partly lexical and non-lexical sign types in the study corpus. From this we can infer that, while it would be more difficult than not to predict the occurrence of any particular sign type in the study corpus, the distribution of fully lexical signs is still more regular than partly lexical and non-lexical signs.

The observed frequencies in Table 6.2 were also coerced into a contingency table and subjected to a test of independence. A Chi-squared test for given probabilities confirmed that there is a dependence and that this dependence is statistically significant. The observed frequencies of sign types in the study corpus differ significantly from uniform distribution: $X^2=2,907.518$, $df=2$, $p<0.001$.

Fully lexical signs occurred 2,768 times although they were expected 1,229 times under a test of independence. Partly lexical signs occurred 554 times although they were expected 1,229 times. Non-lexical signs occurred 364 times although they were expected 1,229 times. The dispersion of sign types suggested by the coefficients of variation reported in Table 6.2 are unlikely to have arisen by chance, and suggest some regularity in the patterning of each sign type in the study corpus (Gries 2009b: 190).

While these reported statistics help us to understand the distribution of sign types in the study corpus, all of these values indicate only the general dispersion of each sign type in the study corpus. What is more interesting is how sign types are dispersed across the individual narratives in the study corpus, and what this tells us about the frequency of use of different sign types by different native or near-native signers.

For example, the general analysis reported above suggests we can expect that all twenty signers used fully lexical signs in their retelling. However, it also suggests some uncertainty as to whether all twenty signers use partly lexical and non-lexical sign types, or whether the use of these signs is idiosyncratic to some extent. The next section explores the distribution and dispersion of sign types in individual narratives, i.e. across corpus parts.

6.2.4. Sign types in the study corpus parts

In this analysis, there are twenty corpus parts which correspond to the twenty individual retellings by individual signers (i.e. one corpus part=one retelling=one signer; $n=20$). One corpus part refers to a single retelling, irrespective of how long it took to tell it. In order to explore the dispersion of sign types across the study corpus parts, it is necessary to know the observed absolute frequencies of identified signs for each signer.

Table 6.3 below reports the observed absolute frequencies of the total signs annotated on the Strong Hand IDgloss tier for each individual signer in the study corpus. A total of 3,686 tokens of IDgloss annotations were observed in the study corpus. Each narrative contains between 113 and 339 tokens of signs, with a median of 173.5 (i.e. 174) and a statistical range of 226 tokens.

Table 6.3 Observed absolute frequencies of signs annotated on the Strong Hand IDgloss tier in each corpus part ($n=20$)

<i>Corpus part</i>	<i>Absolute frequency of tokens on Strong Hand IDgloss tier</i>
AJNAIc2a	137
AKRAIc2a	135
AMGAIc2a	204
AMMAIc2a	172
BAOBBIc2a	175
BDCBIc2a	189
BFSAIc2a	220
BRCAIc2a	339
MBCBIc2a	113
MBHAIc2a	134
MCDBIc2a	226
MFKAIc2a	133
PDHAIc2a	285
PDMAIc2a	120
PGMBIc2a	125
PJHBIc2a	209
SGMBIc2a	156
SPKAIc2a	268
SSNAIc2a	197
SSSBIc2a	149
<i>Column total</i>	<i>3,686</i>
Median	173.5
Statistical range	226

Table 6.4 below reports the relative frequencies (per 1,000 tokens) and integer ratios of fully lexical, partly lexical and non-lexical signs for each individual signer in the study corpus. Note that this categorisation again conflates the sub-classes of the fully lexical, partly lexical and non-lexical sign types reported in Table 6.1.

Table 6.4 Observed relative frequencies (per 1,000 tokens) and integer ratios of the three major classes of sign type in each corpus part ($n=20$)

<i>Corpus part</i>	<i>Fully lexical</i>	<i>Partly lexical</i>	<i>Non-lexical</i>	<i>Ratio</i>
AJNAIc2a	861	73	66	9:1:1
AKRAIc2a	770	148	81	8:1:1
AMGAIc2a	593	250	157	6:3:2
AMMAIc2a	849	93	58	8:1:1
BAOBBIc2a	709	154	137	7:2:1
BDCBIc2a	836	85	79	8:1:1
BFSAIc2a	836	123	41	8:1:0
BRCAIc2a	705	183	112	7:2:1
MBCBIc2a	637	168	195	6:2:2
MBHAIc2a	739	149	112	7:1:1
MCDBIc2a	779	124	97	8:1:1
MFKAIc2a	842	75	83	8:1:1
PDHAIc2a	737	196	67	7:2:1
PDMAIc2a	775	125	100	8:1:1
PGMBIc2a	816	144	40	8:1:0
PJHBIc2a	737	163	100	7:2:1
SGMBIc2a	724	192	83	7:2:1
SPKAIc2a	754	138	108	8:1:1
SSNAIc2a	746	152	102	7:2:1
SSSBIc2a	631	188	181	6:2:2
<i>Totals</i>	<i>15,076</i>	<i>2,924</i>	<i>2,000</i>	<i>10:2:1</i>
Percentage	75.38	14.62	10.00	-
Statistical range	268	177	155	-

In total, approximately two-thirds of the signs annotated on the Strong Hand IDgloss tier in the study corpus were identified as fully lexical signs (75.38%), while the remaining

third were identified as tokens of partly lexical (14.62%) and non-lexical signs (10.00%). However, the relative frequencies of sign types for each individual signer indicate that this (very) approximately 10:2:1 integer ratio is not necessarily reflected in each signer's narrative.

Some signers were observed as using relatively fewer fully lexical signs and more partly lexical and non-lexical signs in their narrative (e.g. a ratio of 6:3:2 was observed for AMGA; a ratio of 6:2:2 was observed for MBCB; and a ratio of 7:2:1 was observed for BAOBB, PDHA, PJHB and SGMB). Other signers were observed as using relatively more fully lexical signs and fewer partly lexical signs and non-lexical signs (e.g. a ratio of 8:1:0 was observed for BFSA and PGMB).

While this comparison is very exploratory and does not consider all factors—for example, whether these differences are statistically significant, or the effects of the different sample sizes (a result of some signers producing shorter or longer narratives than others, see Figure 6.1 below)—it does suggest that the overall frequencies of occurrence reported in Table 6.1 obscure possible sources of variability, and that the possibly idiosyncratic tendencies of individual signers require further qualification.

In order to explore the dispersion of sign types across corpus parts more intuitively, a mosaic plot of each sign type across all twenty parts of the study corpus was computed (see Figure 6.1 below). This enables us to visually compare the observed absolute frequencies of each sign type for each individual signer in relation to the total duration of their retelling, thereby supplementing the conceptualisation of the normalised frequencies and approximate integer ratios reported in Table 6.4 above.

The integer ratios of relative frequencies of sign types for each signer reported in Table 6.4 above suggest that it may be useful to inspect the distribution of sign types in particular narratives. Namely, (a) the narratives of signers who were observed to use fewer fully lexical signs and more partly lexical and non-lexical signs in their narrative than suggested by the overall distribution (i.e. AMGA, BAOBB, MBCB, PDHA, PJHB and SGMB); and (b) signers who were observed to use more fully lexical signs and fewer partly lexical signs and non-lexical signs in their narrative (i.e. BFSA and PGMB). Visual inspection of Figure 6.1 reveals these tendencies more clearly.

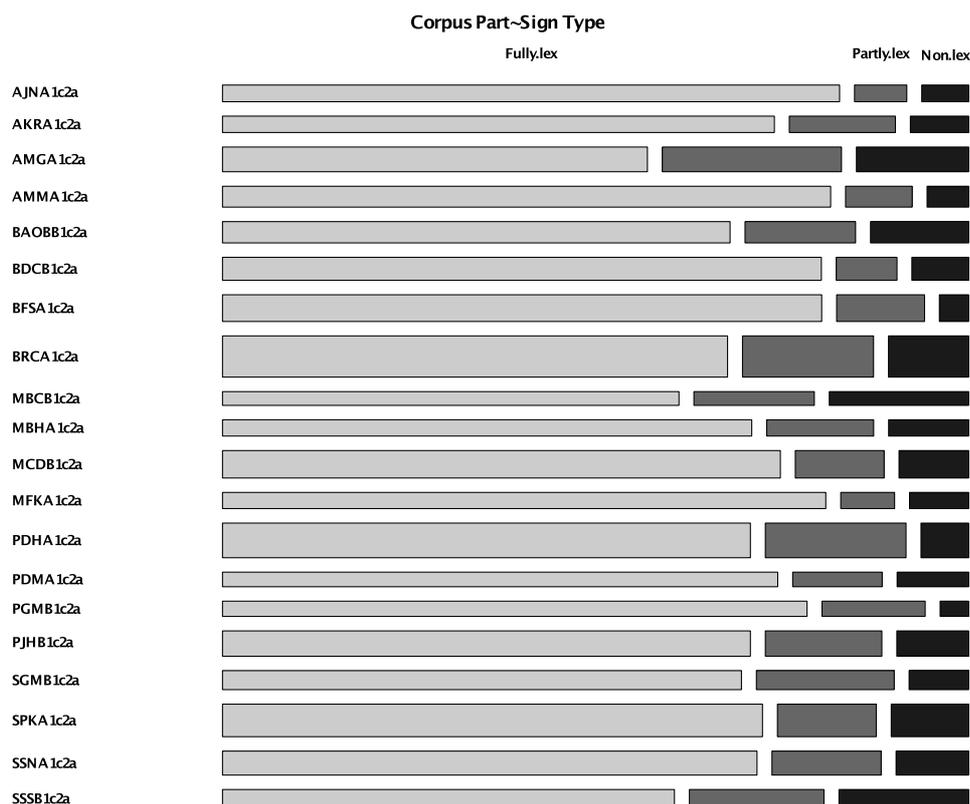


Figure 6.1 Mosaic plot of Corpus Part (file name)~Sign Type in the study corpus

The mosaic plot also gives a better idea of the differences in the size of individual corpus parts (i.e. duration and/or lexical frequency) and the overall proportion of signs produced by individual signers relative to each other. Overall it is easier to compare apples with apples, particularly similarly sized corpus parts.

For example, we can see that BRCA produced a much longer and/or lexically richer narrative than most other signers. We can also see that PJHB and SSNA share similar size corpus parts and similar distributions of sign types. However, SSSB appears also to be a similar size of narrative to PJHB and SSNA, but has quite a dramatically different distribution of sign types, ostensibly due to greater use of non-lexical signs in her narrative. As it happens, SSSB is narrating the story to her younger brother, which may have influenced an intimate register in which gesture and enactment may be used more freely.

This exploration confirms that the dispersion of sign types in the study corpus is not uniform across corpus parts. This suggests that inter-signer variation may have a significant effect on findings regarding the distribution of sign types—and possibly other units—in the study corpus. In other words, that there is potential for the preferences or tendencies of just a few signers to affect the generalisations inferred from this small corpus.

A more specific measure of dispersion that considers the dispersion of each sign type with respect to the corpus parts can be calculated using the deviation of proportions (*DP*) and

the normalised deviation of proportions (DP_{norm}) developed by Gries (2008, 2010b). These measures are parts-based (as opposed to distance-based) indices of the dispersion of linguistic items in texts or corpora (Gries 2008: 707). These measures were created specifically for linguistic investigations. There are a number of reasons that the DP is a useful measure of dispersion for linguistic corpora, but the main reason is the ability to handle observed frequencies in different corpus parts.

Gries provides a simple example to describe this concept (2008: 406). This example considers a corpus of length $l=50$ that is divided into $n=5$ equally-sized parts, and which may be represented as:

b a m n i b e u p k | b a s a t b e w q n | b c a g a b e s t a | b a g h a b e a a t | b a h a a b e
a x a

If a linguist is interested in a word a , it may not be enough to simply add up all the tokens of a and present this count as a generalisation of the entire corpus in which it appears, i.e. that fifteen of the fifty observed tokens were word a (30%). It may also be necessary to quantify the frequency of word a in each n part of the corpus. In this case, only one token of word a was observed in the first part, two tokens were observed in the second part, three tokens in the third part, and so on. Even for a made-up corpus these are potentially significant differences between corpus parts. Thus, a parts-based measure of dispersion for linguistic corpora is indispensable for interpreting the absolute or relative frequencies of occurrence observed in a corpus.

The DP is calculated by: (1) determining the sizes of each of the n corpus parts (normalised against the overall corpus size and corresponding to expected percentages which take differently-sized corpus parts into consideration); (2) determining the frequency with which a given item a occurs in each of the n corpus parts (normalised against the overall number of occurrences of the item and corresponding to an observed percentage); and (3) computing all n pairwise absolute differences of observed and expected percentages, summing them, and dividing by two (summarised from Gries 2008: 415).

The resulting value DP can “theoretically range from approximately 0 to 1, where values close to 0 indicate that a is distributed across the n corpus parts as one would expect given the sizes of the n corpus parts. By contrast, values close to 1 indicate that a is distributed across the n corpus parts exactly the opposite way one would expect given the sizes of the n corpus parts” (Gries 2008: 415).

The corpus parts assumed for computing DP were the individual files, i.e. individual retellings/signers. The DP values for the dispersion of sign types across the twenty parts of the study corpus are reported in Table 6.5 below. The DP for fully lexical signs in the study corpus is very close to 0, suggesting that fully lexical signs are distributed across the n corpus parts almost exactly as one would expect given the sizes of the n corpus parts. The DP for partly lexical and non-lexical signs are somewhat higher, but still much closer to 0 than to 1. This suggests that partly lexical and fully lexical signs are also distributed

across the n corpus parts much as one would expect given the sizes of the n corpus parts (but still less than as expected for fully lexical signs).

These DP values indicate that none of the sign types are underdispersed across the n corpus parts, despite the concerns raised by exploring the data using general statistical methods and the mosaic plot (i.e. concerns that the idiosyncrasies of one or two signers may affect the overall distribution). With respect to the distribution of sign types at least, the dispersion of fully lexical, partly lexical and non-lexical sign types across the study corpus parts is close to the generalised distribution reported in Section §6.2.3 above.

Table 6.5 Deviation of proportions (DP) for three major classes of sign type across all corpus parts ($n=20$)

<i>Sign Type</i>	<i>Deviation of proportions (DP) value</i>
Fully lexical	0.036
Partly lexical	0.113
Non-lexical	0.142

The normalised frequencies of occurrence and measurements of dispersion reported here help to frame the study corpus in relation to the Auslan Corpus, and the parts of the study corpus in relation to each other. The normalised frequencies reported in Section §6.2.3 suggest that fully lexical and non-lexical sign types are more frequent in the study corpus than the Auslan Corpus and Auslan Corpus narratives, although partly lexical depicting signs are less frequent. Partly lexical pointing signs in the study corpus are less frequent than in the Auslan Corpus, but more frequent than in the Auslan Corpus narratives.

The general statistics of dispersion and the mosaic plot suggest that a number of signers use comparatively fewer or more partly lexical and non-lexical signs than other signers in the study corpus. This indicates one possible source of variation for analysing identified clause-like units in the study corpus. However, the deviation of proportions values reported in Table 6.5 suggest that even though the twenty corpus parts differ in size and duration, all sign types in the study corpus are dispersed across the n corpus parts much as expected.

The exploration presented in Section §6.2 facilitated familiarity with: (a) the distribution of three major classes of sign type in the study corpus, Auslan Corpus, and study corpus parts; (b) the sizes of the individual narratives in the study corpus relative to each other; and (c) particular signers who appeared to diverge somewhat from the study corpus norm, at least with respect to their use of three major classes of sign type.

6.3. Architecture of the study corpus

6.3.1. Certain and Uncertain CLU composites in the study corpus

The analytical framework of this study was developed to explore whether signed utterances can be identified and analysed from a clause-level perspective of analysis. The

units identified and analysed in this second exploration of the study corpus are referred to as Clause-Like Units (CLUs). Some annotated CLUs 'stand alone' in their interpretation, while others are linked hypotactically. In the study corpus, two types of hypotaxis were identified: embedding and dependency (see §3.4.2 and §4.4.3.4).

The CLUs identified in the study corpus are grouped into categories of CLU composites depending on how they are linked and the type of relation they construe. This grouping resulted in the identification of several categories of CLU composites in the study corpus narratives (see §4.4.3). CLUs that stand alone in the text constitute the main category of CLU composite: Single CLU composites. CLUs that are linked via relations of embedding and/or dependency constitute other categories of CLU composites: Embed CLU composites, Depend CLU composites, or DependEmbed CLU composites.

Most of these CLU composites were delineated and analysed with relative subjective certainty (see §4.4.3.6 and §5.2.3). These are referred to as Certain CLU composites. However, some were identified with relative uncertainty. These are referred to as Uncertain CLU composites. The analytical architecture of the study corpus for this study is shaped by the overall distribution of CLU composites with respect to subjective certainty of identification and delineation. All successive analyses proceed from this framework.

Table 6.6 below reports the percentage proportion of all categories of CLU composites identified in the study corpus. A total of 1,052 CLU composites were identified in the study corpus. Each corpus part contains between 31 and 86 CLU composites, with a median of 48.5 (i.e. 49) and a statistical range of 55 CLU composites. These CLU composites contain a total of 1,195 CLUs. Each corpus part contains between 99 and 41 CLUs, with a median of 55 and a statistical range of 58 CLUs.

Most CLU composites in the study corpus were identified with relative certainty (94.6%). These Certain CLU composites vary in how they are linked. The majority are Single Certain CLU composites (91.0%), while the rest are sequences of one or more (but typically only two) CLUs linked via relations of embeddedness, dependency, or both (9.0%).

A comparably smaller proportion of CLU composites were identified with relative uncertainty (5.4%). These Uncertain CLU composites vary in how they are linked. The majority are Single Uncertain CLU composites (2.4%), while the rest are sequences of one or more (but typically only two) CLUs linked via relations of embeddedness, dependency, or both (3.0%). Uncertain CLU composites were: (1) uncertainly delineated as an utterance unit; and/or (2) uncertainly analysed regarding possible relations of hypotaxis, where there were usually two or three possible alternative analyses, and where it was not appropriate to preference one analysis in favour of another (see §4.4.3.6 and §5.4).

Overall, there was a strong tendency for Single Certain CLU composites to be identified in these narratives (86.0%). CLU composites that contain CLUs linked via relations of hypotaxis were identified to a lesser extent (11.6%). In these types of CLU composites,

embeddedness is more frequently identified than dependency. The few CLU composites containing relations of both embeddedness and dependency (0.3%) tend to occur at the end of the narratives when the signer makes some comment about the moral of the story.

Table 6.6 Percentage proportion of CLU composites identified in the study corpus

<i>Type of CLU composite (n=4)</i>	<i>Certain (n=995)</i>	<i>Uncertain (n=57)</i>	<i>Row totals (n=1,052)</i>
Single (n=930)	86.027	2.376	88.403
Embed (n=74)	5.513	1.521	7.034
Depend (n=43)	2.757	1.331	4.087
DependEmbed (n=5)	0.285	0.190	0.475
<i>Column totals (n=1,052)</i>	<i>94.582</i>	<i>5.418</i>	<i>100.000</i>

In order to explore the types of CLU composites identified with relative certainty or uncertainty, mosaic plots of all eight categories of CLU composites were computed. Figure 6.2 presents the resulting visualisation of the absolute observed frequencies of each category of CLU composite. It is evident that not only do Single Certain CLU composites account for the largest category of CLU composites identified in the study corpus, the other three categories of CLU composites are much smaller and contain greater proportions of Uncertain CLU composites. The higher proportions of uncertainty could be attributed to the smaller sizes of these sets. It could also reflect a general observation that CLUs linked via relations of hypotaxis in the study corpus are more difficult to interpret, identify and analyse with relative certainty (see §5.4).

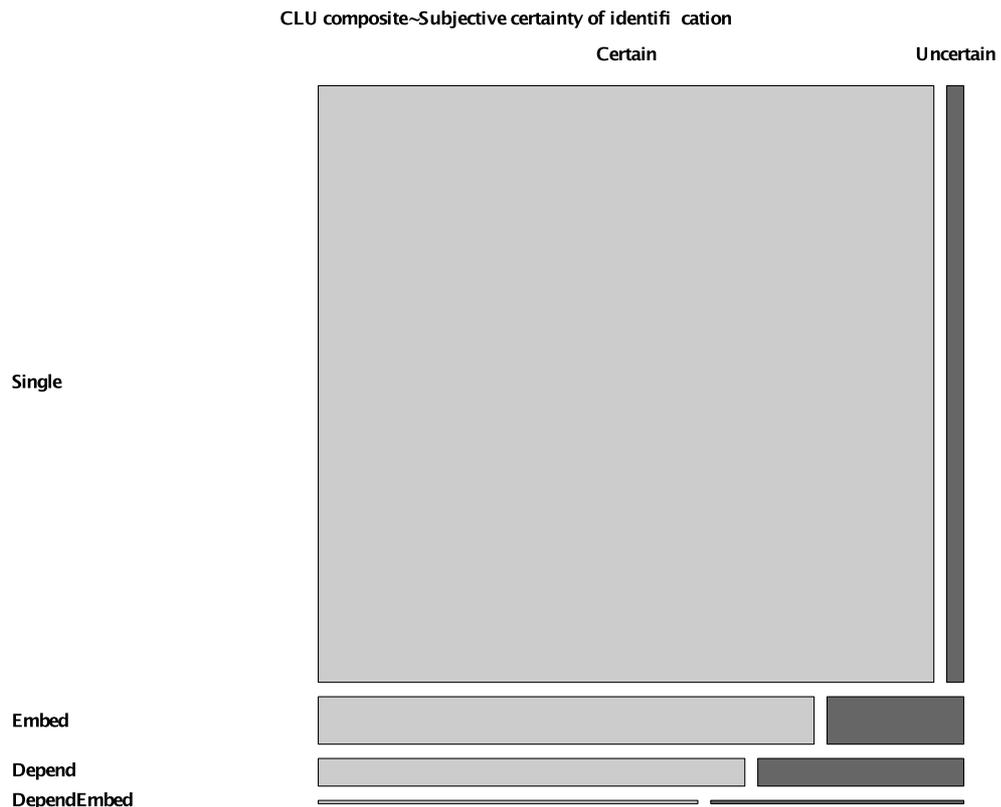


Figure 6.2 Mosaic plot of CLU composite~Subjective certainty of identification of CLU composites in the study corpus

As in Section §6.2 above, the *DP* values for each category of Certain and Uncertain CLU composite were computed. The corpus parts assumed for computing *DP* were again the individual files, i.e. individual retellings/signers. The *DP* values are reported in Table 6.7 below. The *DP* value of Single Certain CLU composites is very close to 0, suggesting that Single Certain CLU composites are distributed across the n corpus parts almost exactly as one would expect given the sizes of the n corpus parts.

The *DP* values of Embed Certain and Depend Certain CLU composites are also relatively close to 0, suggesting that these CLU composites are also distributed across the n corpus parts almost exactly as one would expect given the sizes of the n corpus parts. These values indicate we can expect that these three categories of CLU composites were identified in most corpus parts. That is, Single Certain CLU composites, Embed Certain CLU composites and Depend Certain CLU composites were identified in all or almost all of the narratives in the study corpus.

On the other hand, the *DP* values for the Certain DependEmbed CLU composites and all Uncertain CLU composites are much closer to 1. These *DP* values indicate that these CLU composites are underdispersed across the n corpus parts. That is, not only were these CLU composites infrequently observed overall, they were identified in the narratives of only a few signers.

Table 6.7 Deviation of proportions (*DP*) for eight categories of CLU composites across all corpus parts ($n=20$)

<i>CLU composite</i>	<i>Certain</i>	<i>Uncertain</i>
Single	0.028	0.416
Embed	0.283	0.410
Depend	0.277	0.535
DependEmbed	0.843	0.937

The findings reported in this section help to build an understanding of the analytical architecture of the study corpus and corpus parts. Most of the analytical units identified in the study corpus are Single Certain CLU composites that are well dispersed across all corpus parts. Furthermore, even though Embed Certain CLU composites and Depend Certain CLU composites were identified much less frequently, these units are also well dispersed across all corpus parts. However, DependEmbed Certain CLU composites and all Uncertain CLU composites were identified very infrequently and are underdispersed across all corpus parts.

6.4. Single CLU composites in the study corpus

6.4.1. Differentiating analyses

A total of 905 tokens of Single Certain CLU composites were identified in the study corpus. All tokens were sorted and differentiated according to annotations from overlaps with the CLU composite and CLU tiers in order to explore whether the annotated core elements in each token pattern in recurrent ways. Annotations were extracted from ELAN, categorised in Excel and sorted in R according to two points of differentiation. Each point of differentiation shaped the analysis for successive differentiations.

As this study adopted a composite utterance approach to identifying and analysing possible clause-like units (see Chapter §3), the first point of differentiation was to further categorise Single CLU composites according to the mode of expression of the core elements identified in each token, i.e. handedness and enactment.

The second point of differentiation was to categorise these tokens according to the core elements identified in each unit, i.e. the elements identified as functioning as the core argument(s) and predicate(s) of the clause-like unit.

Following these differentiations, the core elements of the Single Certain CLU composites were also explored according to their classification as a fully lexical, partly lexical or non-lexical sign. Single CLU composites were also explored according to their co-expression with enactment, i.e. constructed action and constructed dialogue.

6.4.2. Mode of expression of core elements

The first differentiation of the Single Certain CLU composites was achieved by sorting the annotations retrieved from overlaps with the SH-Argument, WH-Argument and CA-Argument tiers. When the data were categorised for mode of expression, six patterns emerged from the category of Single Certain CLU composites. Figure 6.3 below displays these six patterns and their percentage proportions.

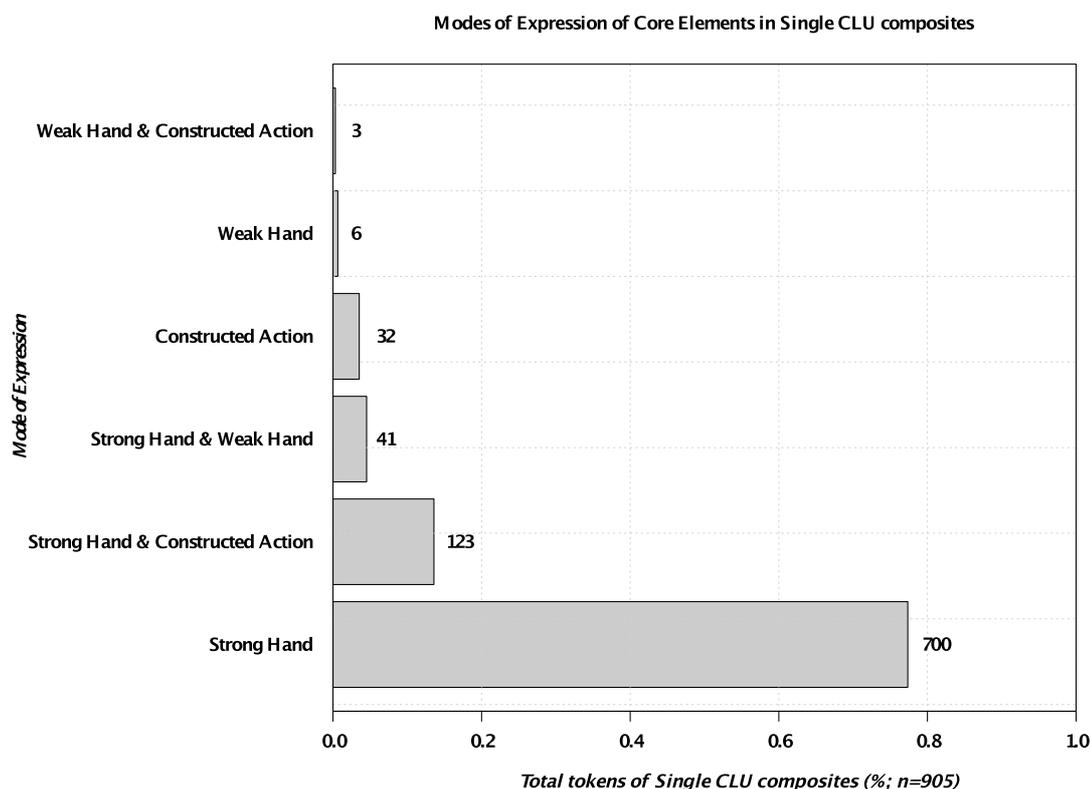


Figure 6.3 Percentage proportion of modes of expression of core elements in Single Certain CLU composites ($n=905$)

Differentiation of core elements according to mode of expression revealed six combinations of handedness and enactment. The strongest preference is for signers to use strong-handed signs to manually express the overt core elements of these CLU composites, i.e. either double-handed signs (e.g. the sign glossed as DOUBT in Video MCDB1c2aCLU#27) or signs produced using the strong hand only (e.g. the signs glossed as NOT-CARE-LESS in Video BAOBB1c2aCLU#9 and LOOK in Video AJNA1c2aCLU#31).

The second preference is for signers to rely on enactment to show core information at the same time as different overt core elements expressed manually (e.g. the sign glossed as THINK recruited for an enactment of the boy thinking in Video SGMB1c2aCLU#6). The third preference is for signers to use a combination of strong-handed and weak-handed signs to overtly express core elements manually (e.g. the weak-handed sign glossed as BECKON2 and the strong-handed sign glossed as FS:WOLF in Video BRCA1c2aCLU#81).

The remaining combinations are for signers rely solely on enactment to express the core information identified in the unit (e.g. the token of enactment of the boy thinking in Video MBHA1c2aCLU#13); for signers to use weak-handed signs only (e.g. the signs glossed as G(5-DOWN):PHOOEY and DSM(5-VERT):MANY-HUMANS-MOVE in Video SGMB1c2aCLU#20); and for signers to use enactment to show core information at the same time as different overt core elements expressed with a weak-handed sign (e.g. the weak-handed sign glossed as NOT-CARE-LESS recruited for a token of an enactment of the villagers in Video PJHB1c2aLHCLU#60—note that PJHB is a left-handed signer). Overall, signers appear to prefer using strong-handed signs with or without enactment to express the core elements identified in these Single CLU composites.

6.4.3. Core elements in Single CLU composites

The second point of differentiation was to categorise these tokens according to their annotated core element analyses. As with the first differentiation, this was achieved by sorting the annotations retrieved from overlaps with the SH-Argument, WH-Argument and CA-Argument tiers. Tokens with repeating (e.g. [V A V A]) or bracketing (e.g. [V A V]) were treated independently to non-bracketed or non-repeated tokens (e.g. [V A]).

Categorising Single Certain CLU composites according to both the mode of expression of their core elements and the functional analyses of their core elements resulted in a list of ninety-six patterns of core element analyses. Table 6.8 below reports: (1) the observed absolute frequency of occurrence of each pattern; (2) the percentage proportion of each pattern; and (3) the relative frequency of occurrence of each pattern per 1,000 tokens.

As these findings are discussed, it is important to keep in mind that all CLU composites are foremost tokens of linguistic analysis rather than tokens of types of clause-like units. It is also yet to be determined if they are tokens of Auslan clause-like units that may be identified and explored elsewhere in the Auslan Corpus. Note that the method of extraction eliminated much distinction between clause-level sequentiality and simultaneity annotated in the study corpus, so it is not possible to comment comprehensively on this aspect here.

Table 6.8 Differentiated patterns of core element analyses in tokens of Single Certain CLU composites (f =absolute frequency (n=905); f_{rel} =relative frequency (per 1,000 tokens); /WH/=Weak Hand)

No.	Pattern	$f(n)$	$f(\%)$	f_{rel}
1	V	212	23.425	234
2	A V	109	12.044	120
3	CA(A) V	55	6.077	61
4	V A	54	5.967	60
5	A	42	4.641	46

6	AI V A2	39	4.309	43
7	VI V2	34	3.757	38
8	Indefinite	32	3.536	35
9	CA(V)	29	3.204	32
10	A VI V2	29	3.204	32
11	AI A2	27	2.983	30
12	nonA	27	2.983	30
13	V /WH/A	17	1.878	19
14	V V	13	1.436	14
15	A CA(V)	13	1.436	14
16	CA(AI) V A2	12	1.326	13
17	CA(VI) V2	11	1.215	12
18	A VI V2 V3	10	1.105	11
19	VI V2 V3	9	0.994	10
20	V A V	8	0.884	9
21	VI V2 A	6	0.663	7
22	AI VI V2 A2	6	0.663	7
23	CA(VI) V2 V3	5	0.552	6
24	A A	5	0.552	6
25	VI A V2	4	0.442	4
26	CA(A) VI V2	4	0.442	4
27	AI V /WH/A2	4	0.442	4
28	A /WH/V	4	0.442	4
29	/WH/V	4	0.442	4
30	VI V2 VI	3	0.331	3
31	V A A	3	0.331	3
32	CA(AI) A2	3	0.331	3
33	VI V2 V3 A	2	0.221	2
34	VI V2 A VI	2	0.221	2
35	VI /WH/V2	2	0.221	2

36	V AI V A2	2	0.221	2
37	CA(A) nonA	2	0.221	2
38	AI V A2 V	2	0.221	2
39	AI AI V A2	2	0.221	2
40	A VI CA(V2)	2	0.221	2
41	VI V2 V3 V4	1	0.110	1
42	VI V2 V3 CA(V4) V5 A	1	0.110	1
43	VI V2 V2	1	0.110	1
44	VI V2 VI V2	1	0.110	1
45	VI V2 VI VI	1	0.110	1
46	VI V2 VI /WH/A	1	0.110	1
47	VI V2 A /WH/A	1	0.110	1
48	VI V2 /WH/A	1	0.110	1
49	VI CA(V2) A V3 VI	1	0.110	1
50	VI CA(V2)	1	0.110	1
51	VI A A /WH/V2	1	0.110	1
52	V AI A2 V AI	1	0.110	1
53	V AI A2	1	0.110	1
54	V A A V	1	0.110	1
55	V A /WH/A	1	0.110	1
56	CA(V1) V2 V3 V4 CA(V5)	1	0.110	1
57	CA(V1) CA(V2)	1	0.110	1
58	CA(V1) /WH/V2	1	0.110	1
59	CA(A1) VI V2 A2	1	0.110	1
60	CA(A) VI V2 V3 V2	1	0.110	1
61	CA(A) VI V2 V3	1	0.110	1
62	CA(A) V V	1	0.110	1
63	CA(A) /WH/V	1	0.110	1
64	AI VI V2 /WH/A2	1	0.110	1
65	AI VI V2	1	0.110	1

66	AI VI CA(V2) V3 VI A2	I	0.110	I
67	AI V V V /WH/A2 /WH/A2 /WH/A2	I	0.110	I
68	AI V V	I	0.110	I
69	AI V CA(A2)	I	0.110	I
70	AI V AI A2	I	0.110	I
71	AI CA(VI) V2 A2	I	0.110	I
72	AI CA(V) A2	I	0.110	I
73	AI A2 AI A2	I	0.110	I
74	AI A2 AI	I	0.110	I
75	AI AI VI V2 A2	I	0.110	I
76	AI AI A2 A2	I	0.110	I
77	AI /WH/A2	I	0.110	I
78	A VI V2 V3 V4	I	0.110	I
79	A VI V2 VI V2 VI V2	I	0.110	I
80	A VI V2 VI	I	0.110	I
81	A VI CA(V2) V3	I	0.110	I
82	A VI /WH/V2	I	0.110	I
83	A V A V	I	0.110	I
84	A V /WH/A	I	0.110	I
85	A CA(VI) V2 V3 V4	I	0.110	I
86	A CA(VI) V2 V3	I	0.110	I
87	A CA(VI) V2	I	0.110	I
88	A A V	I	0.110	I
89	A A CA(V)	I	0.110	I
90	A /WH/VI /WH/V2	I	0.110	I
91	/WH/VI V2 A V2	I	0.110	I
92	/WH/VI /WH/V2	I	0.110	I
93	/WH/AI V A2	I	0.110	I
94	/WH/AI A2 A2	I	0.110	I
95	/WH/A CA(V)	I	0.110	I

96	/WH/A /WH/V	1	0.110	1
	<i>Column totals</i>	905	100.000	1,000

At first glance, Table 6.8 shows that forty patterns of core argument analyses are represented by more than one token, suggesting that these core element analyses may be described more truthfully as patterns of analysis. However, Table 6.8 also shows that thirty-one patterns contain core predicate(s) that were instantiations of constructed action (i.e. framed or unframed tokens of singular events), or core argument(s) that were inferred via constructed action (i.e. not a type of sign at all—rather, the constructed action shows who is doing the enacting in addition to enacting what was done).

Table 6.8 also shows that fifty-six ‘patterns’ (58.3%) are one-off instantiations (hapax legomena) in the study corpus. These hapaxes cannot be described as ‘patterns of analysis’ differentiated according to mode of expression and core element analysis. However, there are some similarities in the list of hapaxes. Many appear to be variations of more frequent types of core argument analyses. Three similarities in particular warrant closer inspection.

Firstly, some types of core element analyses contain repeated or bracketed elements and may be categorised more schematically with other types. For example, tokens of Pattern 1: [V] and Pattern 14: [V V] were identified as expressing a single overt predicate, and could both be categorised as Pattern 1: [V]. The tokens of Pattern 43: [V1 V2 V2], Pattern 44: [V1 V2 V1 V2] and Pattern 45: [V1 V2 V1 V1] were identified as expressing two overt predicates, and could all be categorised as Pattern 7: [V1 V2]. The tokens of Pattern 20: [V A V] and Pattern 54: [V A A V] were identified as expressing an overt argument and predicate, and could both be categorised as Pattern 4: [V A]. Approximately 24.74% of tokens of Single CLU composites contain repeated elements (e.g. Pattern 14: [V V]), and 15.78% contain bracketed elements (e.g. Pattern 20: [V A V]).

Secondly, some patterns were tagged with a sequence of numbered V elements that may be categorised more schematically with other types by treating annotated V sequences as a ‘macro’ predicate that expresses either: (1) a sequence of activities (i.e. a type of serial verb that prompts a series of activities); or (2) multiple symbolisations of a single activity (i.e. a type of serial verb that prompts an elaborate construal of one activity). For example, tokens of Pattern 41: [V1 V2 V3 V4], Pattern 79: [A V1 V2 V1 V2 V1 V2] and Pattern 80: [A V1 V2 V1] were all identified as having one core argument and more than one core predicate. All of these patterns could be categorised as Pattern 2: [A V]. Approximately 16.69% of tokens of Single CLU composites contain annotated V sequences (e.g. Pattern 80: [A V1 V2 V1]).

Thirdly, some patterns that differ only by their mode of expression may be categorised more schematically by not differentiating them according to their mode of expression. For example, the tokens of Pattern 2: [A V] and Pattern 96: [/WH/A /WH/V] were all identified as having one core argument and one core predicate (although articulated via different modes). Even though Pattern 96 occurs as hapax legomenon, this is primarily an

effect of the analytical differentiation. Pattern 96 may be re-categorised as the more frequent Pattern 2: [A V] using less strict criteria. This possibility for re-categorisation will likely affect the occurrence of hapaxes in this differentiated distribution. As reported above, approximately 58.3% of tokens of Single CLU composites are hapax legomena (e.g. Pattern 87: [A CA(V1) V2]).

While exact frequencies differ, these global rankings are more or less comparable with data reported in Ferrara & Johnston (2012) and Hodge & Johnston (2014). Regardless of the degree of differentiation, there is a strong tendency for Single Certain CLU composites to contain only one, two or three core elements in temporal sequence and/or simultaneously. Overall, these tokens tend to contain one (A) or two arguments (A1, A2), and one predicate of varying degrees of complexity (e.g. V, V1, V2).

The top five patterns in Table 6.8 were explored more closely with respect to the annotations created on the GramClass, MacroRole and SemRole tiers. The most frequent pattern listed in Table 6.8 is for tokens of Single Certain CLU composites to express one core predicate, i.e. Pattern 1: [V]. Following the method used here and in the Auslan Corpus, all of these identified predicates were annotated redundantly as Process on the MacroRole and SemRole tiers (see §4.4.3.3).

Approximately 87.7% of these identified predicates are verbs of location and/or direction or depicting verbs that can be modified in the signing space to indicate who did what to whom (e.g. Video PDMA1c2aLHCLU#32). The remaining 12.3% are plain verbs or other signs that cannot be modified for location or direction (e.g. Video SGMB1c2aCLU#7). It is possible that some of these tokens also contain core argument information that is shown 'covertly' via the direction and location of signs, or inferred from the context, although investigating this question requires further corpus enrichment (but see de Beuzeville et al. 2009 and §6.4.5 below).

The second frequent pattern is for Single Certain CLU composites to express one core argument and one core predicate, i.e. Pattern 2: [A V]. Almost all core arguments were identified as expressing an Actor macro-role (99%). Approximately 99% of these Actors were identified as semantic role of Agent, 7.4% as Experiencer, and 1% as Existent (e.g. Video MCDB1c2aCLU#32). Only one token contained a core argument identified an Undergoer macro-role (see Example Video BRCA1c2aCLU#15). Approximately 30.3% of all arguments were expressed via a pointing sign. The remaining 69.7% were expressed via plain nouns, locatable nouns and one depicting noun.

With respect to the core predicates in Pattern 2: [A V], approximately 48.6% were identified as verbs of location and/or direction or depicting verbs that can be modified in the signing space. The remaining 51.4% were identified as plain verbs or other signs that cannot be modified for location or direction. This suggests that roughly half of the Pattern 2: [A V] tokens reported in Table 6.8 express semantically intransitive construals with only one overt core argument (e.g. Video BAOBB1c2aCLU#9).

The third frequent pattern is for signers to rely on enactment to show core information at the same time as expressing one core predicate, i.e. Pattern 3: [CA(A) V]. In these tokens, all enactments were identified as expressing an Actor macro-role. Approximately 70.9% of these Actors were identified as semantic role of Agent and 29.1% as Experiencer (e.g. Video MCDB1c2aCLU#52). Enactments of the boy were identified as Actor in over half of these tokens (61.8%), whereas enactments of the villagers were identified as Actor in the remaining tokens (38.2%).

With respect to core predicates, approximately 56.4% were identified as verbs of location and/or direction or depicting verbs that can be modified in the signing space. The remaining 43.6% were identified as plain verbs or other signs that cannot be modified for location or direction. This suggests all of the Pattern 3: [CA(A) V] tokens express either transitive or intransitive expressions where the sole core argument is shown via enactment rather than explicitly expressed via lexis (e.g. Video PGMB1c2aCLU#38). This also suggests that Pattern 3: [CA(A) V] may be re-categorised as Pattern 1: [V].

The fourth frequent pattern is for Single Certain CLU composites to express one core predicate followed by one core argument, i.e. Pattern 4: [V A]. Approximately 81.5% of these identified predicates are verbs of location and/or direction. None were depicting verbs. The remaining 18.5% were plain verbs.

With respect to the core arguments, approximately 24% were identified as locatable nouns, 14.8% were identified as pointing signs or depicting nouns, and 61.2% were identified as plain nouns or other signs. About two thirds of these core arguments were identified as Undergoer macro-role (75.9%), either Patient (65.9%), Existent (14.6%) Location (7.3%) or Goal (4.9%) (e.g. Video BFSA1c2aCLU#19). The remaining third of core arguments in Pattern 4: [V A] were identified as Attribute macro-role (13%, either a quality or verbiage) or Complement (11.1%, a nominalised process) (e.g. Video AKRA1c2aCLU#27).

The fifth frequent pattern is for Single Certain CLU composites to express a single core argument, i.e. Pattern 5: [A]. Approximately 69% of these core arguments were identified as plain nouns or adjectives that cannot be modified for location. The remaining 31% were identified as locatable nouns or depicting nouns that can be modified for location. About three quarters of these core arguments were identified as Attribute macro-role (85.7%). These Attributes were generally some quality of a thing, person or event (e.g. Video MCDB1c2aCLU#79). The remaining quarter were identified as Actor (11.9%), either an Agent or Existent, or Undergoer; or a Goal (2.4%) (e.g. Video SSNA1c2aCLU#29).

The next thirteen differentiated patterns of core element analyses reported in Table 6.8 account for more than one quarter of the total (32.3%), with a range of 10 to 39 tokens. Several of these patterns warrant closer inspection with respect to their macro-roles: Pattern 6: [A1 V A2], Pattern 7: [V1 V2], Pattern 8: [Indefinite], Pattern 9: [CA(V)] and Pattern 11: [A1 A2].

Pattern 6: [A1 V A2] tokens were identified as expressing two core arguments and one core predicate. Approximately 77% were identified as [Actor Process Undergoer] macro-roles. The remaining 23% were identified as [Actor Process Attribute], [Actor Process Complement] or [Carrier Actor Process] macro-roles.

Pattern 7: [V1 V2] tokens were identified as expressing two core predicates. As mentioned above, tokens with a sequence of numbered V elements may express either a sequence of activities or multiple symbolisations of a single activity. Investigating this question requires further corpus enrichment.

Pattern 8: [Indefinite] tokens were identified as having at least two likely core element analyses ($n=32$). There are several variations of indefinite analyses, but two particular tendencies emerged. The first is [A1_A A2_V] (e.g. Video MDCB1c2aCLU#52, where it is ambiguous as to whether the most appropriate analysis is something like “*wolf! it’s a wolf attack!*” or “*wolf! the wolf attacks!*”). The second is [V_A] (e.g. Video MBCB1c2aCLU#27, where it is ambiguous as to whether the most appropriate analysis is something like “*you’re joking*” or “*it’s a joke*”).

Pattern 9: [CA(V)] tokens are particularly interesting because all core predicate information is enacted rather than prompted using fully lexical, partly lexical, or non-lexical manual signs ($n=29$). As tokens of constructed action that demonstrate an activity, these are tokens of singular events that are either framed by lexical signs or non-manual strategies such as eye gaze and body shifts in the preceding discourse, or they are unframed (e.g. Video BFSA1c2aCLU#54).

As singular events, it is also unlikely these instantiations may be identified and explored elsewhere in the Auslan Corpus, although similar enactments may be identified in each part of the study corpus. However, this is a consequence of text type and context: all signers in the study corpus are retelling the same story, and are therefore creating similar enactments. This is one area where the frequencies of occurrence identified in a corpus may not necessarily suggest conventionalisations of particular signs. That is, the frequency of occurrence of non-conventional and non-lexical signs does not necessarily indicate abstractions from usage events that suggest conventionalisation. For example, even if a high number of demonstrations of the boy hitting the wolf with a stick are quantified in the study corpus (such as in Video BFSA1c2aCLU#54), they are still tokens of singular events that manifest in a corpus part rather than tokens of conventional signs.

Instead, these tokens of CLU composites appear to constitute signed utterances that emerged enchronically within the spatio-temporal context of the narrative event. While it is possible that these tokens may have been used recurrently in subsequent communicative moves between the paired signers who created them, if the standing-for relation remained focally or peripherally active for interactants, any assessment of this potential is beyond the scope of this study (see §3.2.4.3).

Finally, Pattern 11: [A1 A2] tokens were identified as expressing two core arguments (e.g. Video MBHA1c2aCLU#5). Almost all of these tokens were identified as [Carrier Attribute]

macro-roles (96%). Only one token was identified as [Attribute Carrier] macro-role (see Video BAOBB1c2aCLU#8).

Overall, approximately 88.18% ($n=797$) of all tokens of Single Certain CLU composites appear to constitute patterns of clause-like units that may be identified and explored elsewhere in the Auslan Corpus. For example, Pattern 1: [V], Pattern 2: [A V], Pattern 4: [V A], Pattern 6: [A1 V A2], Pattern 7: [V1 V2], Pattern 10: [A V1 V2], and Pattern 11: [A1 A2].

However, the strict criteria used to differentiate patterns in this section means that not all patterns may point to entrenched structures of language use. It is likely that many patterns (such as the hapaxes and tokens with numbered V elements) would first need to be re-categorised as a ‘macro’ pattern of one of the top ten or so patterns of CLU composites listed in Table 6.8. For example, approximately 10.41% of this subset of tokens were identified as co-occurring with enactment that provided the sole information of a core argument ($n=83$). These tokens may be re-categorised as one of the more frequent patterns if this differentiation was not made, for example if Pattern 26: [CA(A) V1 V2] re-categorised as Pattern 1: [V].

To explore the patterns reported in Table 6.8 more schematically, the patterns with (a) repeated and/or bracketed elements, (b) sequences of numbered V elements, and/or (c) overt expression via weak-handed signs or enactment were conflated into a more ‘macro’ inventory of core element analyses where these differentiations are not made. For example, Pattern 3: [CA(A) V] tokens were conflated into Pattern 1: [V], and Pattern 18: [A V1 V2 V3] and Pattern 28: [A /WH/ V] tokens were conflated into Pattern 2: [A V].

Table 6.9 below reports these conflated patterns as a simplified macro inventory of the core element analyses of Single Certain CLU composites in the study corpus. Conflation of the differentiated analyses resulted in a revised inventory of just nine patterns of core element analyses. This revised macro inventory provides a general idea of the patterning of core argument and predicate elements with respect to their presence and ordering, and also indicates the re-ordering of patterns (see column 1 in Table 6.9). For example, the ninth most frequent pattern in the macro inventory is Pattern 53: [V A1 A2], which quite a large difference between the two inventories (i.e. a jump from order 53 to order 9).

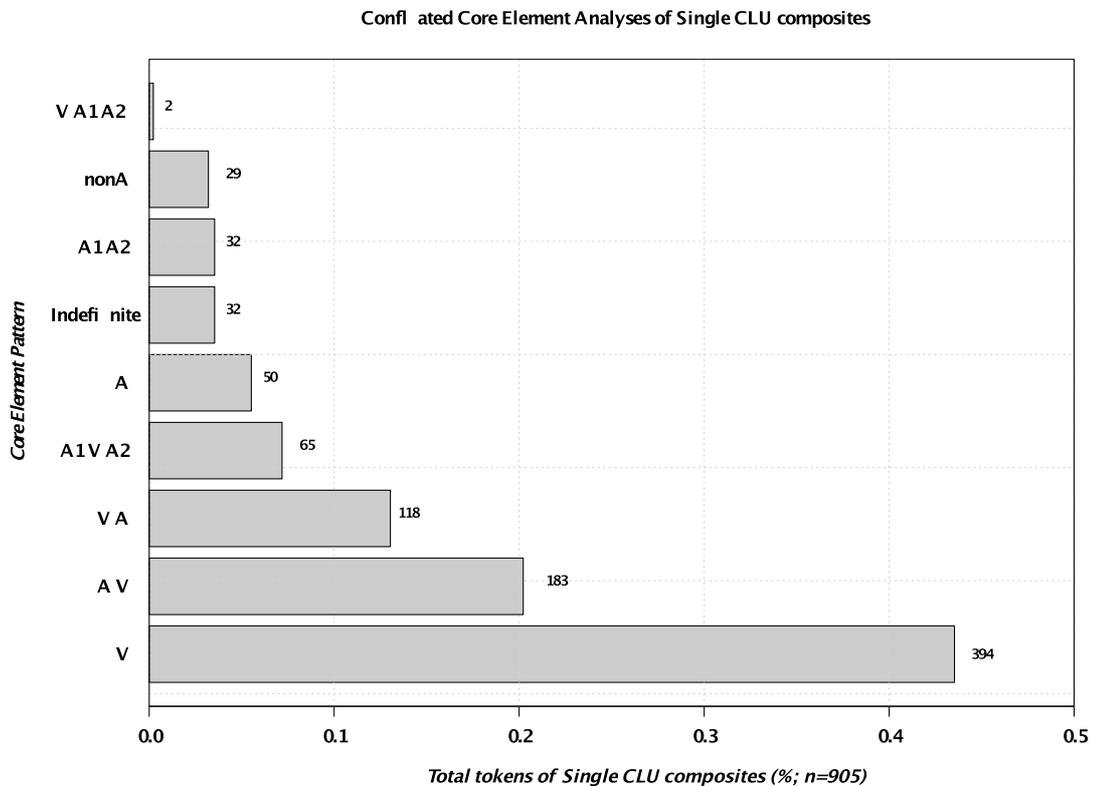
Table 6.9 Conflated patterns of core element analyses in tokens of Single Certain CLU composites in the study corpus in order of decreasing frequency (f =absolute frequency ($n=905$); f_{rel} =relative frequency (per 1,000 tokens)

No.	Pattern	$f(n)$	$f(\%)$	f_{rel}
1	V	394	43.536	435
2	A V	183	20.221	202
4	V A	118	13.039	130
6	A1 V A2	65	7.182	72

5	A	50	5.525	55
8	Indefinite	32	3.536	35
11	A1 A2	32	3.536	35
12	nonA	29	3.204	32
53	V A1 A2	2	0.221	2
	<i>Column totals</i>	<i>905</i>	<i>100.000</i>	<i>1,000</i>

Figure 6.4 below presents the percentage proportion of each pattern reported in Table 6.9. The top three patterns in the macro inventory account for over half of the total (75.25%; $n=681$), with a range of 105 to 331 observations of each pattern. These are (in decreasing order): Pattern 1: [V], Pattern 2: [A V] and Pattern 4: [V A]. The next seven patterns account for 24.75% of the total ($n=224$), with a narrower range of 2 to 79 observations of each pattern. These are (in decreasing order): Pattern 6: [A1 V A2], Pattern 5: [A], Pattern 11: [A1 A2], Pattern 8: [Indefinite], Pattern 12: [nonA] and Pattern 53: [V A1 A2].

Figure 6.4 Percentage proportion of the nine conflated patterns of core element analyses in tokens of Single Certain CLU composites in the study corpus



The revised macro inventory does suggest that the substantiated patterns reported in Table 6.8 constitute clause-level constructions that are complex, schematic and conventionalised (see §3.3.3). Even the hapax legomena in the study corpus can be re-categorised as a macro-pattern. However, it would be premature and misleading to interpret the nine patterns in the macro inventory as all representing tokens of conventionalised clause-level constructions.

It is important to remember that the macro inventory does not differentiate tokens with conventionalised elements from those with non-conventionalised elements. Only the differentiation of tokens of Single Certain CLU composites according to mode of expression, handedness and other factors does this. Thus, it is not true that all the tokens of Single Certain CLU composites in the study corpus are tokens that may be schematicised as a conventionalised construction. In this respect the macro-inventory is potentially deceptive.

Returning to the differentiated analyses reported in Table 6.8, it is clear that not all tokens of Single Certain CLU composites appear to constitute patterns of clause-like units that may be identified and analysed elsewhere in the Auslan Corpus. The differentiation of the core element analyses of approximately 11.82% ($n=107$) of all tokens according to mode of expression and handedness effectively created 'patterns' that are primarily a consequence

of the linguistic analysis undertaken here. As such, these differentiated analyses should not currently be described as conventionalised ‘structures’ of signed language use.

Instead, these tokens primarily constitute enchronically emerging orchestrations of signed language use that depend heavily on aspects of the discourse context for interpretation, as well as the mutually reciprocal and habitual yet non-encoding strategies for disambiguating the context that have developed within these native signed language ecologies.

This includes the tokens of singular events, with or without additional core elements ($n=75$), and the tokens with Indefinite core element analyses ($n=33$). Recall also from Chapter §5 that the original annotator tended to delineate shorter CLUs than the other two annotators. This tendency should be considered in relation to CLUs that contain one token of a singular event. Furthermore, this cautious quantification of tokens with singular events does not include tokens with manual gestures that were identified as core predicates, yet which may also be singular events (e.g. if they are found to be frequent but narrative-specific). Thus, the estimation that one tenth of the tokens are primarily by-products of linguistic analysis—and likely do not represent conventionalised structures that are habitually used by Auslan signers—is on the conservative side.

6.4.4. Enactment

The third point of differentiation for identifying patterns of Single Certain CLU composites was to categorise these tokens according to their annotated analyses on the CA tier. Over half of these Single Certain CLU composites co-occurred with some type of enactment (either constructed action or constructed dialogue) of the boy, sheep, villagers or wolf.

By comparing annotation overlaps of core element analyses and enactment, three tendencies emerged: (1) the signer uses enactment to elaborate overt core elements that are expressed manually (e.g. Video BDCB1c2aCLU#20); (2) the signer uses enactment to realise a core argument and/or predicate at the same time as different overt core elements expressed manually (e.g. tokens of Pattern 3: [CA(A) V]); or (3) signer uses enactment in lieu of any overt core elements expressed manually (e.g. tokens of Pattern 9: [CA(V)]). These strategies have been reported for other narratives in the Auslan Corpus (Ferrara & Johnston 2012, 2014).

6.4.5. Sign type

The core elements in Single Certain CLU composites were also explored according to their sign type. These findings were reported in an earlier study (Hodge & Johnston 2014). Overall, there are almost twice as many overtly expressed core predicates than core arguments in the study corpus. This accords with the typological tendency for core arguments to be inferred in spoken and signed discourse, or simultaneously and ‘covertly’ expressed with core predicates in signed languages. For example, signers may modify signs to show location and direction (and therefore semantic arguments) in the signing space, thereby expressing core information simultaneously.

Although a prior investigation of the modification of indicating verbs in the Auslan Corpus found that less than half were modified for location and/or direction (de Beuzeville et al. 2009), the manual expressions of 'covert' core elements in these tokens still needs to be identified and annotated in order to quantify this aspect of these particular narratives. Nevertheless, a significant amount of non-manual simultaneity is in fact captured in the current investigation. For example, Section §6.4.4 suggests that the co-occurrence of enactment with CLUs in these narratives is extensive.

Approximately 70.5% of all identified core predicate and argument elements were expressed using fully lexical sign types, whereas 29.5% were expressed using partly lexical or non-lexical signs or enactment. This closely mirrors the distribution of sign types in the study narratives in general (see Table 6.1 above). With respect to the core elements expressed via partly lexical and non-lexical sign types (one third of all core elements), pointing signs are used to express overt core arguments, while depicting signs, gestures and enactments are used to express overt core predicates.

With respect to identified core arguments expressed via tokens of partly lexical and non-lexical signs and enactments, these tokens tend to appear as either the sole argument or the first core argument (A or A1) of Single Certain CLU composites. Sole or first core arguments were frequently expressed via pointing signs or inferred via enactment. These tokens are used to symbolically index or show core information about referents inferred from the communicative context or already established in the text.

Overt core arguments in the study corpus were rarely expressed using a depicting sign. This suggests that depicting nouns may be used more to supplement information in these identified CLU composites rather than provide core information. However, this may be a consequence of the particular narrative and text type. In an earlier study of depicting signs in the Auslan Corpus, depicting nouns were identified as functioning as core arguments comparably more frequently. Ferrara (2012) analysed depicting signs in 5,649 clause-like units identified in Auslan retellings of 'Frog, where are you?', which is a picture-based elicitation task, and informal conversations on the topic of medical procedures. Of the 1,809 depicting signs that Ferrara identified, 60.5% function as core predicates, 25.2% function as non-arguments, and 14.3% function as core arguments (Ferrara 2012: 172).

Fully lexical signs in the study corpus tend to appear as the sole, first or second core argument (A, A1 or A2) of Single Certain CLU composites. They tend to express the second core argument more frequently than partly lexical or non-lexical signs, where typologically, new information is usually made explicit.

Fully lexical signs that express core arguments were articulated using either the strong hand or both hands. Articulation of core arguments using only the weak hand is rare. These weak-handed signs were often identified as partly lexical pointing signs, where the strong hand may or may not be articulating other signs at the same time. The frequency of pointing signs articulated with the weak hand contrasts interestingly with those of other partly lexical signs and fully lexical signs articulated solely with the weak hand. Depicting

signs and fully lexical signs that express core arguments are articulated using either the strong hand or both hands; the weak hand is hardly used at all.

There are two factors that may influence these tendencies: handedness and hand dominance, and the act of pointing itself. With respect to handedness: (a) many fully lexical signs are produced with two hands, meaning that the weak hand is not available to articulate a completely different sign; (b) most people favour one hand over another for various activities, leading to less dexterity and multi-functionality in the weak hand compared to the stronger hand; and (c) the cognitive effort required to articulate a pointing sign simultaneously with other signs is probably much less than that required to articulate two different fully lexical signs at the same time.

With respect to the hand dominance: (d) pointing signs function as symbolic indexicals and as such are used to reference or re-activate referents; and (e) the physical form of pointing signs (usually an extended index finger) provides a clear figure that is easily perceived in relation to some ground (i.e. the rest of a usage event) in clause-level composite utterances.

6.5. Single Uncertain CLU composites

6.5.1. Differentiating analyses

A total of 25 tokens of Single Uncertain CLU composites were identified in the study corpus. Most were uncertainly identified because of their textual function in the narrative, and/or because there were at least two possible delineations of CLU composites (76%).

Utterances at the start of the narrative usually expressed information about the title and the topic of the story. These utterances were often problematic to delineate and analyse partly because they were not comparable with other CLU composites identified in the study corpus. Fewer tokens results in less opportunity to compare analyses and improve analytical stability (e.g. the utterance in Video PDHA1c2aCLU#5). Note that this signer is actually pointing to written notes on a table in front of her in this example (which were mistakenly brought into the session), so it is a composite utterance where the pointing sign symbolically indexes an object in a jointly attended real space.

Utterances throughout the text were also sometimes uncertainly identified because there were at least two possible delineations of CLU composites (e.g. Video BRCA1c2aCLU#3). This utterance could be interpreted as a single stand alone unit, something like *“the village there had about ten homes”*, and delineated as a Single CLU composite. Alternatively, it could be interpreted as two stand alone units, something like *“the village was there, it had about ten homes”*, and delineated as two Single CLU composites. It could even be interpreted as purely circumstantial information that is part of the next utterance.

The remaining 24% of Single Uncertain CLU composites were uncertainly identified because of poor video quality, unclear signing, or signer disfluencies (e.g. the utterance in Video PGMB1c2aCLU#23). These tokens were tagged as Indeterminate on the SH-Argument tier because it was not appropriate to force an analysis on these types of

utterances. Doing so would mean they would be included in counts of relatively less problematic analyses (see §4.2.3 and §4.2.4).

6.6. Evaluation

6.6.1. Summary

The first exploration of the study corpus facilitated comparison of the study corpus with the larger Auslan Corpus, and the twenty parts of the study corpus with each other. It also resulted in a number of generalisable findings regarding the distribution of sign types, Single Certain CLU composites, and Single Uncertain CLU composites in the study corpus.

The study corpus was framed by first exploring the frequencies of occurrence and dispersion of strong-handed sign types in the study corpus and Auslan Corpus. The overall proportion of fully lexical, partly lexical and non-lexical sign types in the study corpus was found to reflect the overall proportion of sign types in the total Auslan Corpus, but to differ from the proportion of sign types in the Auslan Corpus narratives.

Within the study corpus itself, the proportion of fully lexical sign types in each corpus part was found to be roughly consistent between signers, whereas the proportion of partly lexical and non-lexical sign types was found to vary more between signers. This constitutes one differentiation of telling and showing meaning in the study corpus that varies across corpus parts. It indicates an important source of variability that may affect the generalisability of corpus findings with respect to how signers may organise their composite utterances from a clause-level perspective of analysis.

The architecture of the study corpus was then described in terms of the frequency and dispersion of CLU composites observed in the study corpus. The overall proportion of the different types of CLU composites in the study corpus and study corpus parts are extremely unbalanced.

There is a strong preference for signers to organise their unfolding narratives via utterances that were identified as Single CLU composites. Most of these tokens were identified and analysed with relative certainty using the analytical method described in Chapter §4. Single Certain CLU composites were found to be dispersed across the twenty corpus parts almost exactly as one would expect given the sizes of the twenty corpus parts ($DP=0.028$). This suggests that this type of CLU composite points to utterances that all signers in the study corpus use throughout their narratives.

Signers in the study corpus also link their utterances via relations of embeddedness or dependency. Many of these hypotactically-linked CLU composites were identified and analysed with subjective certainty. However, these types of CLU composites are much less frequent than Single Certain CLU composites, and contain greater proportions of units identified and analysed with relative uncertainty.

The dispersion of Embed Certain CLU composites ($DP=0.283$) and Depend Certain CLU composites ($DP=0.277$) across the twenty corpus parts was also as one would expect given

the corpus part sizes, even though these CLU composites were observed much less frequently than Single Certain CLU composites. This suggests that most signers in the study corpus used these types of CLU composites at some point(s) in their narratives. However, some signers do not link their utterances via relations of embeddedness or hypotaxis at all, instead perhaps relying on other strategies (e.g. signer BDCB).

It was rare for signers to link their utterances via relations of both embeddedness and dependency, and almost half of these observations were identified and analysed with subjective uncertainty. Both DependEmbed Certain CLU composites and DependEmbed Uncertain CLU composites were infrequent and underdispersed across the corpus parts ($DP=0.843$). Only a few signers combined these strategies at some point in their narrative (usually at the end when summarising the moral or consequences of the story). This is likely an effect of this particular story.

The first exploration of the study corpus began by identifying regularities in Single Certain CLU composites, the most frequent type of CLU composite identified the study corpus. Single Certain CLU composites were differentiated according to the mode of expression of their identified core elements, i.e. handedness and enactment, and their core element analyses, i.e. elements identified as functioning as the core argument(s) and/or predicate(s) of the clause-like unit. Overall, there was a strong preference for signers in the study corpus to explicitly express core elements using strong-handed signs, and/or to show or infer core elements via strategies of enactment.

The top five differentiated core element analyses accounted for over half of the observations: Pattern 1: [V], Pattern 2: [A V], Pattern 3: [CA(A) V], Pattern 4: [V A] and Pattern 5: [A] (52.1%). The top eighteen differentiated core element analyses accounted for over three-quarters of the observations (84.5%). Only the top twelve types of core argument analyses contained greater than twenty observations (see Table 6.8).

The remaining quarter were accounted for by a further seventy-seven core element analyses (15.5%), fifty-six of which were hapax legomena (6.2%). Many tokens in this remaining quarter could be re-categorised as one of the top five if they were not differentiated according to handedness, or if bracketing and repeated elements were treated as non-bracketing and non-repeating elements (see Table 6.9).

Overall, the differentiated tokens of Single CLU composites pattern in regular ways. For example, the most frequent patterns such as Pattern 1: [V] and Pattern 2: [A V]. Most of these tokens appear to constitute patterns of clause-like units that may be identified and explored elsewhere in the Auslan Corpus, particularly if they are re-categorised according to less strict differential criteria.

However, despite these analytical regularities, not all tokens of Single Certain CLU composites may constitute possible entrenched clause-level constructions. A small proportion of the identified patterns suggest strategies of co-construction that emerged within the spatio-temporal context of the narratives. For example, the patterns containing tokens of singular events of constructed action, e.g. Pattern 9: [CA[V]]. Not all of these

observed utterances may become entrenched, especially if the shared spatio-temporal context means there is no reason for some phenomena to grammaticalise.

Other patterns may simply be a consequence of the linguistic analysis undertaken here. As such, these patterns do not yet suggest entrenched constituent-based structures of signed language use. For example, those 'patterns' for which there were only one token, likely a result of how the core element patterns of CLUs were differentiated in the analysis, e.g. Pattern 88: [A A V].

These observations are largely determined on the basis of their token frequency in the study corpus, which was in turn shaped by the two points of differentiation for which CLUs were categorised, i.e. handedness and order of occurrence. However, this is only a small corpus. While the study corpus reveals a number of regular patterns, less frequent patterns may still be identified and analysed elsewhere in the Auslan Corpus, or recognised as a conventional organisation by native signers.

Ten types of core element analyses (including the top five) were described with respect to their macro-role, semantic role and tentative grammatical class. There was an overwhelming tendency for Single Certain CLU composites to prompt 'subject-like' conceptualisations, where the Actor/Agent or Carrier/Existent is expressed before the core predicate or simultaneously inferred with the core predicate, and where the last argument generally expresses an Undergoer/Patient, Attribute/Quality or Complement/Nominalised activity role.

However, they are only 'subject-like' because they express similar relations to clauses described in spoken and written languages that are ordered with subject-like constituents at the beginning of a clause, and many linguists would recognise similarities between these core argument analyses and those reported for languages with grammatical roles such as Subject. There were very few observations of Undergoer/Patient or Attribute/Quality expressed before a core predicate or an Actor argument, and none where space did not play a role in recognising and interpreting the utterance.

These observations suggest that it is not necessary to attribute the regular patterns of organisation in these identified tokens to linear-based grammatical roles such as Subject (see Engberg-Pedersen 2002 and §2.2.1.1). There are other possible explanations that need to be investigated before it would be possible to posit a grammatical role of Subject for Auslan constructions.

Other explanations include temporal iconicity, i.e. whether the ordering of events or sequences of activities simply reflect events and activities in the real world (e.g. Haiman 1985), and/or whether relations between participants and events/processes/activities are simply inferred or juxtaposed in space rather than morphologically coded as a Subject role (e.g. Engberg-Pedersen 2002, 2010).

On the basis of the findings reported here, it seems the most appropriate explanation (for now) is that the organisation of these identified units primarily reflects the temporal iconicity of the unfolding story and the availability of space for co-constructing composite

utterances in Auslan, more so than any reliance on morphosyntactic strategies such as constituent orders that encode semantic roles syntactically.

Recall from Chapter §5 that the rate of maintained disagreement for all CLU composites checked during Round 2 was very low ($r=2.00$), and that the rate of maintained disagreement for all CLU composites from the AMMA1c2a file and list of problematic tokens during Round 3 was negligible ($r=0$). Recall also that 61% of Single Certain CLU composites checked during Round 2 were identified as revised agreements, while 100% of Single Certain CLU composites from the AMMA1c2a file and 85% of Single Certain CLU composites from the list of problematic tokens during Round 3 were identified as revised agreements.

Together, these qualifications suggest that the findings presented here for Single Certain CLU composites reflect analyses for which there was significant agreement with two other annotators, and that also result from new analyses identified during the iterative and collaborative method reported in Chapter §5.

6.6.2. Discussion

Chapter §2 presented a review of previous explorations of clause-level utterances in signed languages that have been reported in the signed language literature. Previous studies have tended to investigate this topic from the scope of constituent order typology, the structure of specific types of clause-level constructions, patterns of ellipsis, and the role of various phenomena in signed language structure. A number of generalisations have been reported, especially with regards to basic constituent order and specific types of clause-level constructions. However, some linguists have identified issues with the methods used to generate these findings, and how data were analysed.

Specifically, it is difficult to compare findings from different studies because methods vary in number and type, and because many studies have tended not to recognise or report on data that are messy or problematic to analyse. This issue remains here, because investigations of balanced and representative signed language corpora are still in the early days. There are few studies with which to compare findings from the study corpus. Instead, findings from the exploration of the study corpus detailed in Chapter §6 are compared with the reported findings that resulted from elicitation tasks such as the Volterra exercise and grammaticality judgements.

Section §4.2.1 explained that investigations of constituent order have primarily relied upon non-corpus methods. Previous studies of constituent order in signed languages have reported three types of constituent orders as basic or specific to certain environments: SVO, SOV and OSV (see §2.2.1.1). The SVO pattern for declarative ditransitive constructions is the most frequently attested constituent order reported in the signed language literature for many unrelated signed languages (e.g. Fischer 1975; Liddell 1980; Volterra et al. 1984; Bergman & Wallin 1985; Billiant & Beugnette 1986; Amaral et al. 1994; Quinto 2000; Oviedo 2001; Sze 2003; Milković et al. 2006; Morales López et al. 2007; Müller de Quadros & Lillo-Martin 2010; and Kimmelman 2011).

Insofar that the study corpus is comparable cross-linguistically, the findings from the Single Certain CLU composites analysed in Section §6.4 above do not align with this general claim. Instead, to the extent that constituent orders (i.e. overtly expressed core element analyses) were identified in the study corpus, the most frequent constituent order is Pattern 1: [V]. In this pattern, the core predicate may or may not also express core argument information by modifying the location and/or direction of signs. This finding supports other corpus-based investigations of Auslan (e.g. Ferrara 2012). It accords with Du Bois's observations of 'preferred argument structure' in spoken languages, where it is extremely rare to find clauses with two core arguments expressed via full noun expressions (Du Bois 1987). It also demonstrates that research methods and text types present a major source of variability for identifying possible constituent orders in signed languages.

Several previous studies also reported SOV order for declarative constructions that contain transitive or ditransitive predicates expressed with indicating signs or a depicting signs. In these cases, at least one of the arguments is simultaneously expressed with the verb or is inferred otherwise by the direction and location of the verb. However, there is a major issue with identifying all of these constructions as SOV, because doing so conflates the distinction between 'encoded semiotics' and 'defeasible implicature' (see §4.4.3).

If a distinction between encoded semiotics and defeasible implicature is made during analysis, then these constructions are more appropriately described as SV, VO or V, depending on which constituents are explicitly encoded in specific instantiations. This distinction was made in the analytical framework developed during this study, and all three patterns are frequently attested in the study corpus, i.e. Pattern 2: [A V], Pattern 4: [V A] and Pattern 1: [V]. Many tokens of these patterns contain core elements expressed via verbs of direction, location or depiction.

Truly sequential SOV order is not attested in the study corpus at all, because there are no observations of [A1 A2 V] pattern of core element analysis. However, this pattern has been observed elsewhere in the Auslan Corpus. For example, in narratives of 'The boy who cried wolf' retold by other signers not included in the study corpus, as well as other text types (Trevor Johnston, personal communication). This suggests that while the [A1 A2 V] pattern did not emerge in the study corpus, it may indeed appear when more data is considered.

A few studies reported SOV and OSV as additional orders for other types of perceived transitivity, semantic function or sign types (e.g. Nakanishi 1994; Oviedo 2001; Kimmelman 2011). Kimmelman reported that the OSV order is only evidenced in elicited locative constructions in Russian Sign Language, and suggests this pattern is due to a spatial versus syntactic coding strategy (Kimmelman 2011).

OSV order was also reported as the unmarked pattern for locative constructions in American Sign Language (Liddell 1980) and as an alternative order in Spanish Sign Language (Morales López et al. 2007). However, despite the fact that locative

constructions and strategies of locating are common in the study corpus narratives, there were no observations of sequential and explicitly encoded OSV orders in the core element analyses of Single Certain CLU composites in the study corpus.

Repeating and/or bracketing has been flagged as suggesting separate constituent orders to non-repeating and non-bracketing orders (Johnston et al. 2007). Identified tokens of Single Certain CLU composites in the study corpus often contain repeated and/or bracketed elements. Approximately 24.74% of these tokens were identified as containing repeated elements (e.g. Pattern 14: [V V]) and 15.78% contain bracketed elements (e.g. Pattern 20: [V A V]).

Overall, the most frequent patterns of core element analyses differentiated in the study corpus align more closely with studies that have reported flexible or variable constituent orders in signed languages (e.g. Schlesinger 1970; Anderson 1978; McIntire 1982; Deuchar 1984; Bergman & Wallin 1985; Coerts 1994; Sutton-Spence & Woll 1999; Engberg-Pedersen 2002; Jantunen 2008; Johnston & Schembri 2007a). The findings presented here also align more closely with studies that have reported other factors beyond syntax that may influence constituent order, such as pragmatics and information structure (e.g. Engberg-Pedersen 2002, 2006, 2010; Morales López et al. 2007; Johnston & Schembri 2007a; Johnston et al. 2007; Jantunen 2008).

In particular, findings from the study corpus correspond with Johnston & Schembri's (2007a) earlier observations that the first constituent in a clause tends to express an actor semantic role, except for clauses where the main predicate is a depicting sign. In these types of clauses, the actor may occur before, after or simultaneously with the depicting sign. These patterns were also observed in a recent corpus-based investigation of depicting signs and clause structure in Auslan (Ferrara 2012).

Clauses with intransitive and transitive plain verbs, and clauses with indicating and depicting verbs were also frequently observed in the study corpus. Furthermore, as observed by Johnston & Schembri (2007a) and reported by Jantunen (2007), verbless clauses (where one argument is an attribute of another argument) were observed relatively frequently in the study corpus, i.e. Pattern 11: [A1 A2].

Reported findings from this exploration of the study corpus can further be compared with findings from studies that have used functional frameworks to investigate constituent order from the perspective of semantic relations such as Agent (A), Patient (P), Verbal predicate (Vp) and Non-Verbal predicate (NVp).

Coerts (1994) identified a number of orders in her NGT elicited data that may be generalised into a preferred order of AVp or ANVp, where the second argument (NVp) may be produced either: (a) after the first argument and before the verb sign, or (b) simultaneously with the verb sign (see §2.2.1.1). This pattern was evidenced frequently in the study corpus as Pattern 2: [A V] and Pattern 11: [A1 A2]. While there were no observations of an [A1 A2 V] sequence, as mentioned above, this sequence has been observed elsewhere in the Auslan Corpus.

Engberg-Pedersen (2002) reported that the general patterning of simple clauses in DTS is AVpU and AUVp, where at least one argument may be inferred from the discourse context. Except for an explicitly encoded AUVp patterning (i.e. an [A1 A2 V] sequence), these patterns were evidenced frequently in the study corpus as Pattern 2: [A V], Pattern 4: [V A] and Pattern 6: [A1 V A2].

Jantunen (2007) reported three combinations of constituent order for transitive declarative clauses in FinSL: AVpU, AUVp or UAVp. These combinations varied depending on the semantic relation expressed by the construction and whether the clause was 'textual' or 'isolated' (i.e. cohesively linked in the narrative or not). Isolated clauses occurred only with AVpU and AUVp patterning. The AVpU pattern was evidenced in the study corpus narratives (i.e. Pattern 6: [A1 V A2]). However, as stated above, the explicitly encoded AUVp pattern was not.

Jantunen found that textual clauses also manifest as UAVp order or with omitted core arguments. This could be akin to the Pattern 1: [V] or Pattern 2: [A V] patterns in the study corpus. However, there was only one observation of a possible fully encoded UAVp order in the study corpus, but interpretation of this pattern depended primarily on the availability of space and recognition of constructed action, rather than the sequence of identified constituents (i.e. a token of Pattern 2: [A V] expressing an Undergoer-Process relation while also showing the Actor via enactment, see Video BRCA1c2aCLU#15).

Johnston et al. (2007) identified several constituent patterns across the three unrelated signed languages using the Volterra picture tasks (Volterra et al. 1984). In non-reversible clauses, they found the Actor precedes the Verb and the Undergoer follows approximately 66% of the time (although both arguments are not always present). In reversible clauses, Johnston et al. (2007) found that the patterning of the Actor preceding the Verb and the Undergoer following increases to approximately 69%. In locative transitive clauses, Johnston et al. (2007) reported that no clear pattern emerged but AVpU and UAVp orders were most frequent. The most frequently identified constituent orders for each language were AVpU and UAVp.

The AVpU organisation observed by Johnston et al. (2007) was overwhelmingly reflected in the study corpus, i.e. Pattern 6: [A1 V A2], and also Pattern 1: [V] and Pattern 2: [A V]. However, as stated above, there was only one observation of a possible UAVp order in these identified tokens, but interpretation of this pattern depended primarily on the availability of space and recognition of constructed action, rather than the sequence of identified constituents.

In general, most studies have reported that the most basic constituent order for signed languages is SVO and SOV (from the perspective of grammatical relations), or AVpU and AUVp (from the perspective of semantic relations). In the study corpus, patterns identifiable as sequential or simultaneous SVO/AVpU orders were frequently observed, but patterns identifiable as sequential SOV/AUVp orders were not. This suggests that the signers in the study corpus tend to encode information about the second argument after a

verb sign, simultaneously with a verb sign, or to rely on other semiotic resources such as space for constraining the context of such an interpretation during the narration. It also suggests that this particular narrative did not provide signers with an opportunity to express information using an SOV/AUVp order.

A number of earlier studies questioned whether constituent order is relevant to investigations of signed language structure or to signed language use (e.g. Johnston 1996; Engberg-Pedersen 2002; Johnston et al. 2007). The findings presented here support this position. The findings from the study corpus indicate that while regular patterns of semiotically encoded constituent orders were certainly observed in the study corpus, it is unlikely that these patterns reflect organisations of encoded morphosyntax such as grammatical relations.

Along with many other previous studies, these findings also show that the ordering of encoded constituents in a signed language are often influenced by several factors (e.g. Coerts 1994; Wulf et al. 2002; Engberg-Pedersen 1995, 2002, 2006, 2010; Johnston et al. 2007; Jantunen 2008). These factors include the type of verbal predicate used in the clause, i.e. whether the main verb can be modified to show who does what to whom; the information status of the clause; the semantic role of arguments in expressed by the clause; and whether the core elements are inferred via other strategies such as ellipsis or other semiotic resources such as enactment.

The tendency for orders such as Pattern 1: [V], Pattern 2: [A V], and Pattern 4: [V A] in the study corpus is also very similar to observations of preferred argument structure in spoken language grammars, whereby simple clauses in discourse are usually a low-transitive predicate and an argument, or an entrenched expression, and where arguments are often inferred rather than explicitly re-activated using morphology and lexis (Thompson & Hopper 2001; Du Bois 1987, 2003; Givón 2009).

Indeed, the tendencies observed in the study corpus mirror Thompson and Hopper's observation that:

[T]he argument structures identified in conversation data demonstrate the close connection between the goals, motives and purposes of everyday conversation in one cultural setting and the grammatical resources that speakers use in this setting draw upon to accomplish their interactional goals...the very nature of clause grammar itself is tightly related to what they are doing with their talk (Thompson & Hopper 2001: 54).

Finally, the SV order (primarily evidenced here as Pattern 2: [A V]) is the most frequent clause pattern reported for corpus analysis of spoken and written English (Biber et al. 1999: 141-152). This suggests that the frequent patterns of core element analyses observed in the study corpus may also reflect the English language contact that Auslan signers experience within their shared signing ecologies.

6.7. Conclusion

The patterns of sign types and core element analyses of Single CLU composites identified in the study corpus were either shared by all signers in the study corpus or specific to one or two signers. The exploration of the study corpus presented in Chapter §6 resulted in two main findings regarding whether signed utterances can be analysed from a clause-level perspective of analysis.

Firstly, many of these patterns appear to constitute clause-like units that may be identified and explored elsewhere in the Auslan Corpus, and which may therefore suggest conventional 'structures' of Auslan resulting from abstractions from use. A number of these patterns have been reported for other signed and/or spoken languages, although not all constructions reported in the signed language literature were identified in the study corpus.

Secondly, some of the patterns identified in the study corpus appear to be utterances that emerged within the ecological and spatio-temporal context of the narratives, or that could not be analysed using the framework developed here. These patterns are primarily by-products of the analytical method for corpus enrichment and the points of differentiation for categorisation that were developed during this study.

There is some doubt that these particular patterns may be identified and explored elsewhere in the Auslan Corpus, or that they are parallel to those reported for signed and spoken languages on the basis of elicited data and applications of constituent-based frameworks. This finding casts some doubt on the question of whether all signed utterances in Auslan can be identified and analysed from a clause-level perspective of analysis, and on findings from the signed language literature that are based on the parallel paradigm.

7. Second exploration: CLU composites with hypotactic linkage

You cannot believe a liar, even when he tells the truth.

— Aesop, *The Boy Who Cried Wolf*

7.1. Introduction

The video files analysed in this thesis were first enriched with annotations using the partly corpus-driven approach and analytical method described in Chapter §4. A proportion of these annotations were then checked using the iterative and collaborative method described in Chapter §5. All annotation files were revised between seven and eleven times during the study. Chapter §7 presents the second (and final) of two explorations of these annotations.

The aim of Chapter §7 is to explore patterns of analysis in the clause-like units identified during the primary enrichment of the study corpus that are linked via relations of hypotaxis (embeddedness and/or dependency), i.e. the Embed, Depend and DependEmbed CLU composites. These CLU composites are quantified according to the patterning of: (1) the subjective certainty with which they were identified as a type of CLU composite; (2) temporal ordering of CLUs in CLU composites (the sequence in which CLUs unfold one after the other); (3) primary expression of relations of dependency (how signers link these CLUs within their narratives); and (4) CLU core elements and enactment (compared with the findings presented in Chapter §6). Findings from this exploration are used to further characterise the analyses resulting from the primary enrichment of the study corpus with respect to the clause-like units identified as linked via relations of hypotaxis, and their identified regularities of organisation.

The second exploration of the study corpus is described and discussed in three sections. Section §7.2 explores the distribution of these CLU composites in relation to each corpus part (i.e. the twenty individual signers/retellings in the study corpus). Section §7.3 presents the quantitative and qualitative findings resulting from analysis of these CLU composites. Section §7.4 evaluates these findings and discusses them in relation to literature on spoken and signed languages, as well as the analytical method described in Chapter §4.

This exploration resulted in the identification of regular patterns of organisation in the study corpus that are either shared by all signers in the study corpus, or specific to one or two signers. Many of these patterns constitute linked clause-like units that may be identified and explored elsewhere in the Auslan Corpus. Other identified patterns constitute emergent strategies of co-construction that suggest symptoms of grammaticalised clause linkage rather than conclusive evidence of grammaticalised clause linkage. Yet other identified patterns appear to constitute units that are primarily by-products of the linguistic analysis undertaken during this study. This exploration also demonstrates a partly corpus-driven approach for investigating and describing signed language lexicogrammar.

7.2. CLU composites in the study corpus parts

7.2.1. Framing the study corpus parts

As explained in §6.2.4, there are twenty corpus parts which correspond to the twenty individual retellings by individual signers (i.e. one corpus part=one retelling=one signer; $n=20$). One corpus part refers to a single retelling, irrespective of how long it took to tell it.

Chapter §6 reported that most of the 1,052 CLU composites identified in the study corpus are stand alone Single Certain CLU composites (86%) that are dispersed throughout the twenty corpus parts as expected given the size of the corpus parts ($DP=0.028$). The remaining CLU composites identified in the study corpus contain CLUs that are linked hypotactically (11.6%), i.e. Embed Certain CLU composites, Embed Uncertain CLU composites, Depend CLU composites, Depend Uncertain CLU composites, DependEmbed Certain CLU composites and DependEmbed Uncertain CLU composites.

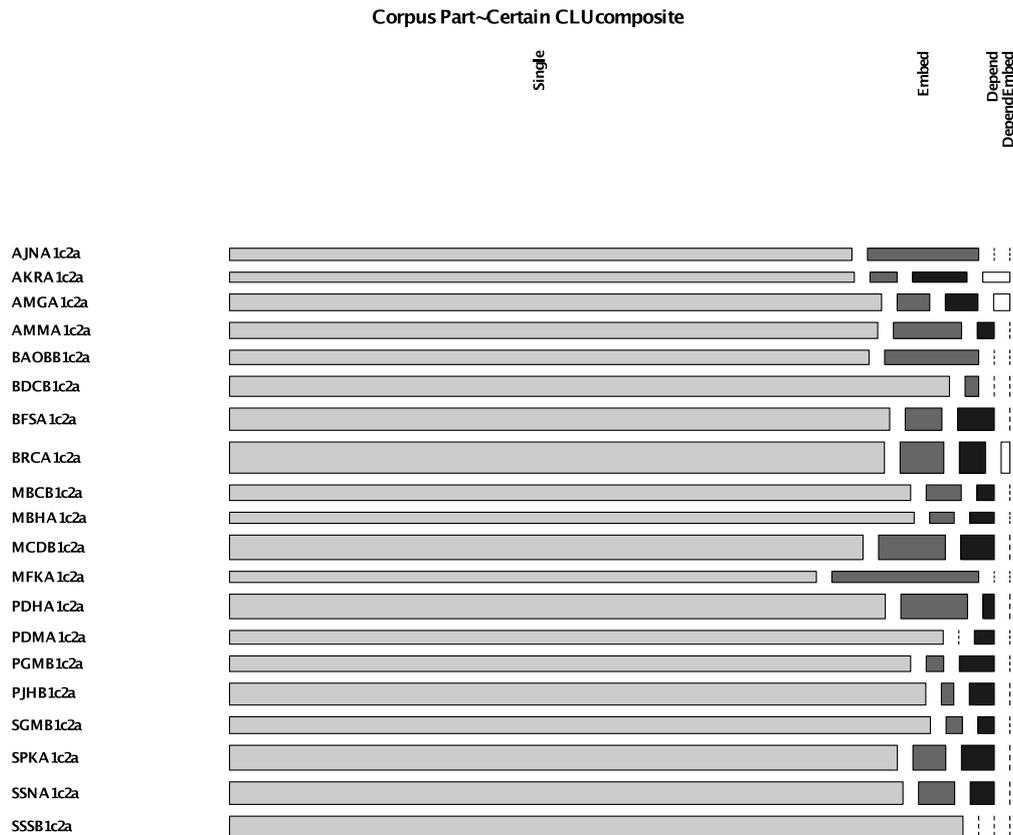
While Embed Certain CLU composites and Depend Certain CLU composites are dispersed much as expected throughout all corpus parts, the remaining four are extremely underdispersed. Overall, the lower frequencies of occurrence and variable dispersions of CLU composites containing relations of hypotaxis in this small corpus suggest that the individual preferences of signers for linking CLUs in these narratives constitute a major source of variability for these types of CLU composites. This may strongly affect the generalisability of findings. It was therefore necessary to explore the distribution of these different CLU composites according to their frequency of occurrence and dispersion in the corpus parts. Certain CLU composites (8.5% of the total) were explored separately from Uncertain CLU composites (3.0% of the total).

7.2.1.1. Certain CLU composites

In order to explore the distributions of Certain CLU composites across corpus parts more closely, a mosaic plot of each Certain CLU composite across all twenty parts of the study corpus was computed (Figure 7.1). This enables us to visually compare the observed absolute frequencies of each Certain CLU composite for each individual signer, and the overall proportion of Certain CLU composites produced by individual signers relative to each other.

Figure 7.1 suggests that a similar ratio of Single Certain CLU composites, Embed Certain CLU composites and Depend Certain CLU composites were identified in each narrative, although not in all narratives. For example, Figure 7.1 shows that no Certain CLU composites identified as containing relations of dependency were observed in the SSSB1c2a file, even though it is about the same size as most other narratives. It was reported in Section §6.2.4 that signer SSSB's narrative also contained a dramatically different distribution of sign types compared to other narratives of a similar size. In particular, a greater proportion of non-lexical signs were observed in her narrative. Together these observations suggest that this signer makes comparably greater recourse for 'showing' meaning rather than encoding it explicitly. This could be a consequence of the fact that this signer is narrating the story to her younger brother.

Figure 7.1 Mosaic plot of Corpus Part (file name)-Certain CLU composites in the study corpus



Further exploration of the distribution of these CLU composites can be undertaken using the frequency of occurrence and dispersion values reported in Table 6.5 and Table 6.6 in Chapter §6. Firstly, fifty-eight tokens of Embed Certain CLU composites were identified in the study corpus (approximately 5.5% of the total CLU composites). These tokens are distributed across the twenty corpus parts almost exactly as one would expect given the sizes of the corpus parts ($DP=0.283$), but are slightly underdispersed compared to the distribution of Single Certain CLU composites ($DP=0.028$) and Depend Certain CLU composites ($DP=0.277$). Embed Certain CLU composites were observed in all files except for PDMA1c2a and SSSB1c2a.

Secondly, twenty-nine tokens of Depend Certain CLU composites were identified in the study corpus (approximately 2.8% of the total CLU composites). These are distributed across the twenty corpus parts almost exactly as expected given the sizes of the corpus parts ($DP=0.277$), but are slightly underdispersed compared to the distribution of Single Certain CLU composites ($DP=0.028$). Depend Certain CLU composites were observed in fifteen different files: AKRA1c2a, AMGA1c2a, AMMA1c2a, BFSA1c2a, BRCA1c2a, MBCB1c2a, MBHA1c2a, MCDB1c2a, PDHA1c2a, PDMA1c2a, PGMB1c2a, PJHB1c2a, SGMB1c2a, SPKA1c2a and SSNA1c2a.

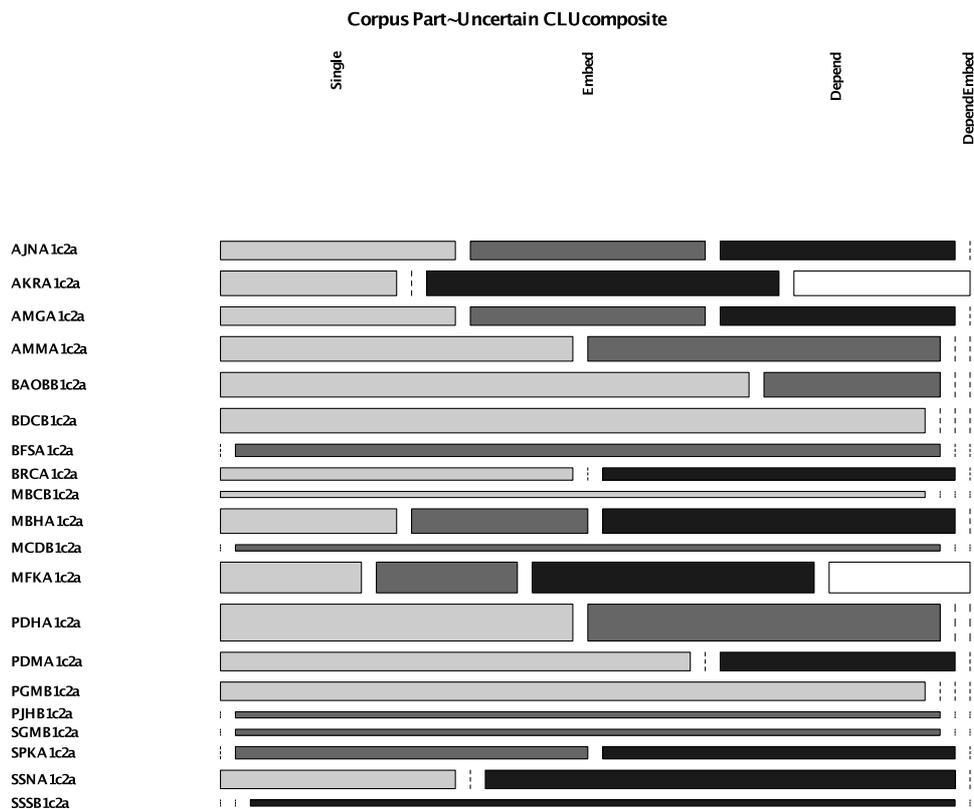
Finally, only three tokens of DependEmbed Certain CLU composites were identified in the study corpus (approximately 0.3% of the total CLU composites). DependEmbed Certain CLU composites are certainly not distributed across the twenty corpus parts as expected given the sizes of the corpus parts ($DP=0.843$). Overall, it appears that some narratives may be characterised as less 'structurally complex' (if one considers CLUs linked hypotactically an indication of structural complexity) and possibly more heavily 'shown' or enacted than other narratives in the study corpus, e.g. AJNA1c2a, BFSA1c2a and SSSB1c2a.

7.2.1.2. Uncertain CLU composites

In order to explore the distributions of Uncertain CLU composites across corpus parts more closely, a second mosaic plot of each Uncertain CLU composite across all twenty parts of the study corpus was computed (Figure 7.2). This enables us to visually compare the observed absolute frequencies of each Uncertain CLU composite for each individual signer, and the overall proportion of Uncertain CLU composites produced by individual signers relative to each other.

Figure 7.2 shows very clearly that the distribution of identified Uncertain CLU composites is much more variable than the distribution of Certain CLU composites presented in Figure 7.1 above. This could be an effect of the smaller sample size, and/or it could suggest that the uncertain identification of CLU composites is perhaps a consequence of signer idiosyncrasies as well as linguistic analysis. Overall, most narratives contained only one or two types of Uncertain CLU composites. Single Uncertain CLU composites and Embed Uncertain CLU composites were the most frequently identified types.

Figure 7.2 Mosaic plot of Corpus Part (file name)~Uncertain CLU composites in the study corpus



Further exploration can be undertaken using the frequency of occurrence and dispersion figures reported in Table 6.5 and Table 6.6 in Chapter §6. Firstly, sixteen tokens of Embed Uncertain CLU composites were identified in the study corpus (approximately 1.3% of the total CLU composites). These are not distributed across the twenty corpus parts as expected given the sizes of the corpus parts ($DP=0.410$). Embed Uncertain CLU composites were observed in twelve different files: AJNA1c2a, AMGA1c2a, AMMA1c2a, BAOBB1c2a, BFSA1c2a, MBHA1c2a, MCDB1c2a, MFKA1c2a, PDHA1c2a, PJHB1c2a, SGMB1c2a and SPKA1c2a.

Secondly, a total of fourteen tokens of Depend Uncertain CLU composites were identified in the study corpus (approximately 1.3% of the total CLU composites). These are not distributed across the twenty corpus parts as expected given the sizes of the corpus parts ($DP=0.535$), and they are less dispersed than the Embed Uncertain CLU composites ($DP=0.410$). Depend Uncertain CLU composites were observed in ten different files: AJNA1c2a, AKRA1c2a, AMGA1c2a, BRCA1c2a, MBHA1c2a, MFKA1c2a, PDMA1c2a, SPKA1c2a, SSNA1c2a and SSSB1c2a.

Finally, only two tokens of DependEmbed Uncertain CLU composites were identified in the study corpus (approximately 0.2% of the total CLU composites). These are certainly not distributed across the twenty corpus parts as expected given the sizes of the corpus

parts ($DP=0.937$). DependEmbed Uncertain CLU composites were observed in two different files: AKRA1c2a and MFKA1c2a. Overall, it appears that the possible clause-like units identified in some narratives may be characterised as more variably uncertain than other narratives in the study corpus, e.g. AKRA1c2a, MBHA1c2a and MFKA1c2a.

7.3. CLU composites with hypotactic linkage in the study corpus

7.3.1. Differentiating analyses

A total of one hundred and twenty-two tokens of CLU composites containing relations of hypotaxis were identified in the study corpus (see Table 6.5). All identified CLU composites were sorted and differentiated according to annotations from overlaps with the CLU composite, CLU, CLUwithinCLU and CLUcomplex tiers. This was done in order to explore whether the sequences of CLUs and annotated core elements in each token pattern in recurrent ways. Annotations were extracted from ELAN, categorised in Excel and sorted in R according to two points of differentiation. Each point of differentiation shaped the analysis for successive differentiations.

The first point of differentiation was to categorise these CLU composites according to the temporal ordering of CLUs in each token. The temporal ordering of CLUs in Embed CLU composites can be known from the specific tag assigned to each CLU in an Embed CLU composite. As explained in Section §4.4.3.4, the tags for annotating the temporal ordering of CLU composites containing relations of embedding are Pre-container, Contained, or Post-container. The stand-alone CLU (the 'embedded' unit) is tagged as Contained. The other CLUs are tagged as Pre-container or Post-container, depending on whether they appear before or after the CLU tagged as Contained. Thus, we know that a CLU tagged as Pre-container occurred before the CLU tagged as Contained.

However, the temporal ordering of Depend CLU composites can only be known by the order in which the CLUs in these CLU composites are extracted. The tags for annotating CLU composites containing relations of dependency only contain information about the dependency of each CLU, not the temporal ordering. These tags are Independent and Dependent. The stand-alone CLUs (the 'independent' unit) are tagged as Independent. The CLUs that do not stand alone are (the 'dependent' unit) are tagged as Dependent. Thus, we know that a CLU tagged as Independent occurred before the CLU tagged as Dependent only by the ordering of the annotated tags in the file and when the annotations are extracted.

The second point of differentiation was to categorise these CLU composites according to how the linkage was primarily expressed, e.g. via a lexical sign (see §4.4.3.4). As with the Single CLU composites, each type of CLU composite with hypotactic linkage was also explored according to the patterning of core element analyses of CLUs in each CLU composite, and their co-expression with enactment (constructed action and constructed dialogue).

7.3.2. Embed Certain CLU composites

Embed Certain CLU composites are initially identified as a sequence of CLUs where one or more CLUs are embedded in another and function as an argument of a CLU. These embedded CLUs tend to be projections of constructed dialogue or ideas. A total of fifty-eight Embed Certain CLU composites were identified in the study corpus, containing a total of one hundred and thirty-one CLUs. All of these CLUs were annotated with tags on the CLUwithinCLU tier that reflect their order of sequence in the unfolding narrative, i.e. the temporal ordering of CLUs tagged as Pre-container, Contained or Post-container. In this way, these tags both reflect the order of CLUs and flag that the annotator interpreted some kind of relation of embeddedness between those CLUs.

For example, the utterance in Video PDHA1c2aCLU#32 is a fairly typical instance of an Embed Certain CLU composite. It contains two CLUs: the pre-container CLU (consisting of one sign in the most frequent [V] pattern of core element analysis), and the contained CLU (consisting of six signs with the relatively frequent [A1 V A2] pattern of core element analysis). That is, this token has a core element analysis of [V]+[A1 V A2], where the second CLU is a core argument of the first. Together they express a projection of constructed dialogue, i.e. *“he yelled: “Wolf! Wolf! The wolf will catch the sheep!”*”.

Signers may use a number of strategies to link CLUs. These include lexis, intonation/expression, or juxtaposition (Johnston 1996; see §3.4.2). In order to investigate the primary strategy used to express embeddedness (but not necessarily the only strategy), all Embed CLU composites were further enriched with annotations on the OvertEmbeddedType tier. This involved first looking for a lexical sign that explicitly encodes a relation of embeddedness, e.g. verbs of saying and thinking. For example, in the utterance in Video PDHA1c2aCLU#32, the lexical sign YELL2 in the identified pre-container unit was annotated as the main indication that these two CLUs are linked. This linkage prompts an interpretation of this utterance as a unified idea (see §4.4.3.2).

If there was no lexis, the annotator considered whether intonation/visual expression, juxtaposition or some other as yet unidentified strategy links the CLUs. It is important to note that there may be several strategies working to link the CLUs, including context and temporal sequence in the text. However, only the primary strategy was coded during this investigation. If these strategies are to be quantified using a partly corpus-driven approach, they must be annotated one by one, starting with those that semiotically encode meaning rather than imply it.

The tokens of Embed Certain CLU composites in the study corpus contain two CLUs ($n=43$), three CLUs ($n=14$) or four CLUs ($n=1$). Table 7.1 below presents the distribution of the temporal ordering of CLUs in Embed Certain CLU composites. Approximately 72.4% are accounted for by one pattern of CLU sequencing, whereby a pre-container CLU introduces the contained CLU (e.g. Video PDHA1c2aCLU#32). A similar pattern accounts for a further 13.8% of these Embed CLU composites, whereby a pre-container CLU introduces two contained CLUs (e.g. Video BA0BB1c2aCLU#19). A third pattern accounts for approximately 6.9% of these Embed CLU composites, whereby a pre-container CLU

introduces a contained CLU and is book-ended by a post-container CLU that is typically a repetition of the pre-container CLU (e.g. Video BRCA1c2aCLU#42). This is similar to the bracketing patterns reported for Single CLU composites in Section §6.4. Three other types of sequences account for the remaining 6.9% (e.g. Video MCDB1c2a#29). These tokens are not truly ‘patterns’ of analysis because there are only one or two observations of each. They appear to be variations on the first three identified patterns.

Table 7.1 Frequencies of occurrence of temporal sequences of CLUs in Embed Certain CLU composites ($n=58$); $f(n)$ =absolute frequency, $f(\%)$ =percentage absolute frequency

<i>CLUwithinCLU Annotations</i>	<i>f(n)</i>	<i>f (%)</i>
pre-container contained	42	72.413
pre-container contained contained	8	13.793
pre-container contained post-container	4	6.896
pre-container contained+ pre-container contained+contained	2	3.448
contained post-container	1	1.724
pre-container contained contained post-container	1	1.724
<i>Column totals</i>	<i>58</i>	<i>100.000</i>

Relations of embeddedness in the Embed Certain CLU composites are primarily expressed using manual lexis. This includes those Embed Certain CLU composites with ‘double embedding’, i.e. where two contained CLUs are themselves a sequence of pre-container CLU and contained CLU (e.g. Video MCDB1c2aCLU#29). The expression of manual lexis was always observed in the pre-container and post-container CLUs. None were observed in the contained CLU. If there was a sequence of two contained CLUs in the same Embed Certain CLU composite, then meaning, intonation/enactment and temporal distance all contributed to the interpretation that they are part of the same Embed Certain CLU composite (e.g. Video BAOBB1c2aCLU#45).

Most Embed Certain CLU composites project locutions of quotes or ideas. Two Embed Certain CLU composites project an activity that is not constructed action or dialogue (i.e. Video AJNA1c2aCLU#31 and Video MCDB1c2aCLU#7). The contained CLUs of these two tokens should perhaps be re-analysed as Single CLU composites with nominalised processes rather than embedded CLUs, i.e. as Pattern 6: [A1 V A2].

Table 7.2 below presents the frequencies of occurrence of the manual lexis observed to link the CLUs that project constructed dialogue. Of these, 90.5% are fully lexical signs that function as a core predicate element in the identified pre-container CLU ($n=57$). 41.3% of these signs function as verbs of saying (e.g. Video PDHA1c2aCLU#32), 36.5% function as

verbs of thinking (e.g. Video AMMA1c2aCLU#13) and 12.7% function as verbs of seeing (e.g. Video PGMB1c2aCLU#27).

Table 7.2 Frequencies of occurrence of the manual lexis used to link CLUs in Embed Certain CLU composites ($n=63$); $f(n)$ =observed absolute frequency, $f(\%)$ =percentage absolute frequency, f_{rel} =relative frequency (per 1,000 words)

<i>Sign (IDgloss)</i>	<i>f(n)</i>	<i>f(%)</i>	<i>f_{rel}</i>
THINK	15	23.810	238
YELL (YELL1, YELL2)	12	19.048	190
SAY	9	14.286	143
SEE	7	11.111	111
KNOW	5	7.937	79
BOY (BOY1, BOY2)	3	4.762	48
SHOUT	3	4.762	48
PRETEND	2	3.175	32
PT (PT:PRO1SG, PT:PRO3SG, PT:PRO3PL)	2	3.175	32
ANNOUNCE	1	1.587	16
HOPE	1	1.587	16
LOOK	1	1.587	16
FS:VILLAGERS	1	1.587	16
WAVE-HANDS2	1	1.587	16
<i>Column total</i>	<i>63</i>	<i>100.000</i>	<i>1,000</i>

Intriguingly, 9.5% of the manual lexis identified as linking CLUs function as nouns of agency ($n=6$). For example, the utterances in Video SPKA1c2aCLU#41 and Video MFKA1c2aCLU#45. In these cases, the signer uses a token of a fully or partly lexical sign such as BOY or PT:PRO3PL to function as an argument of agency to express who is doing the quoting, and then they enact the locution (i.e. the constructed dialogue). In other words, signers used this strategy instead of explicitly coding the relation using a verb of locution, or not explicitly identifying the referent at all (i.e. producing an unframed instance of constructed dialogue).

The short temporal distance between the noun and the constructed dialogue, and the visually unifying nature of the enactment itself, implies a relation between the two CLUs. The implication is that the agent is the one doing the saying or thinking. These nouns of agency (whether fully lexical or partly lexical) are essentially acts of pointing that

symbolically index the subsequent constructed dialogue. All of these signs function as a core argument or are involved in the elaboration of a core argument in the identified CLU.

Overall, the signers in the study corpus use two strategies to project locutions in their narratives: (1) they use a fully lexical conventional sign that functions as a mental verb of saying, thinking or seeing, e.g. YELL2, SAY, THINK, IDEA, KNOW, SEE, LOOK; or (2) they use a fully lexical conventional sign or a partly lexical non-conventional sign that functions as an argument of agency, e.g. BOY, PT:PRO1SG, FS:VILLAGERS. Strategy (1) was identified more frequently than strategy (2).

The individual CLUs in these Embed Certain CLU composites were also explored according to the patterning of core element analyses and enactment. However, core element analyses were differentiated only according to their core function and enactment. There were very few tokens of CLUs with core elements expressed via weak-handed signs, or with repeated and/or bracketing elements. For this reason, handedness and repeated and/or bracketing elements were not differentiated for these CLUs. Instead, their occurrence is described below only where necessary.

Overall, the CLUs in these Embed Certain CLU composites match the more frequently identified patterns reported in Section §6.4. A total of fifty-six CLUs were identified as pre-container CLUs. Approximately 53.5% of pre-container CLUs were identified as Pattern 1: [V]; 10.7% were identified as Pattern 5: [A]; 8.9% were identified as Pattern 2: [A V]; and 8.9% were identified as Pattern 4: [V A]. The remaining 17.9% were identified as various types of core element analyses with complex predicates that were expressed with or without a core argument, such as Pattern 7: [V1 V2].

A total of sixty-five CLUs were identified as contained CLUs. Approximately 21.5% of contained CLUs were identified as Pattern 4: [V A]; 20% were identified as Pattern 2: [A V]; 18.5% were identified as Pattern 1: [V]; 13.8% were identified as Pattern 6: [A1 V A2]; 9.2% were identified as Pattern 5: [A]; and 7.7% were identified as Pattern 11: [A1 A2]. The remaining 9.2% were identified as various types of core element analyses with complex predicates that were expressed with or without a core argument, such as Pattern 7: [V1 V2].

A total of six CLUs were identified as post-container CLUs. Five of these were identified as Pattern 1: [V] and one as Pattern 4: [V A].

Only two Embed Certain CLU composites contained CLUs with indefinite analyses (see Video AJNA1c2aCLU#36 and Video MFKA1c2aCLU#27). Almost all Embed Certain CLU composites co-occurred with enactment (89.8%).

As with the Single Certain CLU composites, all CLUs in Embed Certain CLU composites prompt 'subject-like' conceptualisations, where the Actor/Agent or Carrier/Existent is expressed before the core predicate or simultaneously inferred with the core predicate, and where the last argument generally expresses an Undergoer/Patient, Attribute/Quality or Complement/Nominalised Activity role. There were no

observations contrary to this effect in the pre-container, contained or post-container CLUs in these Embed Certain CLU composites.

7.3.3. Embed Uncertain CLU composites

Embed Uncertain CLU composites contain a sequence of CLUs where one or more CLUs are embedded in another and function as an argument of a CLU, and which were uncertainly identified. A total of sixteen tokens of Embed Uncertain CLU composites were identified in the study corpus, containing a total of thirty-three CLUs. All Embed Uncertain CLU composites project the title of the story (50%), locutions (31.25%), or ideas (18.75%). All were uncertainly identified because of their textual function in the narrative, and/or because there were at least two possible delineations of CLU composites.

The CLUs in each Embed Uncertain CLU composite pattern according to the three most frequent temporal orders reported in Table 7.1 above, i.e. [pre-container contained], [pre-container contained contained] and [pre-container contained post-container]. Relations of embeddedness are primarily expressed using manual lexis (signs that function as verbs, prepositions or nouns of agency), although there is one token where the link is primarily expressed using enactment (see Video SGMB1c2aCLU#17). These signs are either tokens of fully lexical or partly lexical signs (i.e. a pointing sign). About a third of these Embed Uncertain CLU composites co-occurred with enactment (31.25%).

Utterances at the start of each narrative tended to express information about the title and the topic of the story (e.g. Video SPKA1c2aCLU#1). These utterances were often problematic to delineate and analyse. This was partly because they were not (yet) comparable with other CLU composites identified elsewhere in the study corpus. Fewer tokens results in less opportunity to compare analyses and improve analytical stability.

For example, in Video SPKA1c2aCLU#1, the signer is quoting the title of the story by using fully lexical signs and fingerspelling. This utterance is essentially calqued from the written English translation used to elicit the narrative (see Appendix 2). However, she also semi-translates the title using other fully lexical signs in the same utterance. The current analysis represents the best solution given the analytical framework used here, but it is not yet appropriate to consider this analysis as more certain or to categorise it with other Embed Certain CLU composites. For now, these Embed Uncertain CLU composites are grouped primarily as strategies for translating the English title of the story.

Utterances were also sometimes uncertainly identified because there were at least two possible delineations of CLU composites. For example, the utterance in Video PDHA1c2aCLU#40 could be interpreted as something like *"I thought/said: "why not?"* and delineated as an Embed CLU composite. Alternatively, it could be interpreted as a single stand alone unit, something like *"I why-notted"*, and delineated as a Single CLU composite.

These uncertainly delineated utterances are interesting because they are almost identical to the strategy for projecting constructed dialogue reported in Section §7.3.2 above, where signers use a sign that functions as an argument of agency to symbolically index who is doing the quoting, and then they enact the locution (i.e. the constructed dialogue).

However, the contained units in these Embed Uncertain CLU composites all quote ‘verbiage’ rather than a full CLU, which makes them analytically similar to Single CLU composites. This is why they were not categorised as Embed Certain CLU composites. This is a good example of how semantic analysis of signed utterances can identify a discourse strategy that manifests as more than one regular pattern of organisation.

Finally, three tokens were uncertainly identified because of poor video quality or signer disfluencies (e.g. Video PGMB1c2aCLU#23). These tokens were tagged as Indeterminate on the SH-Argument tier because it was not appropriate to force an analysis on these types of utterances. Doing so would mean they would be included in counts of relatively less problematic analyses.

7.3.4. Depend Certain CLU composites

Depend Certain CLU composites are a sequence of CLUs where one or more CLUs are dependent on other independent ‘stand alone’ CLUs, resulting in one coherent idea being expressed over two or more CLUs. A total of twenty-nine Depend Certain CLU composites were identified in the study corpus, containing a total of sixty CLUs. All of these CLUs were annotated with tags on the CLUcomplex tier that reflect their dependency in the unfolding narrative. The tags for annotating CLU composites containing a relation of dependency are Independent and Dependent. The stand-alone CLU is tagged as Independent. The CLUs that do not stand alone are tagged as Dependent. In this way, these tags reflect the independence or dependence of CLUs and flag that the annotator interpreted some kind of relation of dependency between those CLUs.

For example, the utterance in Video AKRA1c2aCLU#6 is a fairly typical instance of a Depend Certain CLU composite. It contains two CLUs: the independent CLU (consisting of three signs in the frequent Pattern 2: [A V]), and the dependent CLU (consisting of ten signs in a repeated variation of the frequent Pattern 1: [V V]). The full utterance patterns as [A V]+[V V], where the second CLU is dependent on the first. Together they express an idea of causation, i.e. Y because X.

In order to investigate the primary strategy used to express dependency (but not necessarily the only strategy), all Depend CLU composites were further enriched with annotations on the OvertDependencyType tier. This involved first looking for a lexical sign that explicitly encodes a relation of dependency. If there was no lexis, the annotator considered whether intonation/expression, juxtaposition or some other as yet unidentified strategy links the CLUs. For example, in the utterance in the Video AKRA1c2aCLU#6, the lexical sign WHY-BECAUSE in the dependent CLU was identified as linking these two CLUs. Together, the two CLUs prompt an interpretation of this utterance as something like “*the boy there was bored, because the sheep eat all day from morning until night, they eat*”.

It is important to note that there may be several strategies working to link these CLUs, including context and temporal sequence in the text. However, as with the Embed CLU

composites, if these strategies are to be quantified using a partly corpus-driven approach, they must be annotated one by one, starting with those that explicitly encode meaning rather than imply it.

The Depend Certain CLU composites in the study corpus contain two CLUs ($n=27$) or three CLUs ($n=2$). Table 7.3 below presents the distribution of the temporal ordering of CLUs in Depend Certain CLU composites. Approximately 82.8% are accounted for by one pattern of CLU sequencing, whereby an independent CLU precedes a dependent CLU (e.g. Video AKRA1c2aCLU#6). Most [independent dependent] sequences are adversative or causal expressions. Others are expressions consequence or expansion, or a causal-conditional expression.

The opposite pattern accounts for a further 10.3% of these Depend Certain CLU composites, whereby a dependent CLU precedes an independent CLU (e.g. Video MCDB1c2aCLU#81). All [dependent independent] sequences are causal-conditional expressions.

The two other sequences account for the remaining 6.9% (see Video SGMB1c2aCLU#42 and Video AKRA1c2aCLU#28). These tokens are not ‘patterns’ of analysis because there is only one observation of each. They appear to be variations on the first two patterns. There is only one instance of repetition, where the utterance begins with an independent CLU that is repeated after the dependent CLU (see Video AKRA1c2aCLU#28).

Overall, most Depend Certain CLU composites express a relation of consequence (27.6%) or causal (25.6%) relations. The utterance in Video AMMA1c2aCLU#11 is an example of a relation of consequence (i.e. “*the sheep eat and graze around there, when finished they go home*”). The utterance in Video AKRA1c2aCLU#6 is an example of a causal relation (i.e. “*the boy was bored, because the sheep eat all day from early morning until late at night, they eat*”).

Some Depend Certain CLU composites simply expand information in the first CLU (17.2%). The utterance in Video PJHB1c2aCLU#14 is an example of a relation of expansion (i.e. “*the sheep were safe from dangerous animals, like wolves and other things that eat sheep*”). Other Depend Certain CLU composites express causal-conditional (13.8%) or adversative (13.8%) relations. The utterance in Video BFSA1c2aCLU#71 is an example of a causal-conditional relation (i.e. “*you cannot believe a liar, even (if/when) he tell the truth*”). The utterance in Video BRCA1c2aCLU#17 is an example of an adversative relation expressed in a constructed dialogue (i.e. “*if you’re bored, open a book and read, alright?*”). Approximately 48.26% of Depend Certain CLU composites co-occur with constructed action or dialogue, but 51.74% do not.

Table 7.3 Temporal sequence of CLUs in Depend Certain CLU composites ($n=29$)

CLUcomplex Annotations	f(n)	f(%)
independent dependent	24	82.76
dependent independent	3	10.34

dependent independent independent	1	3.45
independent dependent independent	1	3.45
<i>Column totals</i>	29	100.00

These relations of dependency are primarily expressed using manual lexis or mouthed lexis (i.e. where the signer mouths an English word without a corresponding manual sign). Two Depend Certain CLU composites are linked by mouthed lexis (i.e. Video AMGA1c2aCLU#55 and Video PDMA1c2aCLU#29). Only one Depend Certain CLU composite is linked primarily via intonation. This token expresses a causal-conditional relation (see Video SGMB1c2aCLU#42). These expressions of manual lexis, mouthed lexis and intonation were always observed in the dependent CLUs. None were observed in the independent CLUs.

Table 7.4 below presents the frequencies of occurrence of the manual and mouthed lexis observed to link these CLUs. All of these signs are fully lexical manual or non-manual signs, including possibly grammaticalised fingerspellings. Note that the signs PRETEND, FS:IF and FS:EVEN all function as conditional connectors in these cases.

Table 7.4 Frequencies of occurrence of the manual and mouthed lexis used to link CLUs in Depend Certain CLU composites ($n=28$); $f(n)$ =observed absolute frequency, $f(\%)$ =percentage absolute frequency, f_{rel} =relative frequency (per 1,000 words)

<i>Sign (IDgloss)</i>	<i>f (n)</i>	<i>f(%)</i>	<i>f_{rel}</i>
WHY-BECAUSE	8	28.571	286
FINISH.GOOD	6	21.429	214
SAME	3	10.714	107
BUT (mouthed)	2	7.143	71
WITH	1	3.571	36
THROUGH	1	3.571	36
STILL	1	3.571	36
PRETEND	1	3.571	36
ONCE	1	3.571	36
NO	1	3.571	36
FS:IF	1	3.571	36
FS:EVEN	1	3.571	36
FS:BUT	1	3.571	36
<i>Column totals</i>	28	100.000	1,000

Approximately 75.9% of these signs function as conjunctions (e.g. Video AKRA1c2aCLU#6, Video BRCA1c2aCLU#17, Video BFSA1c2aCLU#71); 10.3% function as adjectives (e.g. Video PJHB1c2aLHCLU#14); 6.9% (two tokens) function as adverbs (Video SSNA1c2aCLU#71 and Video MDCB1c2aCLU#33); 3.4% (one token) functions as a preposition (Video MCDB1c2aCLU#4); and 3.4% (one token) functions as negation (Video

BFSA1c2aCLU#37). All of these manual and mouthed signs function as non-core elements in the identified CLU.

Individual CLUs in these Depend Certain CLU composites were also explored according to the patterning of core element analyses and enactment. However, core element analyses were differentiated only according to their core function and enactment. As with the Embed Certain CLU composites, there were very few tokens of CLUs with core elements expressed via weak-handed signs, or with repeated and/or bracketing elements. For this reason, weak-handedness and repeated and/or bracketing elements were not differentiated for these CLUs.

Overall, the core element analyses of the CLUs in these Depend Certain CLU composites match the more frequently identified patterns reported in Section §6.4, although more patterns were observed than for the Embed Certain CLU composites. This is possibly because the Depend Certain CLU composites express a wider range of logico-semantic relations.

A total of thirty-one CLUs were identified as independent CLUs. 19.4% of independent CLUs were identified as Pattern 1:[V]; 16.1% were identified as Pattern 6: [A1 V A2]; 12.9% were identified as Pattern 7:[V1 V2]; 12.9% were identified as Pattern 2: [A V]; 9.7% were identified as Pattern 10: [A V1 V2]; 6.5% (two tokens) were identified as Pattern 4:[V A]; 6.5% (two tokens) were identified as Pattern 11: [A1 A2]; and 3.2% (one token) was identified as Pattern 5: [A].

The remaining 12.8% were identified as various types of core element analyses with complex predicates that were expressed with or without a core argument, such as Pattern 22: [A1 V1 V2 A2]. Only three independent CLUs co-occurred with constructed action that showed a core argument, and only one independent CLU contained a singular event of enactment that functioned as a core predicate.

A total of twenty-nine CLUs were identified as dependent CLUs. Approximately 34.5% of dependent CLUs were identified as Pattern 1: [V]; 20.7% were identified as Pattern 2: [A V]; 13.8% were identified as Pattern 7: [V1 V2]; 6.9% were identified as Pattern 6: [A1 V A2]; 3.4% (one token) was identified as Pattern 4: [V A]; and 3.4% (one token) was identified as Pattern 5: [A]. The remaining 17% were identified as various types of core element analyses with complex predicates that were expressed with or without a core argument, Pattern 21: [V1 V2 A]. Only one dependent CLU contained a singular event of enactment that functioned as a core predicate.

No Depend Certain CLU composites contained CLUs with indefinite analyses. Almost a third of the Depend Certain CLU composites co-occurred with constructed action (28.3%).

As with the Single Certain CLU composites and Embed Certain CLU composites, all CLUs in Depend Certain CLU composites prompt 'subject-like' conceptualisations, where the Actor/Agent or Carrier/Existent is expressed before the core predicate or simultaneously inferred with the core predicate, and where the last argument generally expresses an Undergoer/Patient, Attribute/Quality or Complement/Nominalised Activity role. In fact,

as with the Embed Certain CLU composites, there were no observations contrary to this effect in these independent or dependent CLUs.

7.3.5. Depend Uncertain CLU composites

Depend Uncertain CLU composites are a sequence of CLUs where one or more CLUs are dependent on other independent stand alone CLUs, resulting in one coherent idea being expressed over two or more CLUs, and which were uncertainly identified. A total of fourteen tokens of Depend Uncertain CLU composites were identified in the study corpus, containing a total of twenty-nine CLUs. The Depend Uncertain CLU composites in the study corpus contain two CLUs ($n=13$) or three CLUs ($n=1$).

All Depend Uncertain CLU composites are accounted for by the most frequent pattern of temporal sequencing of CLUs reported for Depend Certain CLU composites in Table 7.4 above, i.e. [independent dependent]. There were no observations of repeated or bracketed CLUs. Most Depend Uncertain CLU composites are expressions of consequence (78.57%). For example, the second CLU of the Depend Uncertain CLU composite in Video AKRA1c2aCLU#33 expresses a consequence of the first CLU (i.e. *“well he tried to ask for help, but/yet/and failed”*).

The remaining tokens are expressions of causation, concession or expansion (21.43%). The utterance in AMGA1c2aCLU#53 expresses a relation of causation (i.e. *“well come on, why do you think? it's because he's always lying, you know?”*). The utterance in MKFA1c2aCLU#8 expresses a relation of concession (i.e. *“some days were good, other days felt boring”*). The utterance in BRCA1c2aCLU#1 expresses a relation of expansion (i.e. *“there was one small village there common all over Europe there, same as like villages near the bottom of steep mountains”*). There is only one observation each of these three logico-semantic relations.

Compare these observations of consequence, causation, concession or expansion with the utterances identified as Depend Certain CLU composites, where most tokens express relations of consequence or causation (see §7.3.4). Utterances that express relations of consequence, causation or expansion may be either certainly or uncertainly identified in these narratives. This suggests that signers use several strategies to express these logico-semantic relations in these narratives, not all of which are explicitly encoded.

Most Depend Uncertain CLU composites were uncertainly identified because their relation of dependency is primarily expressed via intonation (78.57%). Specifically, a particular intonation contour/visual expression that was observed in eleven tokens of Depend Uncertain CLU composites. It is suggested that the reader view the following videos before reading further: Video AJNA1c2aCLU#14, Video AKRA1c2aCLU#31, Video AKRA1c2aCLU#33, Video MBHA1c2aCLU#19, Video MBHA1c2aCLU#25, Video MFKA1c2aCLU#42, Video PDMA1c2aCLU#15, Video SPKA1c2aCLU#44, Video SSNA1c2aCLU#49, Video SSNA1c2aCLU#63, and Video SSSB1c2aCLU#63.

In each of these Depend Uncertain CLU composites, the particular ‘prosodic’ characteristics (such as pauses, head movements, facial expressions and eye blinks, see §2.2.3) that contribute to each expressive contour differ. However, all observed contours

share a similar body rhythm that incorporates: (1) highly salient changes between the depth of body shifts (i.e. forwards versus backwards); and (2) changes between head nods and shakes (i.e. up-down versus side-to-side). All of these contours depict a contrast between the first CLU(s) and the last CLU. This contrast invokes a consequential implicature between the CLUs identified as possibly expressing a relation of dependency.

However, it is not possible to claim that these expressive contours constitute the primary expression of a relation of dependency between these CLUs, so that the intonation contour 'encodes a dependency'. This is because it is not (yet?) possible to distinguish between the encoded semiotics and defeasible implicature of this relation.

There are two reasons it is not possible to make this distinction when analysing how these particular CLUs are linked. Firstly, the high rates of disagreement for Depend Uncertain CLU composites in Round 2 and Round 3 reported in Section §5.3.2 and §5.3.3 suggest that the observed relation is not strong enough for three annotators to agree there is unambiguously a relation of dependency (in the same way that lexis may encode such a relation unambiguously).

Secondly, all of these tokens express relations of consequence that may only possibly be interpreted as adversity. They do not explicitly and conventionally encode a relation of adversity in the way that fully lexical signs such as FS:BUT encode relations of adversity in the Depend Certain CLU composites. Temporal sequencing and context also contribute to this interpretation of consequence. For these reasons, all of these CLU composites were categorised as uncertainly identified.

To elaborate this idea further, consider a spoken English utterance: *"Please take a seat Madam...My God! You're a man!"* It is true that a type of dependency can be inferred here, but it is consequential, and the (imagined) intonation cannot be differentiated from the sequential and contextual unfolding of events and utterances. Compare this with another spoken English utterance: *"I offered the lady a seat, but she was a he!"* In this case the relation of adversity is explicitly and conventionally encoded via the fully lexical word 'but' that functions as a conjunction.

Considering the two reasons outlined above, elaborated by the English examples, it was therefore not appropriate to describe these Depend Uncertain CLU composites as linked via a relation of dependency that is expressed primarily via intonation. It is not yet possible to claim that the relation is conventionally encoded rather than implied.

The remaining Depend Uncertain CLU composites were uncertainly identified because there were at least two possible delineations of CLU composites (i.e. Video AMGA1c2aCLU#53, Video BRCA1c2aCLU#1 and Video MFKA1c2aCLU#8). For example, the utterances in Video MFKA1c2aCLU#8 could be delineated as a Depend CLU composite (i.e. *"some days were good, but other days were boring"*) or two Single CLU composites (i.e. *"some days were good. other days were boring"*). The current analysis of these CLU composites were considered to be more appropriate due to the lexical sign OTHER and the intonation contours, which seem to contrast the two utterances. However, the

delineation and core element analyses are still uncertain. All of these relations of dependency are primarily expressed using non-core manual lexical signs that function as conjunctions, i.e. WHY-BECAUSE, SAME and OTHER.

Individual CLUs in these Depend Uncertain CLU composites were also explored according to the patterning of core element analyses and enactment. However, core element analyses were differentiated only according to their core function. Handedness, repeated and/or bracketing elements were not differentiated for these CLUs.

Overall, the CLUs in these Depend Uncertain CLU composites match the more frequently identified patterns reported in Section §6.4. A total of fifteen CLUs were identified as independent CLUs. Approximately 26.7% of independent CLUs were identified as Pattern 1: [V]; 13.3% (two tokens) were identified as Pattern 11: [A1 A2]; 13.3% (two tokens) were identified as Pattern 18: [A V1 V2 V3]; 6.7% (one token) was identified as Pattern 12: [nonA]; 6.7% (one token) was identified as Pattern 2: [A V]; 6.7% (one token) was identified as a singular event Pattern 9: [CA(V)]; and 6.7% (one token) was identified as Pattern 6: [A1 V A2]. The remaining 20.1% were identified as various types of core element analyses with complex predicates that were expressed with or without a core argument, such as Pattern 7: [V1 V2].

A total of fourteen CLUs were identified as dependent CLUs. Approximately 42.9% of dependent CLUs were identified as Pattern 1: [V]; 21.4% were identified as Pattern 5: [A]; 21.4% were identified as Pattern 4: [V A]; 7.1% (one token) was identified as Pattern 2: [A V]; and 7.1% (one token) was identified as Pattern 12: [nonA]. About two-thirds of the Depend Uncertain CLU composites co-occurred with at least some enactment (71.4%).

As with the Single Certain CLU composites, Embed Certain CLU composites and Depend Certain CLU composites, all CLUs in Depend Uncertain CLU composites prompt 'subject-like' conceptualisations, where the Actor/Agent or Carrier/Existent is expressed before the core predicate or simultaneously inferred with the core predicate, and where the last argument generally expresses an Undergoer/Patient, Attribute/Quality or Complement/Nominalised Activity role. There were no observations contrary to this effect in these uncertainly identified independent or dependent CLUs.

7.3.6. DependEmbed Certain CLU composites

DependEmbed Certain CLU composites are a sequence of three CLUs that express both embedding and dependency, where either the independent or dependent CLU is itself an Embed CLU composite. For example, Video BRCA1c2aCLU#96 contains three CLUs: the dependent CLU (consisting of the pre-container [A] and contained [V A] patterns) and the independent CLU (consisting of the [A V1 V2] pattern). The full utterance patterns as [A]+[V A]+[A V1 V2], where the third CLU is dependent on first two CLUs (i.e. *"if randomly the boy said: "I'm telling the truth!", they would still doubt him and not bother"*). Together they express an causal-conditional relation, i.e. if X then Y.

There are only three tokens of DependEmbed Certain CLU composites (i.e. Video BRCA1c2aCLU#96, Video AKRA1c2aCLU#39 and Video AMGA1c2aCLU#45). One token

expresses a causal-conditional relation that includes a projection of constructed dialogue, and two tokens express adversative relations that include a projection of ideas.

Two of the DependEmbed Certain CLU composites are ordered in the most frequent [independent dependent] pattern to express the adversative relations. The remaining DependEmbed Certain CLU composite is ordered in the reverse [dependent independent] pattern to express the causal-conditional relation. All of the embedded CLUs in these tokens are ordered in the most frequent [pre-container contained] pattern.

These relations of dependency and embeddedness are primarily expressed using manual or mouthed lexis. The independent and dependent CLUs are linked by the fully lexical signs FS:IF, STILL and BUT (mouthed). All of these signs were identified in the dependent CLUs of the DependEmbed Certain CLU composites. The pre-container and contained CLUs are linked by BELIEVE, PT:PRO1SG and THINK, most of which were observed in the Embed CLU composites (note that BELIEVE is categorised here as a thinking verb).

As there are only three DependEmbed Certain CLU composites observed in the study corpus, these tokens cannot really be described as ‘patterns’ of analysis. However, all of the core element analyses in each CLU were frequently identified in the Single Certain CLU composites, Embed Certain CLU composites and Depend Certain CLU composites. The core element analyses for the dependent CLUs are: [pre-container [A] contained [V A]]; [A1 V A2]; and [nonA nonA]. The core element analyses for the independent CLUs are: [A V1 V2]; [pre-container [A V] contained [A V]]; and [pre-container [A] contained [A V]]. Yet again, all of the DependEmbed Certain CLU composites prompt ‘subject-like’ conceptualisations.

7.3.7. DependEmbed Uncertain CLU composites

DependEmbed Uncertain CLU composites are a sequence of three or four CLUs that express both dependency and embedding, where either the independent or dependent CLU is itself an Embed CLU composite, and which were uncertainly identified. Only two tokens of DependEmbed Uncertain CLU composites were identified in the study corpus, containing a total of seven CLUs (i.e. Video MFKA1c2aCLU#32 and Video AKRA1c2aCLU#36). Again, the CLUs in these tokens all prompt subject-like conceptualisations.

Firstly, the utterance in Video MFKA1c2aCLU#32 was uncertainly identified because it was problematic to delineate and analyse the core elements of CLUs in this utterance, even though interpretation of this utterance was not a problem. It is actually a very interesting utterance where the signer uses fully lexical signs to modify enactments of the boy’s response to the wolf and also the wolf’s approach (i.e. *“the boy can’t wield-the-crook-like-that to make the wolf run away, he can’t, because the wolf was striding-towards-him-like-that, coming to the sheep”*).

However, no other utterances like this were observed in the study corpus to facilitate comparison. The current analysis represents the best solution given the analytical

framework used here, but it is not appropriate to consider this analysis more certain until it can be compared with similar examples elsewhere in the corpus.

The utterance in Video MFKA1c2aCLU#32 contains four CLUs ordered in the most frequent [independent dependent] pattern to express a causal relation. The independent CLU is ordered in the [pre-container [V] contained [A V] post-container [nonA]] pattern, i.e. Pattern 1, Pattern 2 and Pattern 12. The dependent CLU was identified as Pattern 18: [A V1 V2 V3].

Secondly, the utterance in Video AKRA1c2aCLU#36 was uncertainly identified due to signer disfluency, even though interpretation of this utterance was not a problem. The disfluency is a result of the signer losing her train of thought. She stops mid-utterance and looks down to her right, where there is a copy of written English translation of the story (note that this was contrary to the instructions for the task—the signer was not supposed to bring this to the filming). Once she has recovered her thoughts, she goes on to translate the moral of the story (see Video AKRA1c2aCLU#39). It is not appropriate to categorise this CLU composite as certain because of the disfluency.

The utterance in Video AKRA1c2aCLU#36 contains three CLUs ordered in the less frequent [dependent independent] pattern to express a causal-conditional relation. The dependent CLU is ordered in the [pre-container contained] pattern. The core element analyses of these CLUs are Indeterminate.

This particular utterance also gives some indication of how the written English text provided to participants may have influenced their Auslan narrations. The translation in Video AKRA1c2aCLU#39 (signed after AKRA's disfluency shown in Video AKRA1c2aCLU#36) appears to be directly calqued from the written English text, i.e. *“you cannot believe a liar, even when he is telling the truth”* (see Appendix 2). This literal translation is also reflected in two Depend Certain CLU composites that explain the moral of the story, i.e. the utterances in Video BFSA1c2aCLU#71 (*“you cannot believe a liar, even when he tells the truth”*) and Video SSNA1c2aCLU#71 (*“once you lie all the time, well from that time onwards people will never believe you”*). All the other signers either narrated translations that did not appear to be directly calqued from the written English text (because they interpreted the moral into their own words), or did not summarise the moral of the story at all.

7.4. Evaluation

7.4.1. Summary

The second exploration of the study corpus focussed on identifying and analysing the possible clause-like units that are linked via relations of hypotaxis, i.e. the Embed, Depend and DependEmbed CLU composites. The distribution of both Certain and Uncertain CLU composites was explored across each corpus part. The distribution of each CLU composite across the twenty corpus parts suggests that Embed Certain CLU composites and Depend Certain CLU composites were identified in most narratives in the study corpus. However,

not all types of CLU composites were identified in all narratives, and some signers did not link CLUs via relations of hypotaxis at all.

Comparison of the four Certain CLU composites suggests that, on average, a similar ratio of Single Certain CLU composites, Embed Certain CLU composites and Depend Certain CLU composites were identified in each narrative. Furthermore, Embed Certain CLU composites and Depend Certain CLU composites are distributed across the twenty corpus parts as expected given the sizes of the corpus parts, even though they are much less frequent and slightly underdispersed compared to the Single Certain CLU composites. DependEmbed Certain CLU composites are comparatively infrequent and significantly underdispersed, as they were observed in only three files.

Comparison of the four types of Uncertain CLU composites suggest that the distribution of the Uncertain CLU composites is much more variable than the distribution of Certain CLU composites. Typically only one or two types of Uncertain CLU composites were identified in each narrative. Single Uncertain CLU composites and Embed Uncertain CLU composites were identified more frequently than the Depend Uncertain CLU composites and DependEmbed Uncertain CLU composites, but none are distributed across the twenty corpus parts as expected given the sizes of the corpus parts, i.e. all Uncertain CLU composites are relatively underdispersed. This variability could be an effect of the smaller sample size and the linguistic analysis, and/or it could suggest that the uncertain identification of CLU composites is perhaps a consequence of signer idiosyncrasies.

Each category of CLU composite was also explored individually by differentiating CLUs according to their temporal ordering and their expression of relation(s) of hypotaxis. The differentiation of CLUs in each type of Certain CLU composite according to their temporal ordering and their expression of relation(s) of hypotaxis builds on the findings presented in Chapter §6. Overall, these differentiated tokens pattern in regular ways. In particular, eight strong tendencies for the certainly identified CLU composites were observed:

1. Embed, Depend and DependEmbed CLU composites tend to contain only two or three CLUs;
2. CLUs in these CLU composites tend to be ordered according to temporal iconicity, i.e. the temporal order of CLUs mirrors how the imagined events in the story unfold (e.g. [pre-container contained] and [independent dependent]);
3. CLUs in Embed Certain CLU composites are primarily linked via manual or mouthed lexis, which function as a core element of a pre-container or post-container CLU;
4. Embed Certain CLU composites tend to project locutions (i.e. constructed dialogue) or ideas by: (a) using verbs of saying, thinking or seeing, or (b) using nouns of agency to symbolically index the constructed dialogue;
5. CLUs in Depend Certain CLU composites are primarily linked via manual or mouthed lexis, using signs that function as non-core elements of dependent CLUs;

6. Depend Certain CLU composites tend to express relations of consequence or causation, and there were also observations of relations of expansion, clausal-conditionals and adversative relations;
7. DependEmbed Certain CLU composites (only three tokens) build upon the patterning of Embed Certain CLU composites and Depend Certain CLU composites, e.g. by expressing adversative relations that include a projection of ideas, or a causal-conditional relation that includes a projection of constructed dialogue;
8. Core element analyses of all CLUs in these CLU composites match the frequent patterns identified for the Single Certain CLU composites in Section §6.4 (e.g. Pattern 1: [V] and Pattern 2: [A V]), including the overwhelming tendency for CLUs to prompt subject-like conceptualisations.

The differentiation of CLUs in each type of Uncertain CLU composite according to their temporal ordering and their expression of relation(s) of hypotaxis revealed other tendencies that need to be considered in relation to the regular patterns of organisation summarised above. In particular, five additional tendencies were observed:

9. Utterances at the start of each narrative often express information about the title and the topic of the story that were often difficult to delineate, analyse and compare with other CLU composites in the study corpus (mostly because signers semi-translate the title, thereby creating a type of 'syntactic blend' where the signing is at least partly calqued from English);
10. Some Embed Uncertain CLU composites pattern in an interesting way that bears comparison with the strategy of using signs that function as nouns of agency to symbolically index the constructed dialogue, and which seem to constitute a variation of this strategy;
11. Enactment enables signers to imply relations between events, which may render explicit lexical encoding unnecessary because the enactment is sufficient for disambiguating and constraining the context of interpretation;
12. Most Depend Uncertain CLU composites imply relations of consequence that are linked via an expressive/intonation contour that depicts a contrast between the CLUs in each CLU composite. Together with temporal sequence and context, this organisation invokes a consequential implicature;
13. Influence from English is evident in the utterances at the start of the narrative, the tendency for relations of dependency to be expressed in pre-container and dependent CLUs (and never contained or independent CLUs), the tendency for certain types of lexis at the start of CLUs (e.g. FS:IF), and the core element analyses.

Most tokens of Embed Certain CLU composites, Depend Certain CLU composites and DependEmbed CLU composites appear to constitute patterns that may be identified and explored elsewhere in the Auslan Corpus. However, two tokens of the Embed Certain

CLU composites should be re-analysed as Single Certain CLU composites, as should the tokens of Embed Uncertain CLU composites that project verbiage. This means that the current categorisation of these CLU composites is primarily a by-product of the analysis undertaken here, rather than a descriptive categorisation that reflects an organisational pattern used by signers.

Overall, this exploration identified regular patterns in the study corpus. It also resulted in the differentiation of two different strategies for projecting constructed dialogue in Auslan, and the differentiation of strategies for expressing complex relations of consequence, expansion and concession, as well as causal-conditional and adversative relations.

Recall from §5.3.2 and §5.3.3 that the rate of maintained disagreement for all CLU composites during Round 2 was very low ($r=2.00$), and that the rate of maintained disagreement for all CLU composites from the AMMA1c2a file and list of problematic tokens during Round 3 were negligible ($r=0$). Recall also that the rate of maintained disagreement for Certain CLU composites were also relatively low through the three rounds of checking, but the Uncertain CLU composites were not.

Together, these qualifications suggest that the findings presented here for Embed, Depend and DependEmbed Certain CLU composites reflect analyses for which there was significant agreement with two other annotators, and that also result from new analyses identified during the iterative and collaborative method reported in Chapter §5.

However, it also suggests that the findings presented here for Embed, Depend and DependEmbed Uncertain CLU composites reflect analyses for which there were consistently high rates of disagreement with two other annotators during the three rounds of checking.

7.4.2. Discussion

Earlier in this thesis, Chapter §3 described a theoretical approach that draws from the literature on face-to-face interaction, semiotics, cognitive linguistics and functional linguistics. It explained that principles of cognitive and functional linguistics are useful for elaborating aspects of composite utterances as instantiations of types of linguistic utterances, particularly with respect to how utterances are combined in discourse. The emergence of clause linkage is considered to be driven by discourse-pragmatic pressures, which are influenced by biological, cognitive and interactive pressures, and frequency of use, in addition to other aspects of language as a social phenomenon that evolves to do what we need it to do (see §3.4.2).

Most of the CLU composites analysed and described in Chapter §7 are patterns that may be identified and explored elsewhere in the Auslan Corpus, and which may consequently suggest entrenched constructions. Two types of hypotaxis were evidenced in the study corpus: projection (embedding) and expansion (dependency). As Halliday (1994) and Matthiesson & Thompson (1998) have observed, these relations achieve specific discourse

functions. This observation is certainly reflected in the patterning of hypotactic relations in the study corpus narratives.

Embedding was the most frequently identified type of relationship. This reflects the fact that this narrative contains a number of inner voice interactions and interactions between people (both in the written English text and the Auslan retellings). Projections of constructed action and dialogue may be symbolically indexed using fully lexical signs or non-lexical pointing signs. These findings align with similar findings reported for Danish Sign Language (Engberg-Pedersen 1995).

Relations of dependency were identified less frequently, and tended to express relations of consequence, causation, adversity or causal-conditional relations. This reflects the fact that this narrative describes a moral for living that is developed from a chain of events. CLUs linked via relations of dependency were expressed over two or more CLUs. According to Lehmann's (1988) typology of clause linkage, this suggests their clause linkage is typologically characterised as elaboration. Furthermore, most of these relations were linked and encoded via conventional fully lexical signs, all of which function as non-core elements in the CLU and some of which appear to be calqued from English. This suggests that the clause linkage observed in these narratives is also typologically characterised as maximal syndesis (see §3.4.2).

There were at least fourteen tokens of Depend Uncertain CLU composites that were identified as linked via consequential implicatures that were enriched via intonation, sequence and context. Insofar that intonation is considered non-conventional—and remember that the specific characteristics of intonation were not explicitly quantified in this study, so it is not possible to say how many contours may be conventionalised to some extent—this strategy is currently described as one of enrichment rather than conventional and explicit encoding.

On the basis of these identified relations, the question of whether intonation and space may conventionally encode links between CLUs remains open and inconclusive. It is suggested that other text types will provide richer observations of this phenomena, especially interactions where signers are engaged in some joint, spatially hyper-sensitive activity together.

For example, interactions involving the re-arrangement and discussion of objects in space, such as re-arranging the furniture in a room; or interactions which involve indexing the personal preferences of individual signers sitting in a circle; and the later re-tellings of these interactions to people who were not present during these event. For these types of interactions, it is hypothesised that signers will still use intonation and space to index and enrich rather than conventionally encode.

This claim is not to deny that the CLUs identified as linked via intonation, sequence and context share a contour pattern—it is possible that this contour is somehow conventionalised. However, the tokens of observations from the study corpus cannot be

generalised as functioning as the primary or only means for expressing the relation of dependency in the same way that more explicit linkages are identified.

It is also not possible to characterise the dependent CLUs in any of the relations of dependency as somehow more ‘conservative’ than the independent CLUs (after Bybee 2001; see §3.4.2). However, both independent and dependent CLUs in these relations tend to pattern as one of the frequent types of patterns identified for Single Certain CLUs in Section §6.4. In particular, the CLUs linked via hypotactic relations were all frequently identified as Pattern 1: [V]; Pattern 2: [A V]; Pattern 4: [V A]; Pattern 6: [A1 V A2]; and Pattern 11: [A1 A2]. These patterns all appeared in the revised inventory of macro-patterns presented in Section §6.4. There were also no tokens of core predicates that were expressed via enactment in the CLUs linked via relations of dependency.

7.5. Conclusion

The CLUs linked via relations of hypotaxis identified in the study corpus were either shared by most signers in the study corpus or specific to one or two signers. The exploration of the study corpus presented in Chapter §7 resulted in two main findings.

Firstly, many of these patterns appear to constitute linked clause-like units that may be identified and explored elsewhere in the Auslan Corpus, and which may therefore suggest conventional ‘structures’ of Auslan resulting from abstractions from use and interaction with English. A number of these patterns have been reported for other signed and/or spoken languages, particularly regarding the type and explicitness of identified clause linkages. Other patterns (such as the sequencing of CLUs) appear to reflect the tendencies of temporal iconicity.

Secondly, some of the patterns identified in the current study corpus appear to be primarily by-products of linguistic analysis that need to be re-analysed in future corpus revisions, or set aside until further annotation of other signers and text types may facilitate comparison of identified utterances. As they stand now, these patterns are not categorised or characterised in a way that appropriately reflects how they are co-constructed between signers in the text. They only emerged because I tried to identify clause-like units. This finding casts further doubt on the question of whether all signed utterances in Auslan can be identified and analysed from a clause-level perspective of analysis, and on findings from the signed language literature that are based on the parallel paradigm.

8. Conclusions

We start out postulating sharp boundaries, such as between humans and apes, or between apes and monkeys, but are in fact dealing with sand castles that lose much of their structure when the sea of knowledge washes over them. They turn into hills, leveled ever more, until we are back to where evolutionary theory always leads us: a gently sloping beach.

– Franz de Waal, The Age of Empathy

8.1. Retrospective overview of the thesis

The aim of this thesis was to explore whether signed utterances can be identified and analysed from a clause-level perspective of analysis. This study achieved theoretical and analytical explorations of this research aim. It found that signed utterances can be identified and analysed from a clause-level perspective of analysis, but that the patterns identified represent a range of analyses—not all of which align with findings reported for other signed and spoken languages, or which suggest entrenched patterns of language use.

The research aim was developed by reviewing how clause-like utterances have been investigated in earlier investigations of signed language lexicogrammar in Chapter §2. This line of questioning revealed several problems with the way that signed utterances have been identified and analysed thus far. These problems were attributed to the specific research methods that have been used, as well as the widely accepted paradigm in signed language linguistics that signed languages are used and structured in ways that are parallel to spoken languages.

The review found that this claim is often treated as axiomatic when perhaps it should not be. It outlined several good reasons for questioning this assumption, and identified four issues that have significant implications to theoretical frameworks for analysing and describing native signed languages. These issues are: (1) the application of the sentence as the unit of analysis for multimodal signed language utterances; (2) the theoretical position of prosody and grammar as independently organised and strongly non-isomorphic structures; (3) the particular attention given to unit boundaries rather than unit contours; and (4) the fact that reported findings from perceptual studies of unit boundaries may be analysed alternatively to how they are reported in the literature.

This review found that the constituent order analyses typically used to investigate clause-level units may not necessarily reflect how signers use their signed language. It also suggested that findings from the literature may be interpreted in other ways that potentially illuminates aspects of language use that have previously received little attention from signed language linguists.

For example, one study applied a functional analysis to signed language narratives and found that the units identified through this analysis align with strong prosodic boundaries, but that no single prosodic characteristic could be singled out as ‘marking’ these boundaries. Another study showed that both signers and non-signers may agree on

the delineation of strong boundaries of prosodic units in a language or modality they do not know. These observations suggest that both signers and non-signers interpret the contours of these units rather than the boundaries. The clustering of prosodic features at unit boundaries may instead point to a characterisation of these boundaries as ‘fuzzy’ and ambiguous rather than clearly marked.

The review presented in Chapter §2 concluded that any exploration of a native signed language must consider the nature of signed language ecologies, the real lived experience of deaf signers, and the full range of semiotic resources available to both signers and speakers during their face-to-face interactions.

The research aim was then explored by asking how signers orchestrate and co-construct their signed utterances during their face-to-face interactions. A review of the literature on face-to-face interaction, semiotics, cognitive linguistics and functional linguistics in Chapter §3 found that both signers and speakers engaging in face-to-face interaction do jointly orchestrate and co-construct their utterances using a range of semiotic resources. It also found that the lived experience of deaf signers and their signed language ecologies shape the face-to-face interactions between signers in ways that are both similar and different to face-to-face interactions between hearing speakers.

This review facilitated the development of a framework of composite utterances, lexicogrammar and clause linkage that can be used for investigating signed utterances from a clause-level perspective of analysis. This emerging framework addresses the problems identified in earlier studies, particularly with regards to ambiguity in signed language use and analysis. This review concluded that the components of instantiated composite utterances may be analysed according to their emergence and frequency of use, how they are combined to prompt conceptualisations, the conceptualisations they prompt (i.e. whether they are ‘clause-like’ in some way), and how these utterances may be linked.

In Chapter §4, a review of corpus methods for linguistics found that corpus-based and corpus-driven approaches are especially useful for exploratory studies of signed languages. This study was characterised as using a partly corpus-driven approach for empirical analysis. It is corpus-based because it uses corpus methods to infer findings that are based on corpus data. It is corpus-driven because it uses corpus methods to explore corpus data in new ways.

The annotation framework developed during this study enables annotators to differentiate between semiotic encoding and defeasible implicature during the annotation of clause-like units in the study corpus. The annotation framework also enables annotators to quantify aspects of showing and telling meaning in signed language utterances, and to quantify various types of structural and semantic ambiguity that were recognised through acts of interpretation while annotating the study corpus. The annotation method facilitated a primary and secondary corpus enrichment, and two empirical explorations of the annotations resulting from these enrichments.

The primary enrichment of the study corpus was detailed in Chapter §4. The partly corpus-driven analytical method developed during this study was used to identify and analyse possible clause-level utterances in a study corpus of twenty Auslan retellings of 'The boy who cried wolf'. The delineation and analysis of 'clause-like units' (units that are potentially clauses) resulted in the identification of over nine hundred clause-like units that stand alone in the texts. It also resulted in the identification of just under two hundred clause-like units that are linked to adjacent units via relations of hypotaxis (i.e. embedding, dependency, or both). A small proportion of the total units were also identified with relative uncertainty.

The secondary enrichment of the study corpus was detailed in Chapter §5. A collaborative and iterative method for checking annotations was developed in order to document any personal bias and subjectivity present in the annotated analyses, and to improve the quality of these annotated analyses.

All identified clause-like units were categorised into clusters according to whether they stand alone or whether they are linked hypotactically. They were also clustered according to whether they were certainly or uncertainly identified. This categorisation resulted in the preparation of eight clusters of grouped clause-like units (CLU composites). A proportion of each cluster was then re-interpreted and re-analysed (i.e. 'checked') by two other annotators. The results of this cross-interpretation were then explored to ascertain percentage rates of disagreement, to resolve problematic analyses, and to identify subjective differences in the interpretation, annotation and analysis of the clause-like units identified in the study corpus.

Findings from this method suggest that the analyses of clause-like units that stand alone and which were identified with greater subjective certainty are likely to be less controversial than other identified units. It also found that the original annotator tended to delineate shorter clause-like units in the study corpus when compared to the other two annotators, and that some tokens of clause-like units are more likely to be by-products of the linguistic analysis rather than close reflections of the patterns of organisation used by signers.

This secondary enrichment of the study corpus resulted in the development of an iterative and collaborative method for checking analyses that is indispensable to corpus enrichment and exploration. The three iterations revealed aspects of the data that were not deeply questioned prior to undertaking the iterative process for checking analyses, thereby helping to generate new knowledge regarding analytical disagreements and ambiguity in the study corpus. It also provided valuable insights into how corpus findings should be interpreted in context of the range of data and analyses evidenced in a data set, as well as insights into the subjective nature of analysing messy data.

Chapter §6 detailed the first empirical exploration and description of the clause-like units that were annotated and revised in the study corpus. This exploration focussed on clause-like units identified as standing alone in the text. During this exploration, the study corpus

was contextualised in relation to the annotated Auslan Corpus and to the narratives in the annotated Auslan Corpus. The architecture of the study corpus was then outlined according to the distribution of the eight clusters of CLU composites in the study corpus, and in the study corpus parts. Each cluster in the study corpus was then analysed according to several points of differentiation. These units were differentiated according to mode of expression (how the identified core elements in each unit were expressed), handedness (articulation with the strong hand, weak hand and/or enactment), and the core argument and predicate elements.

This exploration found that signer idiosyncrasies are a possible source of variation that may affect the interpretation of findings resulting from this exploration, particularly with respect to how individual signers show and tell meaning in their narratives. It also identified a number of regular patterns of organisation of the clause-like units that stand alone, many of which appear to constitute clause-like units that partly align with patterns reported in the literature, and that may be identified and explored elsewhere in the Auslan Corpus.

These identified clause-like units may therefore indicate entrenched 'structures' of Auslan that result from abstractions from frequent use. These patterns include: Pattern 1: [V]; Pattern 2: [A V]; Pattern 4: [V A]; Pattern 5: [A]; Pattern 6: [A1 V A2]; Pattern 7: [V1 V2]; and Pattern 11: [A1 A2]. Not all of the patterns reported in the literature were evidenced in the study corpus, which could be a result of text type and sample size, or a consequence of the strict criteria for identifying core elements in clause-like units used in this method.

Crucially, this exploration also found that some of the patterns identified in the study corpus appear to emerge only as the narratives unfold, and are highly dependent on the spatio-temporal context for recognition and interpretation. These include patterns where constructed action was identified as expressing core predicate information.

Other patterns could not be confidently delineated or analysed using the framework developed here. As such, they are primarily by-products of the analytical method for corpus enrichment and the points of differentiation for categorisation that were developed during this study. These include Pattern 8: [Indefinite] and a number of uncertainly identified CLU composites. It is unlikely that these patterns may be identified and explored elsewhere in the Auslan Corpus, or that they can be described in terms of the constituent patterns typically reported for signed and spoken languages on the basis of elicited data and applications of constituent-based frameworks.

Chapter §7 detailed the second empirical exploration and description of the clause-like units that were annotated and revised in the study corpus. This exploration focussed on clause-like units that were identified as hypotactically linked. This exploration identified a number of regular patterns of organisation of the clause-like units linked via relations of embeddedness and dependency. Most tokens of these CLU composites appear to constitute patterns that may be identified and explored elsewhere in the Auslan Corpus,

and which may therefore reflect entrenched 'structures' of Auslan resulting from abstractions from frequent use.

These patterns include the temporal ordering of clause-like units in linked utterances, the use of manual or mouthed lexis for projecting constructed dialogue or for expressing relations of adversity and causal-conditionals, and the locus of explicitly encoded clause linkage. Patterns of core element analyses also reflect the most frequent patterns of stand-alone clause-like units that were identified during the first exploration of the study corpus. These include: Pattern 1: [V]; Pattern 2: [A V]; Pattern 4: [V A]; Pattern 5: [A]; Pattern 6: [A1 V A2]; Pattern 7: [V1 V2]; and Pattern 11: [A1 A2]. However, these patterns appear to reflect the pressures of cognitive processing and temporal iconicity, and the richness of implicature, more so than grammatical structure. The strategies of hypotactic linkage in these CLU composites also point to the strong influence of English in these native Auslan ecologies.

8.2. Conclusions of the thesis

This thesis concludes that signed utterances in narratives can be identified and analysed from a clause-level perspective of analysis, but that the patterns identified in the study corpus represent a range of analyses—not all of which align with findings reported for other signed and spoken languages, or suggest patterns of language use.

Many patterns appear to constitute patterns that may be explored elsewhere in the Auslan Corpus, and may consequently suggest entrenched 'structures' of signed language use. This includes the most frequent patterns of core element analyses that were identified during the exploration of stand alone clause-like units. It includes the patterns of clause-like units linked via relations of hypotaxis. It also includes the patterns for explicitly linking these clause-like units via manual or mouthed lexis.

However, some patterns appear to constitute strategies of co-construction that emerge as the narratives unfold and are highly dependent on the spatio-temporal context for recognition and interpretation. This includes the frequent identification of tokens of constructed action as the core predicate of stand alone clause-like units, which are effectively singular events that are recognised as signs only in the context of the narrative. It includes the relatively frequent projections of constructed dialogue using signs that function as nouns of agency rather than verbs of saying. These signs symbolically index the subsequent constructed action or dialogue rather than encode it as embeddedness.

It includes the use of intonation, context and temporal iconicity for inferring relations of consequence. It also includes the use of partly lexical and non-lexical manual signs for expressing core information, although the variable distribution of partly lexical and non-lexical sign types between individual signers suggests that signers vary in how they tend to constrain their contexts of interpretation. That is, the extent to which individual signers draw upon semiotic resources for telling showing meaning varies between signers, and likely also depends on the signer with whom they are interacting.

Yet other patterns appear to result directly from the linguistic analysis undertaken here, and as such are primarily by-products of analysis rather than patterns of language use. They only emerged through the attempt to identify and analyse clause-like units. This includes the proliferation of patterns that resulted from the categorisation of core element analyses according to strict points of differentiation. Most of these patterns could be re-categorised as one of the most frequent 'macro' patterns described in Section §6.4. It includes several tokens identified in the study corpus that should be re-analysed differently, and the tokens of clause-like units identified at the start of each narrative.

It also includes the clause-like units that were identified as linked primarily via intonation. These units were identified using an annotation method that tried to differentiate meaning that is semiotically encoded from that which is implied. While it was extremely useful and important to identify these relations, it is not appropriate to describe these relations as semiotically 'encoded' in a conventional way. This is because the relation is implied through the interaction of intonation, context and temporal iconicity. As they are annotated now, these patterns are primarily a consequence of the linguistic analysis. They do not constitute a descriptive characterisation that appropriately reflects how these utterances were co-constructed and enriched enchronically by signers during their retellings.

Together, these observations and findings indicate that an analysis of signed utterances from a clause-level perspective points only to symptoms of grammaticalised clause structure in Auslan. The partly corpus-driven empirical findings presented in this thesis do not provide conclusive evidence of grammaticalised clause structure for all of the data observed in the study corpus. In other words, I am not confident that an analysis of signed utterances from a clause-level perspective unequivocally shows that all observed signed language data can be described as fully grammaticalised clausal structures. This interpretation of the data is based on the empirical findings of the study corpus, as well as review of a wide range of literature on signed languages, spoken languages and face-to-face interaction. It also accords with my experience of using signed, spoken and written languages.

This conclusion supports recent studies that indicate the tight integration of showing and telling meaning in face-to-face signed and spoken language use, but has significant implications for earlier claims regarding the constituent order typology of signed languages, and even of spoken languages. It also has serious theoretical implications for arguments for a structural basis of signed and spoken languages, including constituent order, grammatical roles and other parallel applications from unimodal language frameworks.

8.3. Further research

Further research is required in order to explore how Auslan signers integrate aspects of showing and telling meaning throughout these narratives. This would involve enriching the study corpus files and additional retellings of 'Frog, where are you?' with annotations to analyse each narrative as individual performances rather than as clause-like units. In

particular, how tokens of non-conventional singular events such as enactments are recognised and interpreted enchronically within the context of the retelling as they first emerge, and recurrently thereafter (in the same retelling). This would be achieved by analysing the temporal patterning of enactment versus non-enactment as narrative events unfold (e.g. Hodge & Ferrara, to appear). It promises to further understanding of how signers orchestrate and co-construct their narratives.

The current study can be built on, and its observations strengthened, by including a wider range of text types that involve more explicitly bidirectional interaction than narratives. Research using the Auslan Corpus to date has mostly focussed on narrative texts: enriching narratives with IDglossing, investigating specific signs such as the 'finish' signs and depicting signs, investigating aspectual modifications, and investigating clause-like units. It is necessary to expand into other text types that involve more explicitly bidirectional interaction than narratives, and to consider other scopes in addition to clause-level utterances, in order to further explore how signers negotiate communicative moves.

Other avenues for further research include comparing the findings presented in this thesis with similar studies in other signed languages, including the enrichment of signed language corpora using the iterative and collaborative method for checking annotations developed here. The availability of the annotated British Sign Language Corpus and other signed language corpora present opportunities for comparing both related and unrelated signed languages in this way. It would also be beneficial to create or use a similar corpus of multimodal spoken language interactions. Such a corpus can be used to further explore the semiotic strategies that both signers and speakers draw upon in their face-to-face interactions.

A third avenue of further research would be to explore how Auslan is used for showing, telling and doing. This would involve documenting interactions between signers engaged in various ubiquitous activities such as driving, walking, eating and so on while using their signed language. It is also important to document other signed language ecologies beyond native and near native signers. This includes non-native late learners and hearing signers, deafblind signers and Auslan interpreters.

8.4. Final thoughts

I finish this project with an increased appreciation of the complex ways that signers disambiguate and constrain contexts of interpretation, and the complex ways that humans and other animals interact with each other in their ecological niches. I have greater awareness of the potential for research to result in findings and claims that reflect the analysis but not necessarily the way that things may be. I have greater awareness of the necessity of using annotated corpora to investigate signed and spoken language use, for interpreting individual analyses in context of the full range of analyses, and for the role that our subjectivity plays in science and language research.

I have come to appreciate the usefulness of differentiating between encoded semiotics and defeasible implicature in signed language analysis, and the understanding that this can bring. I am left questioning what constitutes a pattern or organisation or structure of language use insofar that it reflects the way that signers use their language, and not just how we analyse them, and I wonder what is structure and if it exists beyond linguistic analysis. I have also developed huge respect for the people who create signed language corpora, develop tools for multimodal analysis, and who invest long hours and hard work into corpus enrichment for the benefit of both researchers and signed language communities.

Appendix 1: Supplementary materials

Two supplementary materials accompany this thesis as a digital package. These materials are archived in a .zip file labelled 'SupplementaryMaterials_GHodgePhDthesis':

- (1) Example Video Library: A folder of ninety-three digital video files (.mov) of signs and utterances identified in the annotated study corpus;
- (2) Study Corpus ELAN files: A folder of twenty ELAN annotation files (.eaf) and preference files (.pfsx) of the twenty Auslan retellings in the study corpus.

Files from the Example Video Library are referenced throughout this thesis. Each reference directs the reader to view an annotated example of a specific instantiation of an utterance(s) in a particular narrative in the study corpus. For example, 'Video AJNA1c2aCLU#14' refers to a video file of Clause-Like Unit Number 14 produced by the signer AJNA in their narration of 'The boy who cried wolf' (1c2a is the Auslan Corpus meta code for these narratives; see notation conventions on page 15 for further information). Video AJNA1c2aCLU#14 is the first example video in the folder labelled 'Example Video Library'. The reader can select the video file, view the instantiated utterance as it was annotated in the study corpus, and consider this example with the relevant discussion in the thesis.

The complete digital video files (.mp4) of the twenty retellings are also available for download from the Auslan Corpus deposit at the Endangered Languages Archive (ELAR) at the School of Oriental and African Studies, University of London (<http://elar.soas.ac.uk/deposit/0001>). These video files can be linked to the Study Corpus ELAN files annotated during this study.

In order to access and download files in the Auslan Corpus deposit, new users of ELAR must first create an account (<http://www.elar-archive.org/using-elar/registering.php>). Registered users can view, stream and download material deposited according to the access permissions of the depositors and their communities. Ordinary users (access protocol 'U') can access up to 646 files in the Auslan Corpus, including the twenty retellings of 'The Boy Who Cried Wolf' analysed during this study.

Once registered, ELAR users can download .mp4 files of the twenty retellings by using the 'search this deposit' function at the top left corner of the deposit page. The relevant search keywords are: AJNA1c2a, AKRA1c2a, AMGA1c2a, AMMA1c2a, BAOBB1c2a, BDCB1c2a, BFSA1c2a, BRCA1c2a, MBCB1c2a, MBHA1c2a, MCDB1c2a, MFKA1c2a, PDHA1c2a, PDMA1c2a, PGMB1c2a, PJHB1c2a, SGMB1c2a, SPKA1c2a, SSNA1c2a, SSSB1c2a.

The reader is encouraged to download and view the .mp4 files of the retellings in order to get a feel for how these narratives unfold and for the Auslan used by the individual signers who contributed to the study corpus. The reader can also link these .mp4 files to the Study Corpus ELAN files and explore the full ELAN annotation files (.eaf) containing

all the annotations of individual narratives. This may be useful for viewing instantiated utterances edited for the Example Video Library in context of a longer stretch of discourse.

To open an ELAN file and view annotations, the ELAN software must be first installed on your computer. The latest version of ELAN for either Windows, Mac or Linux is available here: <http://tla.mpi.nl/tools/tla-tools/elan/download/>

Once ELAN software is installed, individual ELAN annotation files can be opened. To open an ELAN annotation file (.eaf), it is necessary to link this file with the media file (.mp4) and viewing preferences file (.pfsx). The ELAN annotation file (.eaf) should already be linked to the viewing preferences file (.pfsx) in the .zip file of supplementary materials that accompanies this thesis. However, you will still need to link these files to the media file (.mp4) to view on your personal computer. Once you have downloaded the .mp4 files from the ELAR Auslan Corpus deposit, the following steps will enable you to link and view these files in ELAN:

1. Open the ELAN software and select File > Open > FileName. For example, the FileName AJNA1c2a_GH.eaf refers to the first ELAN annotation file in the folder labelled 'Study Corpus ELAN Files'.
2. Opening this file will prompt a command to "please locate the media file FileName.mp4". Find this media file on your computer and select Open. For example, the relevant clip for the file labelled AJNA1c2a_GH.eaf is labelled AJNA1c2a.mp4 when downloaded from the Auslan Corpus ELAR deposit. The ELAN file will open with the media file and you will see a video clip with time-aligned annotations on various tiers.
3. If necessary, link the viewing preferences for the ELAN annotation files via Edit > Preferences > Import preferences. This will prompt a command to "select preferences (.pfsx)". Find the relevant preferences file on your computer and select Open. For example, the file labelled AJNA1c2a_GH.pfsx in 'Study Corpus ELAN Files' is the relevant preferences file for the ELAN annotation file labelled AJNA1c2a_GH.eaf. The ELAN file will re-organise itself according to the preferences used for viewing and annotating the study corpus ELAN annotation files.

Once individual ELAN annotation files are linked with their relevant media file and viewing preferences, it is easy to explore the annotations created in the individual files. For example, you can use the Clause-Like-Unit-GH tier to navigate to particular instantiations of utterances referenced in this thesis. The annotations on specific tiers can also be viewed by selecting relevant tiers in the Subtitle Viewers to the left and right of the video.

Appendix 2: The boy who cried “wolf”

Once upon a time there was a shepherd-boy who had to watch after all the sheep from the people in his village. Every morning he picked them up and brought the whole flock to the hills where they could graze all day. Every evening he drove them together and took them back home.

Sometimes it was very nice out there in the hills and time passed by very quickly. At other times the boy was extremely bored and had enough of the sheep nibbling grass from early in the morning until late in the evening.

One day he decided to play a little game. “Wolf! Wolf!” he cried out loud. “There is a wolf trying to catch my sheep!”

All the villagers came out of their houses to help the boy with the wolf—only to see him crying with laughter at seeing their angry faces.

The boy played this trick over and over again, and again and again the villagers left their houses to help him. However one winters night, the boy was just starting to drive the sheep together, the wolf truly did come at last. The first thing the boy heard was the frightening bleat of the sheep, and then all of a sudden he saw a big, grey figure coming out of the dark.

The boy trembled with fear since his shepherds’ stick was all he had and the wolf looked really dangerous. He ran to the village crying: “Wolf! Wolf! There is a wolf chasing the sheep.”

Yet this time the people did not come out of their houses. Only two looked up when they heard the screaming, but they shrugged their shoulders and said to each other: “He has played this game too often.”

And before the boy could find anyone to help him, the wolf had killed and eaten all the sheep.

Moral (lesson): You cannot believe a liar, even when he is telling the truth.

References

- Albert, M. L., Goodglass, H., Helm, N., Rubens, A., & Alexander, M. (1981). *Clinical Aspects of Dysphasia*. Vienna: Springer-Verlag.
- Amaral, M. A., Coutinho, A., & M. R. D. Martins. 1994. *Para Uma Gramática da Língua Gestual Portuguesa*. Caminho: Lisboa.
- Anderson, L. 1978. Historical Change and Stability of American Sign Language. Unpublished manuscript. Washington DC: Gallaudet College.
- Ameka, F. K. (2006). Real descriptions: Reflections on native speaker and non-native speaker descriptions of a language. In F. K. Ameka, A. Dench & N. Evans (Eds.), *Catching language: The standing challenge of grammar writing* (pp. 69-112). Berlin: Mouton de Gruyter.
- Armstrong, D. F., Stokoe, W. C., & S. Wilcox, S. 1995. *Gesture and the Nature of Language*. Cambridge: Cambridge University Press.
- Baayen, R. H. 2008. *Analyzing Linguistic Data: A Practical Introduction to Statistics*. Cambridge: Cambridge University Press.
- Baker, C., & Padden, C. A. (1978). Focusing on the nonmanual components of American Sign Language. In P. Siple (Ed.), *Understanding Language Through Sign Language Research* (pp. 27-58). New York: Academic Press.
- Bavelas, J. (2007). Face-to-face dialogue as a micro-social context: the example of motor mimicry. In S. D. Duncan (Ed.), *Gesture and the Dynamic Dimension of Language* (pp. 127-146). Amsterdam/Philadelphia: John Benjamins.
- Bavelas, J., Black, J., Lemery, C. R., & Mullett, J. (1986). "I show how you feel." Motor mimicry as a communicative act. *Journal of Personality and Social Psychology*, 50, 322-329.
- Bavelas, J., Coates, L., & Johnson, T. (2000). Listeners as co-narrators. *Journal of Personality and Social Psychology*, 79(6), 941-952.
- Bavelas, J., & Chovil, N. (2006). Hand gestures and facial displays as part of language use in face-to-face dialogue. In V. Manusov & M. Patterson (Eds.), *Handbook of Nonverbal Communication* (pp. 97-115). Thousand Oaks, CA: Sage.
- Bellugi, U., & Fischer, S. D. (1972). A comparison of signed language and spoken language. *Cognition*, 1, 173-198.
- Bergman, B., & Wallin, L. (1985). Sentence Structure in Swedish Sign Language. In W. Stokoe & V. Volterra (Eds.), *SLR '83. Proceedings of the III. International Symposium on Sign Language Research in Rome 1983* (pp. 217-225). Rome: Istituto di Psicologia, CNR.
- Bernstein, B. (2003[1971]). *Class, Codes and Controle*. London: Routledge.
- Biber, D. (1990). Methodological issues regarding corpus-based analyses of linguistic variation. *Literary and Linguistic Computing*, 5, 257-269.

- Biber, D. (1993). Representativeness in corpus design. *Literary and Linguistic Computing*, 8(243-257).
- Biber, D. (2010). Corpus-based and corpus-driven analyses of language variation and use. In B. Heine & H. Narrog (Eds.), *The Oxford Handbook of Linguistic Analysis* (pp. 159-192). Oxford: Oxford University Press.
- Biber, D., Johansson, S., Leech, G., Conrad, S., & Finegan, E. (1999). *Longman Grammar of Spoken and Written English*. Essex: Pearson Education Limited.
- Billant, J., & Beugnette, G. (1986). *La structuration syntaxique du langage gestuel des jeunes sourds français*. Nancy: Presses Universitaires.
- Bod, R. (2010). Probabilistic Linguistics. In B. Heine & H. Narrog (Eds.), *The Oxford Handbook of Linguistic Analysis* (pp. 633-662). Oxford: Oxford University Press.
- Bod, R., Hay, J., & Jannedy, S. (2003). *Probabilistic Linguistics*. Rochester: MIT Press.
- Bolinger, D. (1983). Intonation and gesture. *American Speech*, 58, 156-174.
- Bouchard, D., & Dubuisson, C. (1995). Grammar, order and position of Wh-signs in Quebec Sign Language. *Sign Language Studies*, 87, 99-139.
- Bouchard, D. (1996). Sign languages and language universals: The status of order and position in grammar. *Sign Language Studies*, 91, 101-160.
- Boyes Braem, P. (1999). Rhythmic temporal patterns in the signing of deaf early and late learners of Swiss German Sign Language. *Language and Speech*, 42(2-3), 177-208.
- Boyes Braem, P., Fournier, M., Rickly, F., Corazza, S., Franchi, M., & Volterra, V. (1990). A comparison of techniques for expressing semantic roles and locative relations in two different sign languages. In W. H. Edmondson & F. Karlsson (Eds.), *SLR '87: Papers from the Fourth International Symposium on Sign Language Research* (pp. 114-120). Hamburg: Signum.
- Brentari, D., & Crossley, L. (2002). Prosody on the hands and face: Evidence from American Sign Language. *Sign Language and Linguistics*, 5(2), 105-130.
- Buchstaller, I., & D'Arcy, A. (2009). Localized globalization: A multi-local, multivariate investigation of quotative *be like*. *Journal of Sociolinguistics*, 13(3), 291-331.
- Bybee, J. (2001). Main clauses are innovative, subordinate clauses are conservative: consequences for the nature of constructions. In J. Bybee & M. Noonan (Eds.), *Complex sentences in grammar and discourse: Essays in honor of Sandra A. Thompson* (pp. 1-17). Amsterdam: John Benjamins.
- Bybee, J. (2003). Mechanisms of change in grammaticization: The role of frequency. In B. D. Joseph & J. Janda (Eds.), *The Handbook of Historical Linguistics* (pp. 602-623). Oxford: Blackwell.
- Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 82(4), 711-733.
- Bybee, J., & Hopper, P. (Eds.). (2001). *Frequency and the emergence of linguistic structure*. Amsterdam: John Benjamins.

- Cameron, R. (1998). A variable syntax of speech, gesture, and sound effect: Direct quotations in Spanish. *Language Variation and Change*, 10(43-83).
- Carlson, R., Hirschberg, J., & Swerts, M. (2005). Cues to upcoming Swedish prosodic boundaries: subjective judgment studies and acoustic correlates. *Speech Communication*, 46, 326–333.
- Casey, S. K. (2003). Relationships between gestures and signed languages: Indicating participants in actions. In A. Baker, B. van den Bogaerde & O. Crasborn (Eds.), *Cross-Linguistic Perspectives in Sign Language Research, Selected papers from TISLR 2000* (pp. 95-118). Hamburg: Signum Verlag.
- Chafe, W. (1987). Cognitive constraints on information flow. In R. S. Tomlin (Ed.), *Coherence and Grounding in Discourse* (pp. 21-51). Amsterdam: John Benjamins.
- Chafe, W. (1994). *Discourse, Consciousness and Time: The flow and displacement of conscious experience in speaking and writing*. Chicago: University of Chicago Press.
- Chomsky, N., & Halle, M. (1968). *The Sound Pattern of English*. New York: Harper and Row.
- Chomsky, N., & Lasnik, H. (1993). The theory of principles and parameters. In J. Jacobs, A. von Stechow, W. Sternefeld & T. Vennemann (Eds.), *Syntax: An International Handbook of Contemporary Research* (Vol. 1, pp. 506-569). Berlin: Mouton de Gruyter.
- Clark, H. H., & Gerrig, R. (1990). Quotations as demonstrations. *Language*, 66(4), 764-805.
- Clark, H. H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. *Cognition*, 22, 1-39.
- Clark, E. V., & B. F. Kelly (Eds.). (2006). *Constructions in Acquisition*. Palo Alto: CSLI.
- Coerts, J. (1994). Constituent order in Sign Language of the Netherlands. In M. Brennan & G. Turner (Eds.), *Word order issues in sign language: working papers presented at a workshop held in Durham, 18-22 September 1991*. Durham: International Sign Linguistics Association.
- Cogill-Koez, D. (2000). Signed language classifier predicates: Linguistic structures or schematic visual representation? *Sign Language and Linguistics*, 3(2), 153-207.
- Consten, M., & Loll, A. (2012). Circularity effects in corpus studies - why annotations sometimes go round in circles. *Language Sciences*, 34, 702-714.
- Cormier, K., & Smith, S. (2011). *Defining and annotating constructed action, constructed dialogue and role shift*. Paper presented at the 33rd Annual Meeting of the German Linguistic Society, Workshop on Sign Language Discourse, 23-25 February, University of Göttingen, Germany.
- Cormier, K., Smith, S., & Zwets, M. (2011). *Show and tell: Framing and narrating constructed action in signed and spoken languages*. Paper presented at the Complex Sentences and Beyond in Sign and Spoken Languages workshop, 13-14 October, 2011, Georg-August-Universität, Göttingen, Germany.

- Cormier, K., Smith, S., & Zwets, M. (2013). Framing constructed action in British Sign Language narratives. *Journal of Pragmatics*, 55, 119-139.
- Crasborn, O. (2007). How to recognise a sentence when you see one. *Sign Language and Linguistics*, 10(2), 103-111.
- Crasborn, O., Mesch, J., Waters, D., Nonhebel, A., van der Kooij, E., Woll, B., et al. (2007). Sharing sign language data online: Experiences from the ECHO project. *International Journal of Corpus Linguistics*, 12(4), 535-562.
- Crasborn, O., & Sloetjes, H. (2008). Enhanced ELAN functionality for sign language corpora. In Crasborn, Hanke, Efthimiou, Zwitterlood & Thoutenhoofd (Eds.), *Proceedings of the 3rd Workshop on the Representation and Processing of Sign Languages: Construction and Exploitation of Sign Language Corpora* (pp. 39-43). Paris: ELDA.
- Croft, W. (1995). Intonation units and grammatical structure. *Linguistics*, 33, 839-882.
- Croft, W. (2001). *Radical Construction Grammar: Syntactic Theory in Typological Perspective*. Oxford: Oxford University Press.
- Croft, W. (2003). *Typology and Universals* (Second ed.). Cambridge: Cambridge University Press.
- Croft, W. (2007). Intonation units and grammatical structure in Wardaman and in cross-linguistic perspective. *Australian Journal of Linguistics*, 27(1), 1-39.
- Croft, W., & Cruse, A. (2004). *Cognitive Linguistics*. Cambridge, UK: Cambridge University Press.
- Cruttenden, A. (1995). *Intonation*. Cambridge: Cambridge University Press.
- Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. New York: Harper and Row.
- Cutler, A., Dahan, D., & Van Donselaar, W. (1997). Prosody in the comprehension of spoken language: A literature review. *Language and Speech*, 40, 141-201.
- Danziger, K. (1990). *Constructing the Subject: Historical Origins of Psychological Research*. Cambridge: Cambridge University Press.
- de Beuzeville, L., Johnston, T., & Schembri, A. (2009). The use of space with indicating verbs in Auslan: A corpus-based investigation. *Sign Language and Linguistics*, 12(1), 53-82.
- de Beuzeville, L., (2006). *Visual and linguistic representation in the acquisition of depicting verbs: a study of native signing deaf children of Auslan (Australian Sign Language)*. Unpublished doctoral dissertation. University of Newcastle.
- Deuchar, M. (1984). *British Sign Language*. London: Routledge & Kegan Paul.
- de Waal, F. (2009). *The Age of Empathy: Nature's Lessons for a Kinder Society*. London: Crown.

- Dictionary of Danish Sign Language*. (2008). Centre for Sign Language and Sign Supported Communication — KC, Danish Deaf Association. Available online at <http://www.tegnsprog.dk/>
- Diessel, H. (2004). *The Acquisition of Complex Sentences*. Cambridge: Cambridge University Press.
- Diessel, H. (2007). Frequency effects in language acquisition, language use, and diachronic change. *New Ideas in Psychology*, 25, 108-127.
- Dingemanse, M. (2011). *The Meaning and Use of Ideophones in Siwu*. Unpublished PhD dissertation. Radboud University Nijmegen.
- Dingemanse, M. (2012). Advances in the cross-linguistic study of ideophones. *Language and Linguistics Compass*, 6(10), 654-672.
- Dryer, M. (1997). Are grammatical relations universal? In J. Bybee, J. Haiman & S. Thompson (Eds.), *Essays on language function and language type* (pp. 115-143). Amsterdam: John Benjamins.
- Du Bois, J. W. (1987). The discourse basis of ergativity. *Language*, 63, 805-855.
- Du Bois, J. W. (2003). Discourse and grammar. In M. Tomasello (Ed.), *The New Psychology of Language* (Vol. 2, pp. 47-88). Mahwah, NJ: Lawrence Erlbaum Associates.
- Du Bois, J. W., Schuetze-Coburn, S., Cumming, S., & Paolino, D. (1993). Outline of discourse transcription. In J. A. Edwards & M. D. Lampert (Eds.), *Talking Data: Transcription and Coding in Discourse Research* (pp. 45-89). Hillsdale, NJ: Erlbaum.
- Ellis, N. C. (2012). What can we count in language, and what counts in language acquisition, cognition and use? In S. T. Gries & D. J. Divjak (Eds.), *Frequency effects in cognitive linguistics* (Vol. 1, pp. 7-33). Berlin: Mouton de Gruyter.
- Emmorey, K. (Ed.). (2003). *Perspectives on classifier constructions in sign languages*. Mahwah, NJ: Erlbaum.
- Enfield, N. (2009). *The Anatomy of Meaning: Speech, Gesture, and Composite Utterances*. Cambridge: Cambridge University Press.
- Engberg-Pedersen, E. (1993). *Space in Danish Sign Language: The Semantics and Morphosyntax of the Use of Space in a Visual Language*. Hamburg: Signum Verlag.
- Engberg-Pedersen, E. (1994). Some simultaneous constructions in Danish Sign Language. In M. Brennan & G. Turner (eds.), *Word-order issues in sign language. Working papers*, 73-88. Durham: ISLA.
- Engberg-Pedersen, E. (1995). Reported speech in Danish Sign Language. In S. Schousboe (Ed.), *Embedding in Functional Grammar*. Copenhagen: Department of English, University of Copenhagen.
- Engberg-Pedersen, E. (2002). Grammatical relations in Danish Sign Language: Topic and subject. In A. Pajunen (Ed.), *Mimesis, Sign, and the Evolution of Language* (pp. 13-28). Türku, Finland: University of Türku.

- Engberg-Pedersen, E. (2006). *Intertwined ellipsis - a multiclausal construction in Danish Sign Language*. Paper presented at the Deutsche Gesellschaft für Sprachwissenschaft (DGfS) workshop "How to recognise a sentence when you see one: methodological and linguistic issues in the creation of sign language corpora", 23-34 February, Bielefeld, Germany.
- Engberg-Pedersen, E. (2010). Expressions of causation in Danish Sign Language. *Sign Language and Linguistics*, 13(1), 40-67.
- Fauconnier, G., & Turner, M. (2002). *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.
- Fazzini, M. (Interviewer), & Paterson, D. (Interviewee). (2009). *Don Paterson: Interview with Marco Fazzini* [Interview transcript]. Retrieved from: <http://www.donpaterson.com/interviews.htm>
- Fenlon, J. (2009). *Seeing sentence boundaries: the production and perception of visual markers signalling boundaries in signed languages*. Unpublished doctoral dissertation, University College London, London.
- Fenlon, J., Denmark, T., Campbell, R., & Woll, B. (2007). Seeing sentence boundaries. *Sign Language and Linguistics*, 10(2), 177-200.
- Ferrara, L. (2012). *The grammar of depiction: Exploring gesture and language in Australian Sign Language (Auslan)*. Unpublished PhD dissertation. Macquarie University, Sydney.
- Ferrara, L., & Johnston, T. (2012). *Enactment in discourse: Conceptualization through language and gesture*. Paper presented at the Language, Culture, and Mind V. 27-29 June. Universidade Católica Portuguesa, Lisbon, Portugal.
- Ferrara, L., & Johnston, T. (2014). Elaborating who's what: a study of enactment and clause structure in Auslan (Australian Sign Language). *Australian Journal of Linguistics*, 34(2): 193-215.
- Fillmore, C. J., Kay, P., & O'Connor, M. C. (1988). Regularity and idiomaticity in grammatical constructions: The case of let alone. *Language*, 64, 501-538.
- Finlay, I. H. (1966). *Wave/rock*. Aspen no. 7, item 13. Retrieved from UbuWeb: <http://www.ubu.com/aspen/aspen7/waveRock.html>
- Fischer, S. (1975). Influences on word order changes in ASL. In C. N. Li (Ed.), *Word Order and Word Order Change* (pp. 1-25). Austin, TX: University of Texas Press.
- Flores-Ferran, N. (2007). A bend in the road: Subject personal pronoun expression in Spanish after 30 years of sociolinguistic research. *Language and Linguistics Compass*, 1(624-652).
- Fogel, A. (1993a). *Developing Through Relationships: Origins of Communication, Self and Culture*. London: Harvester-Wheatsheaf.
- Fogel, A. (1993b). Two principles of communication: co-regulation and framing. In J. Nadel & L. Camaioni (Eds.), *New Perspectives in Early Communicative Development* (pp. 9-22). London: Routledge.

- Fogel, A., Garvey, A., Hsu, H-C., & West-Stroming, D. (2006). *Change Processes in Relationships: A Relational-Historical Research Approach*. Cambridge: Cambridge University Press.
- Foley, W. A., & Van Valin, R. D. (1984). *Functional Syntax and Universal Grammar*. Cambridge: Cambridge University Press.
- Fox, B. A., & Robles, J. (2010). It's like mmm: Enactments with it's like. *Discourse Studies*, 12(6), 715-738.
- Frazier, L., Carlson, K., & Clifton Jr, C. (2006). Prosodic phrasing is central to language comprehension. *Trends in Cognitive Science*, 10(6), 244-249.
- Friedman, L. (1976). The manifestation of subject, object and topic in American Sign Language. In C. N. Li (Ed.), *Subject and Topic* (pp. 125-148). New York: Academic Press.
- Givón, T. (1979). *On Understanding Grammar*. New York: Academic Press.
- Givón, T. (1984). *Syntax: A Functional-Typological Introduction* (Vol. 1). Amsterdam/Philadelphia: John Benjamins.
- Givón, T. (1989). *Mind, Code and Context: Essays in Pragmatics*. London: Lawrence Erlbaum Associates.
- Givón, T. (2005). *Context as Other Minds: The Pragmatics of Sociality, Cognition and Communication*. Amsterdam/Philadelphia: John Benjamins.
- Givón, T. (2009). *The Genesis of Syntactic Complexity: Diachrony, Ontogeny, Neuro-Cognition, Evolution*. Amsterdam: John Benjamins.
- Goldberg, A. (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.
- Goodwin, C. (1979). The interactive construction of a sentence in natural conversation. In G. Psathas (Ed.), *Everyday Language: Studies in Ethnomethodology* (pp. 97-121). New York: Irvington Publishers.
- Goodwin, C. (1981). *Conversational Organization: Interaction Between Speakers and Hearers*. New York: Academic Press.
- Goodwin, C., & Goodwin, M. (1986). Gesture and coparticipation in the activity of searching for a word. *Semiotica*, 62(1-2), 51-75.
- Goodwin, C. (1995). The negotiation of coherence within conversation. In M. A. Gernsbacher & T. Givón (Eds.), *Coherence in Spontaneous Text* (pp. 117-137). Amsterdam/Philadelphia: John Benjamins.
- Goodwin, C. (2003a). The body in action. In J. Coupland & R. Gwyn (Eds.), *Discourse, the Body and Identity*: Palgrave MacMillan.
- Goodwin, C. (2003b). Pointing as situated practice. In S. Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 217-241). Mahwah NJ: Erlbaum.

- Green, J. A. (2009). *Between the Earth and the Air: Multimodality in Arandic Sand Stories*. Unpublished PhD dissertation. Melbourne: University of Melbourne.
- Green, J. A. (2014). *Drawn from the Ground: sound, sign and inscription in Central Australian sand stories*. Cambridge: Cambridge University Press.
- Green, J. A. & D. Wilkins (2014). 'With or without speech: Arandic sign language from Central Australia'. *Australian Journal of Linguistics*, 34(2), 234-261.
- Gries, S. Th. (2008). Dispersions and adjusted frequencies in corpora. *International Journal of Corpus Linguistics*, 13(4), 403-437.
- Gries, S. Th. (2009a). What is corpus linguistics? *Language and Linguistics Compass*, 3(5), 1225-1241.
- Gries, S. Th. (2009b). *Quantitative Corpus Linguistics with R*. New York: Taylor & Francis
- Gries, S. Th. (2010a). *Statistics for linguistics with R: A Practical Introduction*. Berlin: Mouton de Gruyter.
- Gries, S. Th. (2010b). Dispersions and adjusted frequencies in corpora: further explorations. In S. T. Gries, S. Wulff & M. Davies (Eds.), *Corpus Linguistic Applications: Current Studies, New Directions* (pp. 197-212). Amsterdam: Rodopi.
- Gries, S. Th. (2010c). Useful statistics for corpus linguistics. In A. Sánchez & M. Almela (Eds.), *A mosaic of corpus linguistics: selected approaches* (pp. 269-291). Frankfurt am Main: Peter Lang.
- Gries, S. Th. (2013). Sources of variability relevant to the cognitive sociolinguist, and corpus- as well as psycholinguistic methods and notions to handle them. *Journal of Pragmatics*, 52, 5-16.
- Grosjean, F., & Lane, H. (1977). Pauses and syntax in American Sign Language. *Cognition*, 5, 101-117.
- Grosjean, F., & Hirt, C. (1996). Using prosody to predict the end of sentences in English and French: normal and brain-damaged subjects. *Language and Cognitive Processes*, 11(1/2), 107-134.
- Grunwald, P., Myung, I. J., & Pitt, M. A. (2004). *Advances in Minimum Description Length: Theory and Applications*. Cambridge, Massachusetts: MIT Press.
- Haiman, J. (1985). *Natural Syntax: Iconicity and Erosion*. Cambridge: Cambridge University Press.
- Hale, K. (1972). Some questions about anthropological linguistics: The role of native knowledge. In D. Hymes (Ed.), *Reinventing Anthropology* (pp. 382-397). New York: Pantheon Books.
- Halliday, M. A. K. (1994). *An Introduction to Functional Grammar* (Second ed.). London: Edward Arnold.
- Hanke, T., & Prillwitz, S. (1995). SyncWriter: Integrating video into the transcription and analysis of sign language. In H. Bos, F. Schermer & M. Gertrude (Eds.), *Sign Language Research 1994: Proceedings of the Fourth European Congress on Sign*

Language Research, Munich, September 1-3 (International Studies on Sign Language and Communication of the Deaf; 29) Hamburg: Signum Verlag. Retrieved from:
<http://www.signum-verlag.de/BTitel/pdf/3-927731-57-9b.pdf>

- Hansen, M., & Heßmann, J. (2007). Matching propositional content and formal markers: Sentence boundaries in a DGS text. *Sign Language and Linguistics*, 10(2), 145-175.
- Harris, R., Holmes, H. M., & Mertens, D. M. (2009). Research ethics in sign language communities. *Sign Language Studies*, 9(2), 104-131.
- Haspelmath, M. (2006). Against markedness (and what to replace it with). *Journal of Linguistics*, 42(1), 25-70.
- Haspelmath, M. (2007). Pre-established categories don't exist: consequences for language description and typology. *Linguistic Typology*, 11(1), 119-132.
- Haspelmath, M. (2008). Frequency vs. iconicity in explaining grammatical asymmetries. *Cognitive Linguistics*, 19(1), 1-33.
- Haspelmath, M. (2010a). Framework-free grammatical theory. In B. Heine & H. Narrog (Eds.), *The Oxford Handbook of Grammatical Analysis* (pp. 341-365). Oxford: Oxford University Press.
- Haspelmath, M. (2010b). Comparative concepts and descriptive categories in cross-linguistic studies. *Language*, 86(3), 663-687.
- Haspelmath, M. (2011). The indeterminacy of word segmentation and the nature of morphology and syntax. *Folia Linguistica*, 45(1), 31-80.
- Haspelmath, M., Dryer, M., Gil, D., & B. Comrie (eds.). (2005). *The World Atlas of Language Structures*. Oxford: Oxford University Press. See also <http://wals.info/>
- Heine, B., & Kuteva, T. (2005). *Language contact and grammatical change*. Cambridge: Cambridge University Press.
- Heßmann, J. (2001). *Gehörlos so! Materialien zur Gebärdensprache* (Internationale Arbeiten zur Gebärdensprache und Kommunikation Gehörloser, Bd. 32). Hamburg: Signum Verlag.
- Heine, B., & Kuteva, T. (2007). *The Genesis of Grammar*. Oxford: Oxford University Press.
- Hodge, G. (2014). How deafness may emerge as a disability as social interactions unfold. *Narrative Inquiry in Bioethics: A Journal of Qualitative Research*. 3(3): 193-196.
- Hodge, G., & Ferrara, L. (to appear). Showing the story: Enactment as performance in Auslan narratives. *Proceedings of the National 44th Australian Linguistic Society Conference - 2013*.
- Hodge, G., & Johnston, T. (2014). Points, depictions, gestures and enactment: Partly lexical and non-lexical signs as core elements of single clause-like units in Auslan (Australian sign language). *Australian Journal of Linguistics*. 34(2): 262-291.
- Hodge, R., & Kress, G. (1988). *Social Semiotics*. New York: Cornell University Press.
- Hopper, P. (1987). Emergent Grammar. *Berkeley Linguistics Society*, 13, 139-157.

- Hopper, P. J., & Thompson, S. A. (2008). Projectability and clause combining in interaction. In R. Laury (Ed.), *Crosslinguistic Studies of Clause Combining: The Multifunctionality of Conjunctions* (pp. 99-123). Amsterdam/ Philadelphia: John Benjamins.
- Jantunen, T. (2007). The equative sentence in Finnish Sign Language. *Sign Language and Linguistics*, 10(2), 113-143.
- Jantunen, T. (2008). Fixed and free: Order of the verbal predicate and its core arguments in declarative transitive clauses in Finnish Sign Language. *SKY Journal of Linguistics*, 21, 83-123.
- Janzen, T. (1995). *The Polygrammaticalization of Finish in ASL*. Unpublished Master's thesis, University of Manitoba, Winnipeg.
- Janzen, T. (2004). Space rotation, perspective shift, and verb morphology in ASL. *Cognitive Linguistics*, 15(2), 149-174.
- Janzen, T. (2012). Lexicalization and grammaticalization. In R. Pfau, M. Steinbach & B. Woll (Eds.), *Sign Languages* (pp. 816-841). Berlin: Mouton de Gruyter.
- Janzen, T., & Schaffer, B. (2002). Gesture as the Substrate in the Process of ASL Grammaticalization. In R. P. Meier, K. A. Cormier & D. Quinto-Pozos (Eds.), *Modality and Structure in Signed and Spoken Languages* (pp. 199-224). Cambridge: Cambridge University Press.
- Johnston, T. (1989). *Auslan Dictionary: A Dictionary of the Sign Language of the Australian Deaf Community*. Sydney: Deafness Resources Australia.
- Johnston, T. (Ed.). (1997). *Signs of Australia on CD-ROM: A Dictionary of Auslan (Version 1.0 for Windows)*. Sydney: North Rocks Press.
- Johnston, T. (1998). *Signs of Australia: A New Dictionary of Auslan*. Sydney: North Rocks Press.
- Johnston, T. (1996). Function and medium in the forms of linguistic expression found in a sign language. In W. H. Edmondson & R. B. Wilbur (Eds.), *International Review of Sign Linguistics* (Vol. 1, pp. 57-94). Mahwah, NJ: Lawrence Erlbaum.
- Johnston, T. (2001). Nouns and verbs in Australian Sign Language: An open and shut case? *Journal of Deaf Studies and Deaf Education* (September 2001), 235-257.
- Johnston, T. (2003). Language standardization and signed language dictionaries. *Sign Language Studies*, 3(4), 431-468.
- Johnston, T. (2004). W(h)ither the deaf community? Population, genetics and the future of Australian Sign Language. *Sign Language Studies*, 6(2), 137-173.
- Johnston, T. (2010). From archive to corpus: Transcription and annotation in the creation of signed language corpora. *International Journal of Corpus Linguistics*, 15(1), 106-131.
- Johnston, T. (2011). *Auslan Corpus Annotation Guidelines* [November version]. Macquarie University, Sydney. Available at: <http://www.auslan.org.au/about/annotations>

- Johnston, T. (2012). Lexical frequency in signed languages. *Journal of Deaf Studies and Deaf Education*, 17(2), 163-193.
- Johnston, T. (2013a). *Auslan Corpus Annotation Guidelines* [February version]. Macquarie University, Sydney. Available at: <http://www.auslan.org.au/about/annotations/>
- Johnston, T. (2013b). Formational and functional characteristics of pointing signs in a corpus of Auslan (Australian sign language): are the data sufficient to posit a grammatical class of 'pronouns' in Auslan? *Corpus Linguistics and Linguistic Theory*, 9(1), 109-159.
- Johnston, T. (under review). The reluctant oracle: Adding value to, and extracting of value from, a signed language corpus through strategic annotations.
- Johnston, T., & Crasborn, O. (2006). *The use of ELAN annotation software in the creation of signed language corpora*. Paper presented at the EMELD '06 Workshop on Digital Language Documentation: Tools and Standards, the State of the Art, 20-22 June 2006, Lansing, MI.
- Johnston, T., Cresdee, D., & Schembri, A. (2011). *Synchronic contextual variation and grammaticalization in a signed language: the case of two finish-related signs*. Paper presented at the 11th International Cognitive Linguistics Conference, 11-17 July.
- Johnston, T., & Ferrara, L. (2012). Lexicalization in signed languages - when is an idiom not an idiom? *Selected Papers from UK-CLA Meetings* (Vol. 1, pp. 229-248).
- Johnston, T., Vermeerbergen, M., Schembri, A., & Leeson, L. (2007). Real data are messy: Considering cross-linguistic analysis of constituent ordering in Australian Sign Language (Auslan), Vlaamse Gebarentaal (VGT) and Irish Sign Language (ISL). In P. Perniss, R. Pfau & M. Steinbach (Eds.), *Visible Variation: Cross-Linguistic Studies on Sign Language Structure*. Berlin: Mouton de Gruyter.
- Johnston, T., & Schembri, A. (2006a). *Identifying clauses in signed languages: applying a functional approach*. Paper presented at the DGfS [Deutsche Gesellschaft für Sprachwissenschaft] workshop *How to recognise a sentence when you see one: methodological and linguistic issues in the creation of sign language corpora*, 23-24 February, Bielefeld, Germany.
- Johnston, T., & Schembri, A. (2006b). Issues in the creation of a digital archive of a signed language. In L. Barwick & N. Thieberger (Eds.), *Sustainable data from digital fieldwork* (pp. 7-16). Sydney: University of Sydney Press.
- Johnston, T., & Schembri, A. (2007a). *Australian Sign Language: An Introduction to Sign Language Linguistics*. Cambridge: Cambridge University Press.
- Johnston, T., & Schembri, A. (2007b). Testing language description through language documentation, archiving and corpus creation: The case of indicating verbs in the Auslan Archive Corpus. In P. K. Austin, O. Bond & D. Nathan (Eds.), *Proceedings of Conference on Language Documentation and Linguistic Theory* (pp. 145-154). London: SOAS.
- Johnston, T., & Schembri, A. (2010). Variation, lexicalization and grammaticalization in signed languages. *Langage et Société*, 131, 19-35.

- Johnston, T., & Schembri, A. (2013). Corpus analysis of sign languages. In C. Chapelle (Ed.), *Encyclopedia of Applied Linguistics* (pp. 479-501). London: Wiley-Blackwell.
- Kelly, B. F. (2002). The development of speech, gesture, and action as communicative strategies. *Language and Gesture: Proceedings of the 27th Annual Meeting of the Berkeley Linguistics Society*. Berkeley, CA: University of California, Department of Linguistics.
- Kelly, B. F. (2006). The development of constructions through gesture. In E. V. Clark & B. F. Kelly (Eds.), *Constructions in Acquisition* (pp. 11-25). Palo Alto: CSLI.
- Kendon, A. (1988). *Sign Languages of Aboriginal Australia: Cultural, Semiotic and Communicative Perspectives*. Cambridge: Cambridge University Press.
- Kendon, A. (2004). *Gesture: Visible Action as Utterance*. Cambridge: Cambridge University Press.
- Kimmel, M. (2012). Intersubjectivity at close quarters: How dancers of *Tango Argentino* use imagery for interaction and improvisation. *Journal of Cognitive Semiotics*, IV(1), 76-124.
- Kimmelman, V. (2012). Word order in Russian Sign Language. *Sign Language Studies*, 12(3), 414-445.
- Kim, H. (1996). The structure of the intonation unit and verbal affixes in Korean conversation. *Tamhwawa Inchi [Discourse and Cognition]*, 2, 47-74.
- Kisch, S. (2008). "Deaf discourse": The social construction of deafness in a Bedouin community. *Medical Anthropology*, 27(3), 283-313.
- Kisch, S. (2009). Book Review of Margalit Fox. 2007. *Talking Hands: What Sign Language Reveals About the Mind*. New York: Simon & Schuster. *Sign Language and Linguistics*, 12(2), 203-210.
- Kita, S. (Ed.). (2003). *Pointing: Where language, culture, and cognition meet*. Mahwah NJ: Erlbaum.
- Kockelman, P. (2005). The semiotic stance. *Semiotica*, 157(1/4), 233-304.
- Kundera, M. (2003). *Testaments Betrayed*. (L. Asher, Trans.). London: Penguin/Faber and Faber.
- Kusters, A. (2010). Deaf on the lifeline of Mumbai. *Sign Language Studies*, 10(1), 36-68.
- Kuhn, T. S. (2012/1962). *The Structure of Scientific Revolutions*. Chicago: The University of Chicago Press.
- Knudsen, B. (2012). *Infants' appreciation of others' mental states in prelinguistic communication*. Unpublished PhD dissertation. Radboud University, Nijmegen.
- Labov, W. (2001). *Principles of Linguistic Change* (Vol. 2: Social Factors). Oxford Blackwell.
- Lakoff, G. (1991). Cognitive versus generative linguistics: How commitments influence results. *Language and Communication*, 11(1/2), 53-62.

- Lambrecht, K. (1994). *Information Structure and Sentence Form: Topic, Focus and the Mental Representations of Discourse Referents*. Cambridge: Cambridge University Press.
- Langacker, R. W. (1987). *Foundations of Cognitive Grammar* (Vol. 1: Theoretical Prerequisites). Stanford, California: Stanford University Press.
- Langacker, R. W. (2005). Construction grammars: cognitive, radical, and less so. In F. J. Ruiz de Mendoza Ibanez & M. Sandra Peña Cervel (Eds.), *Cognitive Linguistics: Internal Dynamics and Interdisciplinary Interaction* (pp. 101-159). Berlin and New York: Mouton de Gruyter.
- Langacker, R. W. (2008). *Cognitive Grammar: A Basic Introduction*. Oxford: Oxford University Press.
- Langacker, R. W. (2010). How not to disagree: The emergence of structure from usage. In K. Boye & E. Engberg-Pedersen (Eds.), *Language Usage and Language Structure*. Berlin/NY: De Gruyter Mouton.
- LaPolla, R. J. (2003). Why languages differ: variation on the conventionalisation of constraints on inference. In D. Bradley, R. J. LaPolla, B. Michailovsky & G. Thurgood (Eds.), *Language Variation: papers on variation and change in the Sinosphere and in the Indosphere in honour of James A. Matisoff* (pp. 113-144). Canberra: Pacific Linguistics.
- LaPolla, R. J. (2005). Typology and Complexity. In J. W. Minett & W. S.-Y. Wang (Eds.), *Language Acquisition, Change and Emergence: Essays in Evolutionary Linguistics* (pp. 465-493). Hong Kong: City University of Hong Kong Press.
- Leavens, D. A., & Hopkins, W. D. (1998). Intentional communication by chimpanzees: A cross-sectional study of the use of referential gestures. *Developmental Psychology*, 34, 813-822.
- Leavens, D. A., & Hopkins, W. D. (1999). The whole-hand point: The structure and function of pointing from a comparative perspective. *Journal of Communicative Psychology*, 113, 417-425.
- Lee, D. (2010). What corpora are available? In M. McCarthy (Ed.), *The Routledge Handbook of Corpus Linguistics*. New York, NY: Routledge.
- Leech, G. (2000). Grammars of Spoken English: New outcomes of corpus-oriented research. *Language Learning*, 50(4), 675-724.
- Leeson, L., & Saeed, J. I. (2012). Word Order. In R. Pfau, M. Steinbach & B. Woll (Eds.), *Handbook of Sign Linguistics*. Berlin: Mouton de Gruyter.
- Lefebvre, H. (1991). *The Production of Space* (D. Nicholson-Smith, Trans.). Oxford Blackwell.
- Lehar, S. (2012). *The World in Your Head*. New York: Psychology Press.
- Lehmann, C. (1988). Towards a typology of clause linkage. In J. Haiman & S. A. Thompson (Eds.), *Clause Combining in Grammar and Discourse* (pp. 181-226). Amsterdam/Philadelphia: John Benjamins.

- Li, C. N., & Thompson, S. (1976). Subject and topic: A new typology of language. In C. N. Li (Ed.), *Subject and Topic* (pp. 457-489). New York: Academic Press.
- Liddell, S. K. (1977). *Investigations into the syntactic structure of American Sign Language*. Unpublished PhD dissertation. University of California, Berkeley.
- Liddell, S. K. (1978). Nonmanual signals and relative clauses in American Sign Language. In P. Siple (Ed.), *Understanding Language Through Sign Language Research* (pp. 59-90). New York: Academic Press.
- Liddell, S. K. (1980). *American Sign Language Syntax*. Den Hague: Mouton de Gruyter.
- Liddell, S. K. (1995). Real, surrogate, and token space: Grammatical consequences in ASL. In K. Emmorey & J. Reilly (Eds.), *Language, Gesture, and Space*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Liddell, S. K. (2003). *Grammar, gesture, and meaning in American Sign Language*. New York: Cambridge University Press.
- Liddell, S., & Metzger, M. (1998). Gesture in sign language discourse. *Journal of Pragmatics*, 30, 657-697.
- Lucas, C., Bayley, R., & Valli, C. (2001). *Sociolinguistic Variation in American Sign Language*. Washington DC: Gallaudet University Press.
- Lucas, C., Bayley, R., Reed, R., & Wulf, A. (2001). Lexical variation in African American and White signing. *American Speech*, 76(4), 339-360.
- Lyons, J. (1977). *Semantics* (Vol. 2). Cambridge: Cambridge University Press.
- Malm, A. (ed.) 1998. *Suomalaisen viittomakielen perussanakirja*. [Basic dictionary of Finnish Sign Language] Kuurojen Liittory & Kotimaisten kielten tutkimuskeskus. Helsinki: KL Support Oy.
- Massone, M. I., & Curiel, M. (2004). Sign order in Argentine Sign Language. *Sign Language Studies*, 5(1), 63-93.
- Matsumoto, K. (2000). Intonation units, clauses and preferred argument structure in conversational Japanese. *Language Sciences*, 22, 63-86.
- Matthiessen, C., & Thompson, S. A. (1988). The structure of discourse and 'subordination'. In J. Haiman & S. A. Thompson (Eds.), *Clause Combining in Grammar and Discourse* (pp. 275-330). Amsterdam/Philadelphia: John Benjamins.
- Maturana, H. R., & Varela, F. J. (1987). *The Tree of Knowledge: The Biological Roots of Human Understanding*. Boston: Shambhala Publications.
- McCullers, C. (2008/1940). *The Heart is a Lonely Hunter*. Penguin: London.
- McEnery, T., & Wilson, A. (2001). *Corpus Linguistics* (Second ed.). Edinburgh: Edinburgh University Press.
- McEnery, T., & Hardie, A. (2012). *Corpus Linguistics: Method, Theory and Practice*. Cambridge: Cambridge University Press.

- McIntire, M. (1982). Constituent Order and Location in American Sign Language. *Sign Language Studies*, 37(345-386).
- McKee, R., Schembri, A., McKee, D., & Johnston, T. (2011). Variable 'Subject' presence in Australian Sign Language and New Zealand Sign Language. *Language Variation and Change*, 23(375-398).
- Meier, R. P. (2002). The acquisition of verb agreement: pointing out arguments for the linguistic status of agreement in signed languages. In G. Morgan & B. Woll (Eds.), *Directions in Sign Language Acquisition* (pp. 115-141). Amsterdam/Philadelphia: John Benjamins.
- Meier, R. P. (2008). Channeling language. *Natural Language and Linguistic Theory*, 26, 451-466.
- Meir, I. (1999). A perfect marker in Israeli Sign Language. *Sign Language and Linguistics*, 2(1), 43-67.
- Menn, L., & Obler, L. (1990). *Agrammatic Aphasia: A Cross-Language Narrative Sourcebook* (Vol. 1). Amsterdam: John Benjamins.
- Merleau-Ponty, M. (1962). *Phenomenology of Perception*. New York: Routledge & Kegan Paul.
- Mesch, J. (2001). *Tactile sign language: Turn-taking and questions in signed conversations of deaf-blind people*. Seedorf, Germany: Signum Verlag.
- Metzger, M. (1995). Constructed dialogue and constructed action in American Sign Language. In C. Lucas (Ed.), *Sociolinguistics in Deaf Communities* (pp. 255-271). Washington DC: Gallaudet University Press.
- Metzger, M., & Bahan, B. (2001). Discourse Analysis. In C. Lucas (Ed.), *The Sociolinguistics of Sign Languages* (pp. 112-144). Cambridge: Cambridge University Press.
- Milković, M., Bradarić-Jončić, S., & Wilbur, R. B. (2006). Word order in Croatian Sign Language. In R. B. Wilbur (Ed.), *Investigating Understudied Sign Languages - Croatian SL and Austrian SL, with comparison to American SL: Special issue of Sign Language & Linguistics* 9:1/2 (pp. 169-206).
- Miller, C. (1994). Simultaneous constructions in Quebec Sign Language. In M. Brennan & G. H. Turner (Eds.), *Word-Order Issues in Sign Language: Working Papers Presented at a Workshop in Durham, 18-22 September 1991* (pp. 89-112). Durham, UK: International Sign Linguistics Association.
- Mithun, M. (2005). On the assumption of the sentence as the basic unit of syntactic structure. In Z. Frajzyngier (Ed.), *Linguistic Diversity and Language Theories* (pp. 169-183). Amsterdam: John Benjamins.
- Molino, Jean. 1990. Musical Fact and the Semiology of Music. *Music Analysis* 9: 133-156. Translated by J. A. Underwood from the French original. *Fait musical et sémiologie de la musique. Musique en jeu* 17 (1975): 37-62.
- Morales-López, E., Bobillo-García, N., Reigosa-Varela, C., Freire-Rodríguez, C., & Pérez-Casanova, C. (2007). El orden de los constituyentes en LSE: La función del tópico

- y del foco en la oración y en el discurso. In P. Cano López et al. (Ed.), *Actas del VI Congreso de Lingüística General Universidad de Santiago de Compostela. May 3-7th 2004* (pp. 987-996). Madrid: Arco/Libros.
- Müller de Quadros, R., & Lillo-Martin, D. (2010). Clause structure. In D. Brentari (Ed.), *Sign Languages* (pp. 225-251). Cambridge: Cambridge University Press.
- Mulrooney, K. (2009). *Extraordinary from the Ordinary: Personal Experience Narratives in American Sign Language*. Washington DC: Gallaudet University Press.
- Nakanishi, K. (1994). The influence of Japanese word order on Japanese Sign Language. In M. Brennan & H. Turner (Eds.), *Word-Order Issues in Sign Language: Working Papers Presented at a Workshop in Durham, 18-22 September 1991* (pp. 171-192). Durham, UK: International Sign Linguistics Association.
- Neidle, C., Kegl, J., MacLaughlin, D., Bahan, B., & Lee, R. G. (2000). *The Syntax of American Sign Language: Functional Categories and Hierarchical Structure*. Cambridge, MA: MIT Press.
- Nespor, M., & Sandler, W. (1999). Prosody in Israeli Sign Language. *Language and Speech*, 42(2-3), 143-176.
- Nespor, M., & Vogel, I. (1986). *Prosodic Phonology*. Dordrecht: Foris Publications.
- Nicodemus, B. (2007). *The use of prosodic markers to indicate utterance boundaries in American Sign Language interpretation*. Unpublished doctoral dissertation, University of New Mexico, NM.
- Nyst, V. A. S. (2012). Shared Sign Languages. In M. Pfau, M. Steinbach, B. Woll & S. language (Eds.), *Sign Language* (pp. 552-574). Berlin: Mouton de Gruyter.
- Ochs, E., Schieffelin, B., & Platt, M. (1979). Propositions across utterances and speakers. In E. Ochs & B. Schieffelin (Eds.), *Developmental Pragmatics*. New York, NY: Academic Press.
- Okrent, A. (2002). A modality-free notion of gesture and how it can help us with the morpheme vs. gesture questions in sign language linguistics (or at least give us some criteria to work with). In R. Meier, K. Cormier & D. Quinto-Pozos (Eds.), *Modality and Structure in Signed and Spoken Languages* (pp. 175-198). New York: Cambridge University Press.
- Oviedo, A. (2001). *Apuntes para una gramática de la Lengua de Señas Colombiana*: Republica de Colombia, Ministerio de Educación Nacional, Instituto Nacional para Sordos.
- Park, J. (2002). Cognitive and interactional motivations for the intonation unit. *Studies in Language*, 26(3), 637-680.
- Payne, T. E. (1997). *Describing Morphosyntax: A Guide for Field Linguists*. Cambridge: Cambridge University Press.
- Pfau, R., & Steinbach, M. (2011). Grammaticalization in sign languages. In H. Narrog & B. Heine (Eds.), *The Oxford handbook of grammaticalization* (pp. 683-695). Oxford: Oxford University Press.

- Piantadosi, S., Tily, H., & Gibson, E. (2012). The communicative function of ambiguity in language. *Cognition*, 122, 280-291.
- Pickering, J. (1997). Beyond Cognitivism: Mutualism and Postmodern Psychology. In P. Pykkänen, P. Plykkö & A. Hautamäki (Eds.), *Brain, Mind and Physics*. Amsterdam: IOS Press.
- Polanyi, M. (1974/1958). *Personal Knowledge: Towards a Post-Critical Philosophy*. Chicago: The University of Chicago Press.
- Pynte, J., & Prieur, B. (1996). Prosodic breaks and attachment decisions in sentence parsing. *Language and Cognitive Processes*, 11(1/2), 165-191.
- Quaeghebeur, L. (2012). The 'all-at-onceness' of embodied, face-to-face interaction. *Journal of Cognitive Semiotics*, IV(1), 167-188.
- Quinto, D. G. (2000). *Word order in Mexican Sign Language*. Paper presented at the 7th International Conference on Theoretical Issues in Sign Language Research (TISLR7), July 22-27.
- R Core Development Team. (2013). *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. ISBN 3-900051-07-0. <http://www.R-project.org> Retrieved 11 May 2013.
- Rissanen, J. (1989). *Stochastic Complexity in Statistical Inquiry*. Singapore: World Scientific Publishing Company.
- Rodríguez Louro, C. (2013). *Be like* in cross-generational Australian English speech. *English World Wide*, 34(1), 48-76.
- Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest systematics for the organisation of turn-taking for conversation. *Language*, 50, 696-735.
- Sampson, G. (2007). Grammar without grammaticality. *Corpus Linguistics and Linguistic Theory*, 3-1, 1-32.
- Sandler, W. (1999). Prosody in two natural language modalities. *Language and Speech*, 42(2/3), 127-142.
- Sandler, W. (2012). Dedicated gestures and the emergence of sign language. *Gesture*, 12(3), 265-307.
- Sandler, W., & Lillo-Martin, D. (2006). *Sign language and linguistic universals*. Cambridge: Cambridge University Press.
- Sandler, W., Mier, I., Padden, C. & Aronoff, M. (2005). The emergence of grammar: Systemic structure in a new sign language. *Proceedings of the National Academy of Sciences*, 102(7), 2661-2665.
- Schegloff, E. A. (1979). Identification and recognition in telephone conversation openings. In G. Psathas (Ed.), *Everyday Language: Studies in Ethnomethodology* (pp. 23-78). New York: Irvington Publishers, Inc.
- Schembri, A. (2001). *Issues in the Analysis of Polycomponential Verbs in Australian Sign Language (Auslan)*. Unpublished PhD dissertation. University of Sydney.

- Schembri, A. (2009). *Documenting sign languages*. Paper presented at the 3L International Summer School for Language Documentation and Description, 22 June-3 July 2009, School of Oriental and African Studies, University of London.
- Schembri, A., Jones, C., & Burnham, D. (2005). Comparing action gestures and classifier verbs of motion: Evidence from Australian Sign Language, Taiwan Sign Language and Nonsigners' gestures without speech. *Journal of Deaf Studies and Deaf Education*, 10(3), 272-290.
- Schembri, A., McKee, D., McKee, R., Pivac, S., Johnston, T., & Goswell, D. (2009). Phonological variation and change in Australian and New Zealand Sign Languages: The location variable. *Language Variation and Change*, 21, 193-231.
- Schembri, A., Cormier, K., Johnston, T., McKee, D., McKee, R., & Woll, B. (2010). British, Australian, and New Zealand sign languages: Origins, transmission, variation and change. In D. Brentari (Ed.), *Sign Languages*. Cambridge: Cambridge University Press.
- Schembri, A., & Johnston, T. (2013). Sociolinguistic variation and change in sign languages. In R. Bayley, R. Cameron & C. Lucas (Eds.), *Oxford Handbook of Sociolinguistics* (pp. 503-524). Oxford: Oxford University Press.
- Shibatani, M. (1991). Grammaticization of topic into subject. In E. C. Traugott & B. Heine (Eds.), *Approaches to Grammaticalization* (Vol. II, pp. 93-133). Amsterdam/Philadelphia: John Benjamins.
- Shibatani, M., & Pardeshi, P. (2002). The causative continuum. In M. Shibatani (Ed.), *The grammar of causation and interpersonal manipulation* (pp. 85-126). Amsterdam/Philadelphia: John Benjamins.
- Schlesinger, I. M. (1970). The grammar of sign language and the problem of language universals. *Leyden studies in linguistics and phonetics*. The Hague, The Netherlands: Mouton.
- Schober, M. F., & Clark, H. H. (1989). Understanding by addressees and overhearers. *Cognitive Psychology*, 21, 211-232.
- Selkirk, E. O. (1984). *Phonology and Syntax: The Relation Between Sound and Structure*. Cambridge, MA: MIT Press.
- Sindoni, M. G. (2013). *Spoken and Written Discourse in Online Interactions*. London: Routledge.
- Slobin, D. I. (2006). What makes manner of motion salient? Explorations in linguistic typology, discourse, and cognition. In M. Hickmann & S. Robert (Eds.), *Space in languages: Linguistic systems and cognitive categories* (pp. 58-81). Amsterdam/Philadelphia: John Benjamins.
- Sperber, D., & Wilson, D. (1986). *Relevance: Communication and Cognition*. Oxford: Basil Blackwell.
- Stefanowitsch, A. (2006). Negative evidence and the raw frequency fallacy. *Corpus Linguistics and Linguistic Theory*, 2-1, 61-77.

- Stern, L. (2010). *Chattering: Stories*. London: Granta.
- Streeck, J. (2003). The body taken for granted: Lingering dualism in research on social interaction. In P. J. Glenn, C. D. LeBaron & J. Mandelbaum (Eds.), *Studies in Language and Social Interaction*. Mahwah, NJ: Erlbaum.
- Streeck, J. (2008). Depicting by gesture. *Gesture*, 8(3), 285-301.
- Supalla, T., Newport, E., Singleton, J., Supalla, S., Metlay, D., & Coulter, G. (No date). *The Test Battery for American Sign Language Morphology and Syntax*. Unpublished manuscript and video materials. University of Rochester, New York.
- Sutton-Spence, R., & Woll, B. (1999). *The Linguistics of British Sign Language: An Introduction*. Cambridge: Cambridge University Press.
- Sze, F. (2003). Word order in Hong Kong Sign Language. In A. Baker, B. van den Bogaerde & O. Crasborn (Eds.), *Cross-Linguistic Perspectives in Sign Language Research, Selected Papers from TISLR 2000* (pp. 163-192). Hamburg: Signum Verlag.
- Sze, F. (2008). Blinks and intonational phrasing in Hong Kong Sign Language. In J. Quer (Ed.), *Signs of the Time: Selected Papers from TISLR 2004* (pp. 83-107). Hamburg: Signum.
- Tannen, D. (1989). *Talking voices: Repetition, dialogue, and imagery in conversational discourse*. Cambridge: Cambridge University Press.
- Tao, H. (1996). *Units in Mandarin Conversation: Prosody, Discourse and Grammar*. Amsterdam: John Benjamins.
- Thompson, S. A., & Hopper, P. J. (2001). Transitivity, clause structure, and argument structure: Evidence from conversation. In J. Bybee & P. Hopper (Eds.), *Frequency and the Emergence of Linguistic Structure* (pp. 27-60). Amsterdam/Philadelphia: John Benjamins.
- Tognini-Bonelli, E. (2001). *Corpus Linguistics at Work*. Amsterdam/Philadelphia: John Benjamins.
- Tomasello, M. (2003). *Constructing a Language: A Usage-Based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press.
- Van Gijn, I. (2004). *The Quest for Syntactic Dependency: Sentential Complementation in Sign Language of the Netherlands*. Unpublished Doctoral dissertation, University of Amsterdam, Amsterdam.
- Van Valin, R. D., & LaPolla, R. J. (1997). *Syntax: Structure, Meaning and Function*. Cambridge: Cambridge University Press.
- Verhagen, A. (2010). Usage, structure, scientific explanation, and the role of abstraction, by linguists and by language users. In K. Boye & E. Engberg-Pedersen (Eds.), *Language Usage and Language Structure*. Berlin/New York: Walter de Gruyter.
- Vermeerbergen, M. (1996). *ROOD KOOL TIEN PERSOON IN. Morfo-syntactische aspecten van gebarentaal*. Unpublished PhD dissertation. Vrije Universiteit.

- Vermeerbergen, M. (1998). *Word order issues in sign language research: a contribution from the study of Flemish-Belgian Sign Language*. Poster presented at the Sixth International Conference on Theoretical Issues in Sign Language Research (TISLR 6), Washington DC, 12-15 November.
- Vermeerbergen, M., Leeson, L., & Crasborn, O. (Eds.). (2007). *Simultaneity in Signed Languages: Form and Function*. Amsterdam / Philadelphia: John Benjamins.
- Volterra, V., Laudanna, A., Corazza, S., Radutsky, E., & Natale, F. (1984). Italian Sign Language: the order of elements in the declarative sentence. In F. Loncke, P. Boyes Braem & Y. Lebrun (Eds.), *Recent Research on European Sign Languages*. Lisse: Swets & Zeitlinger.
- Wilbur, R. (1994). Eyeblinks and ASL phrase structure. *Sign Language Studies*, 84, 221-240.
- Wilbur, R. (1999). Stress in ASL: Empirical evidence and linguistic issues. *Language and Speech*, 42(2-3), 229-250.
- Wilbur, R., & Patschke, C. G. (1998). Body leans and the marking of contrast in American Sign Language. *Journal of Pragmatics*, 30, 275-303.
- Wilcox, S. (2004). Cognitive iconicity: Conceptual spaces, meaning, and gesture in signed languages. *Cognitive Linguistics*, 15(2), 119-147.
- Wilkinson, E. L. (2009). *Typology of signed languages: Differentiation through kinship terminology*. Unpublished doctoral dissertation, University of New Mexico, Albuquerque, NM.
- Wilson, D., & Sperber, D. (1993). Linguistic form and relevance. *Lingua*, 90(1), 1-25.
- Winston, E. (1991). Spatial referencing and cohesion in American Sign Language text. *Sign Language Studies*, 73, 397-410.
- Winston, E. (1992). Space and involvement in an American Sign Language lecture. In J. Plant-Moeller (Ed.), *Expanding horizons: Twelfth National Convention of the Registry of Interpreters for the Deaf* (pp. 93-105). Silver Spring, MD: Registry of Interpreters for the Deaf.
- Woodbury, A. (2003). Defining Documentary Linguistics. In P. K. Austin (Ed.), *Language documentation and description* (Vol. 1, pp. 25-51). London: School of Oriental and African Studies, University of London.
- Wrobel, U. (2007). Space as a communicative resource: a functional-pragmatic approach to visual languages. *Sign Language and Linguistics*, 10(2), 223-231.
- Wulf, A., Dudis, P., Bayley, R., & C. Lucas (2002). Variable subject presence in ASL narratives. *Sign Language Studies*, 3(1), 54-76.
- Zeshan, U. (Ed.). (2005). *Interrogative and Negative Constructions in Sign Languages* (Vol. 1). Nijmegen: Ishara Press.
- Zeshan, U., & de Vos, C. (2012). *Sign Languages in Village Communities: Anthropological and Linguistic Insights*. Nijmegen/Berlin: Ishara Press/Walter de Gruyter.

Zimmerman, E. (2003). Play as research: The iterative design process. In E. Zimmerman (Ed.), *Design Research: Methods and Perspectives*. Cambridge, Massachusetts: MIT Press.

Zimmerman, J., Stolterman, E., & Forlizzi, J. (2010). An analysis and critique of *Research through Design*: towards a formalization of a research approach. *Proceedings of the 8th ACM Conference on Designing Interactive Systems* (pp. 310-319). New York: ACM.