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Little Kids, Big Verbs

The Acquisition of Murrinhpatha Bipartite Stem Verbs

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Abstract

This thesis examines the acquisition of Murrinhpatha, a polysynthetic language of northern Australia, based on semi-naturalistic data from 5 children (1;9-6;1) over a two-year period. It represents the first detailed acquisition study of an Australian non-Pama Nyungan language and thus contributes to a growing crosslinguistic and typological understanding of the process of language acquisition. In particular it focuses on the acquisition of Murrinhpatha bipartite stem verbs and the acquisition of complex inflectional verbal paradigms. These structures pose a number of challenges to the language learner, which raise questions for current theories of morphological acquisition.

The structure of this thesis is built around three major research questions. The first aims to describe the characteristics of early verb use in Murrinhpatha both with regard to their structure and their semantics and pragmatics. I describe the development of verb structures in Murrinhpatha finding that these are sensitive to phonological/prosodic factors and not truncated according to morphosyntactic factors. The semantics and pragmatics of early verbs show similarities to English-acquiring children despite the great typological differences of these languages. Secondly I examine the acquisition of the complex inflectional paradigms of Murrinhpatha classifier stems. This system appears to be too complex to allow for abstract rule-based morphological acquisition but also too large to rely on rote learning of individual inflected forms. I find that children begin by using a small core of rote learned inflected forms and gradually expand verb paradigms along predictable pathways relying on low level analogy and semi-regular patterns of inflection. Finally I consider the acquisition of Murrinhpatha bipartite stem verb morphology. These verbs are constructed of two stem elements, a classifier stem and a lexical stem, which co-vary to encode verbal semantics and argument structure. Such a system has not previously been explored from an acquisition perspective, and thus I investigate how children acquire the underlying compositional principles of the system. While children do use bipartite stem morphology contrastively, they are found not to acquire the compositional principles underlying the system in the age range considered. This suggests that the Murrinhpatha bipartite stem verb system is not regular or transparent enough to allow for the acquisition of the principles of compositionality during the earlier stages of development.

Declaration

I declare that:

a) This thesis comprises only my original work towards the Doctor of Philosophy degree;
b) Due acknowledgement has been made in the text to all other material used;
c) Full ethics procedures and guidelines have been followed; and
d) The thesis is fewer than 100,000 words in length exclusive of tables, maps, figures, and foreign language examples.



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List of Abbreviations

ADV	adverbial
APPL	applicative
AT	adult target
B.SBJ	supra-inflection class, singular subject, b-
Br	brother
CLF:ANIM	noun classifier, animate
CLF:HUMAN	noun classifier, human
CLF:LANG	noun classifier, language
CLF:PLACE	noun classifier, place and time
CLF:THING	noun classifier, neuter/residue class
CLF:TREE	noun classifier, tree
CLF:VEG	noun classifier, non-meat food
CLF:WATER	noun classifier, water
CLF:WEAPON	noun classifier, weapon
CSP	classifier stem paradigm
DM	discourse marker
DO	direct object
DU	dual
EMPH	emphasis
EXCL	exclusive
EXIST	existential mood
F	female
Fa	father
FOC	focus
FUT	future tense
FUTIRR	future irrealis
HITH	hither
IBP	incorporated body part
INCL	inclusive
INTS	intensifier
IO	indirect object
LOC	locative
LVC	light verb construction
M	male
M.NFUT	supra-inflection class, non-future tense, -m
M.SBJ	supra-inflection class, singular subject, m-
Mo	mother
NEG	negative
NFUT	non-future tense
NGAM.NFUT	supra-inflection class, non-future tense, -ngam
NGAN.NFUT	supra-inflection class, non-future tense, -ngan
NG.SBJ	supra-inflection class, singular subject, ng-
N.NFUT	supra-inflection class, non-future tense, -n
NUM	number
PC	paucal

PERL	perlative
PIMP	past imperfective
PL	plural
POSS	possessive
PSTIRR	past irrealis
PWord	prosodic word
RDP	reduplicated
RR	reflexive/reciprocal
S	subject
S.CS	serialised classifier stem
SG	singular
TAM	tense/aspect/mood
Zi	sister

1 Setting the Scene

This thesis investigates the acquisition of verbs in Murrinhpatha, a polysynthetic language of Northern Australia. It follows the language development of five children aged between 1;9 and 6;1 over a two year period through the recording and analysis of small group interactions in semi-naturalistic contexts. Murrinhpatha verbs exhibit a number of properties that pose interesting challenges for the language learner and for current theories of acquisition, including bipartite stem morphology and large complex verbal paradigms. There has been relatively little study of the acquisition of these types of structures, and of the acquisition of polysynthetic and Australian languages more generally. In order to better understand psychological processes such as language acquisition we need to consider as typologically diverse a range of languages as possible (Bowerman, 2011; Evans & Levinson, 2009; Stoll & Lieven, 2013). This thesis therefore helps to fill a substantial gap in our understanding and makes an important contribution to our knowledge of the acquisition of complex morphological systems. It also provides the first detailed acquisition study of a non-Pama Nyungan language of northern Australia.

The acquisition of polysynthetic verbs present a number of problems for the child. These verbs may be long and complex structures beyond the capabilities of children during earlier stages of development. This may lead children to avoid the production of verbs (e.g. Stoll et al., 2012) or to truncate verb structures (Kelly, Wigglesworth, Nordlinger, & Blythe, 2014). Furthermore, polysynthetic verb systems consist of large and complex verbal paradigms. For many of these systems children are not able to rely on the acquisition of morphological rules due to complex and potentially irregular paradigmatic patterns (Mithun, 2010). This means that children potentially need to learn large numbers of minimally different verbal forms and rely on low scale analogy and schematization in acquiring such a language (Stoll, 2015).

It has been shown through a typological approach to language acquisition that particular typological characteristics impact acquisition in similar ways (Bowerman, 2011). For example agglutinative morphology tends to be acquired more easily than synthetic morphology (e.g. Slobin, 1982). Furthermore, children acquiring languages with rich morphological systems become aware of the importance of morphology at a younger age (e.g. Laaha & Gillis, 2007). This study contributes to this typological approach by considering the impacts on acquisition of polysynthetic verb structures and complex morphological systems, thus examining the interaction between morphological richness and complexity in the acquisition of morphology.

The difficulty in pursuing a crosslinguistic typological approach lies in the lack of available data and the challenges in creating comparable acquisition corpora (Stoll & Lieven, 2013). Lieven & Stoll (2010, p. 144) report, in surveying longitudinal and experimental studies, that we know something about the acquisition of approximately 1% of the world's languages. This 1% shows a major bias towards the major Indo-European languages of Northwestern Europe. Polysynthetic languages continue to be underrepresented in acquisition research and consequently a great deal about how these are learned by children in comparison to typologically different languages is not understood.

The lack of research of polysynthetic languages is understandable given that few have been adequately studied from an adult usage perspective (Kelly et al., 2014). This statement could also be applied to Australian languages where the primary focus has been on the documentation and description of adult languages. Unfortunately the opportunity to study such languages is disappearing as smaller languages suffer from the influence of larger more

dominant languages and cease to be acquired by children. As was noted by Mithun more than 25 years ago regarding the acquisition of polysynthetic languages "[t]here is much to discover in little time" (Mithun, 1989, p. 286). Today this urgency is increased since many of the world's polysynthetic languages are endangered or under threat (Kelly et al., 2014). In the context of traditional Australian Indigenous languages, Murrinhpatha is relatively exceptional as it continues to be acquired as a first language. Of the approximately 250 traditional Indigenous languages spoken at the time of colonisation only 15-18 continue to be learned by children as a first language (Koch & Nordlinger, 2014, p. 4). Murrinhpatha is thus one of the few remaining traditional Australian Indigenous languages able to be studied from an acquisition perspective highlighting the importance of this study.

The characteristics of Murrinhpatha verbs pose a number of problems for acquisition, many of which have either not been examined or are underexplored. The majority of Murrinhpatha verbs have a bipartite stem structure where one of a closed class of approximately 38 classifier stems combines with one of a larger class of lexical stems (Street, 1987; Walsh, 1976). Together these encode the semantics and argument structure of the verb (Nordlinger & Caudal, 2012). These elements, which may be discontinuous, co-vary to encode different verbal meanings. The following examples are verbs with the same lexical stem *-kurrk* 'scratch' in combination with different classifier stems.[1]

(1)

a) *mam-kurrk*
1SGS.HANDS(8).NFUT-scratch
'I scratched something (with hand or stick).'

b) *thunungam-kurrk*
2SGS.FEET(7).NFUT-scratch
'You scratched something (with your foot).'

[1] Classifier stems are traditionally glossed with numbers as a full semantic analysis of this system is yet to be achieved as discussed in §2.2.

c) *pan-kurrk*
3SGS.SLASH(23).NFUT-scratch
'They (sg) dug in the ground with a stick (e.g. for crabs).'

(Adapted from Nordlinger, 2015, p. 492)

Classifier stems are portmanteau morphs encoding subject person and number as well as tense/aspect/mood, as indicated in the glosses of the previous examples. Classifier stems form paradigms that can encode over 50 morphological property sets. The inflectional patterns of these paradigms, although displaying a number of inter- and intra-paradigmatic 'semi-regularities', have a great amount of homophony, suppletion and irregularity that means forms cannot easily be generated from general patterns (Nordlinger, 2015). In addition to stem morphs Murrinhpatha verbs have a range of affixal morphs including object markers, incorporated body parts and additional number and tense/aspect/mood marking as outlined in §2.2. This means that verbs may be large polymorphemic constructions as shown in (2). Verbs are capable of encoding all core arguments meaning that arguments need not be realised as overt nominals in order to compose a full grammatical clause.

(2)

mam-ngi-ngkarlay-warda=dim
3SGS.HANDS(8).NFUT-1SG.DO-wave-NOW=3SGS.SIT(1).NFUT
'He's waving at me.'

(LAMP_20131206_WF_01_V1 00:09:59)

These verb structures, explained in greater detail in §2.2, raise a number of interesting questions for acquisition. Crosslinguistically children's early word productions often differ from target forms through the omission of segments and syllables (e.g. Demuth, 1996b). Polysynthetic verbs may be long words meaning that they are likely to be truncated by children. It has been found in a wide variety of languages that children omit non-stem morphology (Deen, 2009). In a number of morphologically complex languages this results in

children producing bare stems stripped of all non-stem morphology (Courtney & Saville-Troike, 2002). Whether or not children produce bare stems is somewhat more complicated in Murrinhpatha where the majority of verbs have bipartite stem structures. Furthermore, it must be considered how children initially consider the bipartite structure. They may treat a particular stem element as the 'true' stem or indeed treat the stem combination as the 'stem' before uncovering the principles of the bipartite stem system.

Murrinhpatha's complex and often irregular verbal paradigms pose problems for theories of morphological acquisition which focus on children's acquisition of rules (e.g. Pinker & Prince, 1991), as generating rules for such a system is not straightforward (Walsh, 1976, p. 224). However without the existence of productive morphological rules it seems unlikely that children are able to acquire the complex paradigms of polysynthetic languages (Mithun, 2010). Little is known about how children acquire the complex paradigms of polysynthetic languages (Stoll, 2015). This thesis contributes important new insights into the acquisition of such systems and the ability of various theoretical approaches to account for them.

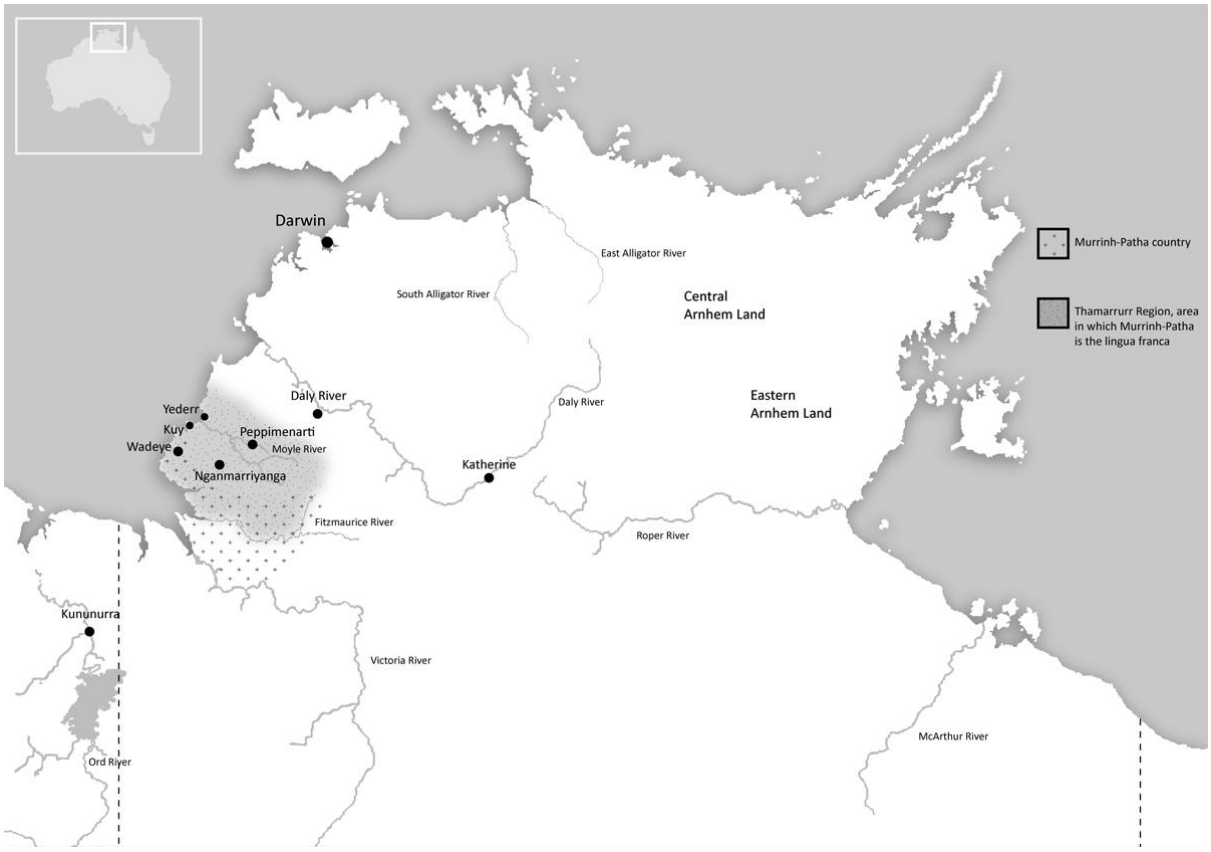
There has also been little study into the acquisition of structures similar to Murrinhpatha bipartite stem verbs. Murrinhpatha bipartite stem combinations may be semantically compositional, raising questions as to when children acquire these compositional principles and whether children acquire verbs as lexicalised units or learn to produce them 'on-line'. Acquisition studies of bipartite structures in other languages find that children do acquire such compositional principles as evidenced by the production of novel combinations based on grounds of semantics and frequency (Behrens, 1998; Berman, 2011; Family, 2009; Imedadze & Tuite, 1992). The acquisition of such structures is dependent on factors such as frequency of the combinatorial elements as well as the entire construction and morphosemantic transparency (e.g. Berman, 2011). This thesis examines the impacts of such factors on the acquisition of Murrinhpatha bipartite stem verbs.

1.1 Historical & Sociolinguistic Context

The location for this study is the town of Wadeye (Port Keats). Wadeye lies on the edge of coastal mangroves at the end of the Port Keats road near the western coast of Australia's Northern Territory (see figure 1). Wadeye is one of Australia's largest indigenous towns with

approximately 2700 residents (Taylor & Ivory, 2013). The majority of these residents are Indigenous Australians from the traditional clans of the surrounding Thamarrurr region (Taylor, 2010). These people typically speak Murrinhpatha as a first language which continues to be the dominant language of the community. Over the past decades the Indigenous population in Wadeye has undergone a demographic shift with a rise in the percentage of the younger population. In 2009 approximately 50% of the population was under the age of 18 (Taylor, 2010). The remainder of the Wadeye population includes people who have married in to families from the area and a predominantly non-indigenous population of 'service providers' including health workers, educators, contractors, council workers, shop staff and police. The service provider population is largely transient with some acting as 'Fly-In-Fly-Out' workers and the remainder typically only remaining in the town for a handful of years. This population is socially quite segregated from the local Indigenous community.

Figure 1. Map of Wadeye, Murrinhpatha and the Thamarrurr Region ("Map of Wadeye…" n.d.)



The township of Wadeye has a relatively short history. In 1935 a Catholic Mission was established by the Missionaries of the Sacred Heart at nearby Werntek Nganayi, now also known as 'Old Mission'. In 1939, due to the need for a more reliable water supply, the mission was moved to its current location at Wadeye on Sandfly Creek on the Yek Dimnin clan estate. This became known as Port Keats until the 1970s when the town also became officially known as Wadeye. The founding of the mission attracted clans from the surrounding region who relocated to Wadeye. By the 1950's some twenty clans resided in Wadeye (B. J. Pye, 1972) representing around 6 different language groups. Today up to 27 different clan groups reside in Wadeye, depending on different sources. Formal education began at Wadeye in 1941 with basic literacy and numeracy taught to the girls who resided at the convent (Taylor, 2010). In 1947 dormitories were constructed to accommodate boys and girls separately. During the week children were separated from their families and forced to speak English (Kelly, Nordlinger, & Wigglesworth, 2009). Despite this, children appear to have continued to speak traditional languages, in particular Murrinhpatha, to each other as well as with their families on weekends and during holidays. This dormitory system of schooling persisted until the late 1960's when a new 'open' school was established (Taylor, 2010). While this way of schooling, partnered with the movement of clan groups to Wadeye, may have been to the detriment of many traditional languages of the area it does not appear to have weakened Murrinhpatha.

Murrinhpatha is the language of the Yek Diminin clan,[2] on whose land Wadeye is located. This makes Murrinhpatha the appropriate or proper language of Wadeye.[3] The vitality of Murrinhpatha in comparison to other languages may be due to the fact that Wadeye is located on Murrinhpatha land. Today Murrinhpatha is spoken by approximately 2500 people who predominantly reside in and around Wadeye. In addition to Murrinhpatha the traditional languages of clan groups residing at Wadeye have been identified as Murrinh Kura, Marri Ngarr, Magati Ke, Marri Tjevin and Marri Amu (Blythe, 2009; Mansfield, 2014a). In addition to these Indigenous languages Jaminjung, Mendhe and more recently Ngan'giwumirri and Ngan'gikurrungurr are also associated with and spoken to varying extents by Wadeye residents. Today while Murrinhpatha remains the dominant language of the town, used between speakers in all social environments where possible, other traditional

[2] Murrinhpatha is also the language of various other clan groups.
[3] See Rumsey (1993) for a description of the relationship between people, language and land in a broader Australian Aboriginal context.

Indigenous languages have either very few fluent speakers or are no longer spoken. This means that the majority of people who speak Murrinhpatha as a first language today do not actually belong to clans who identify as Murrinhpatha people. People in Wadeye continue to identify as 'owners' of traditional languages other than Murrinhpatha associated with their clans but may not be speakers of these languages.

In addition to Murrinhpatha, Indigenous people in Wadeye use English to communicate with 'service providers'. There is a wide range of competency in English in the Wadeye Indigenous population. Typically those over the age of around 40, who were schooled in the dormitory system, have a greater command of English, whereas younger generations tend to be less competent. Outside of the 'service provider' context other languages such as Kriol and varieties of Aboriginal English are used for communication with people who do not speak Murrinhpatha. These may be people who have married into Murrinhpatha speaking families or are visiting relatives. There is substantial mobility between Wadeye and a number of inland communities including Peppimenarti, Emu Point and Daly River where people typically speak Kriol[4] as a first language (Mansfield, 2014a; Reid, 1990; Rhydwen, 2003).[5] When people visit or emigrate from Kriol speaking areas they likely use a mixture of Kriol, varieties of English and Murrinhpatha to communicate, depending on the abilities of the relevant interlocutors. People in Wadeye also have connections with populations in Kununurra & Wyndham in Western Australia as well as populations in Darwin and the Tiwi Islands north of Darwin (Taylor, 2010). It is largely unclear what impact these links have on the language ecology of Wadeye.

The majority of Indigenous children in Wadeye today grow up with Murrinhpatha as their first language. They are raised in a monolingual environment with limited input from other traditional Indigenous languages, varieties of English or Kriol. I have noted some limited influence of specific vocabulary such as kin terms from other traditional languages of the area. This tends to occur when the child is not a Murrinhpatha person. For example, one family associated with this project whose children are Marri Tjevin, report that their children understand and produce some Marri Tjevin words including several kin terms. This influence

[4] Kriol refers to an English lexifier creole language spoken as a first language by up to 30,000 people across regions of the top end of Australia from Cape York to Broome and south to Tennant Creek (Meakins, 2014).
[5] It should be noted that many Kriol speakers in places such as Daly River may not identify as speaking 'Kriol' and instead use other labels to refer to this language such as 'Pidgin English' or 'Ngan'giwatyfala' (Rhydwen, 2003).

is however very marginal given that the child has limited access, if any, to interactions with fluent Marri Tjevin speakers. Furthermore these lexical borrowings are likely simply inserted into Murrinhpatha constructions.

Indigenous children in Wadeye typically have only limited exposure to English before they commence education at the local school 'Our Lady of the Sacred Heart Thamarrurr Catholic College'. The school provides a bilingual program with biliteracy instruction in Murrinhpatha and English, based on a step transition model (Devlin, 2005). Literacy and numeracy are taught in Murrinhpatha from Transition (the first year of school) to year 2. The transition to English literacy then begins in year 3. Despite the bilingual program, children's literacy in English and Murrinhpatha is below relevant benchmarks and English competency remains limited. This may in part be due to low rates of attendance (Taylor, 2010), lack of teacher training in teaching English as a foreign language (Kelly et al., 2009), lack of fully trained teachers who speak Murrinhpatha as a first language and broader impacts of poverty and disengagement with such institutions in the broader community. Before attending school children have little to no receptive or productive skills in English. They may overhear and be addressed in English sporadically at places like the shop and health clinic. They also watch English language television and movies. Exposure in these environments results in little more than the acquisition of the odd word or phrase such as swear words or the line '*Let it go'* from the hit song of the same name in the movie Frozen (Buck & Lee, 2013).

Although the monolingual acquisition of Murrinhpatha is the norm for children in Wadeye there are also numerous examples where children's linguistic repertoires are more varied. For example a younger cousin of the children in this study has a father from Emu Point. His primary language is Kriol and he is not fluent in Murrinhpatha although his competency is improving. This child, who is now 3 years of age, has a noticeably different linguistic repertoire to that of her cousins, using a wider variety of English and Kriol words. This is likely attributable, to some extent, to the linguistic repertoire of her father. An additional factor is that her grandparents in particular claim that she is able to understand 'English'. This belief, that has existed since before the child began speaking, appears to have impacted the way in which caregivers speak to this child with a number of Murrinhpatha speakers often addressing her in English despite their sometimes limited competency. The focus children in this study however are typical of children in Wadeye in that they are

monolingual Murrinhpatha speakers with parents and extended families who also mostly speak Murrinhpatha as their primary language.

The way in which children are raised in Wadeye has not been a central focus of this study. It is worthwhile however to provide some observations of day-to-day life based on my own time spent with a small number of families. These observations have contributed to the methodology used in this study, in particular the structure of recording environments as detailed in §4.5. It should be noted that I have spent limited time with people in their homes and these preliminary observations require further rigorous anthropological investigation. For an overview of the literature concerning Indigenous children and youth in Australia see Eickelcamp (2010).

Children born in Wadeye are typically cared for by their mothers. They are mostly carried until they are able to walk or are replaced by the arrival of a younger sibling. In addition young children may be cared for by fathers[6], grandparents, the mother's female siblings (also referred to as *kale* 'mother'), sister's in-law and elder siblings. This spread of caregiving responsibility is evidenced by the fact that children may regularly sleep at different houses under the care of various kin. For example, one of the children in the study often stayed at the house of his parents as well as the house typically occupied by his *kawu* (MoMo) in a different part of town.

Children are spoken to from a young age and are treated as autonomous beings capable of making their own decisions. For example when going fishing a two year old may be given the option to come or stay. There is a noticeable child-directed speech register used by some speakers when talking to young children, in particular pre-verbal infants. This register is characterised by higher overall pitch, exaggerated intonation patterns and potentially palatalisation. Children are also often prompted to speak by more experienced interlocutors. Prompting takes a specific structure which children appear to be highly attuned to. The prompter says what is to be said by the child followed by either *thama* 'you say it' or *na-na/-nge* 'say it to him/her'. Initially I considered that prompting may be a result of parents

[6] Mansfield (2014a, p. 32) reports that in many cases young fathers may have a very limited role as a caregiver for their children. He suggests that this may be due to a lack of financial resources and access to housing. He further suggests that relationships between parents may break down. Although I have also observed such cases I am also aware of young fathers who take an active role in the upbringing of their children. It is not uncommon to see fathers accompanied by their small children at the shop or kicking a football at the oval. It is unclear what expectations exist with regard to fatherhood across the broader community.

wanting their children to 'perform' during recordings, however, given observations in a variety of other contexts where the child's speech was not a primary focus I do not believe this to be the case. Instead this appears to be a typical explicit method of instruction used by more experienced speakers to guide less competent speakers in their behaviour and language use.[7] It is clear however that some caregivers tend to provide more prompts than others (Kelly & Davidson, 2015).

Children in Wadeye grow up surrounded by family and are in constant contact with speakers of various generations. Children also spend a large amount of time playing in their own peer group with siblings and cousins. The significance of the peer group in the child's social world has also been identified in a number of other Indigenous Australian contexts including Maningrida (Hamilton, 1981), Aurukun (Martin, 1993) and Docker River (Fietz, 2008). The importance of these peer groups likely increases as children grow older and become more independent from older caregivers such as parents and grandparents. Indeed the peer groups of young men in Wadeye have been shown to be a major factor in their social organisation (Mansfield, 2014a).

1.2 Broad Research Questions & Outline of this Thesis

The central focus of this thesis is to examine aspects of the acquisition of verbs and verb morphology in Murrinhpatha. The data for this study is based on the spontaneous language use of five children aged between 1;9 and 6;1 over a two year period in semi-naturalistic contexts. The study is built around three major research questions, given below, which are presented in greater detail in §3.6.

1. What are the characteristics of children's early Murrinhpatha verbs and what factors account for these characteristics?
2. How do children acquire the complex morphological patterns of Murrinhpatha classifier stem paradigms?
3. How do children acquire the underlying compositional principles of the Murrinhpatha bipartite stem verb system?

[7] In my own learning of Murrinhpatha, I have also been prompted in the same way as young children.

The remaining structure of this thesis is as follows. Chapter 2 provides a general overview of the Murrinhpatha language and previous linguistic work on Murrinhpatha. It also includes a detailed description of the verb structures which are central to this thesis including bipartite stem morphology, classifier stem paradigms and the prosodic structure of verbs. Chapter 3 is a literature review of empirical studies and theoretical proposals regarding the acquisition of verbs and verb morphology. The presentation of literature relating to the three research questions above provides the foundation for analysis of the Murrinhpatha corpus undertaken in chapters 5 to 7. Undertaking acquisition research in a context like Wadeye, which is unfamiliar to the researcher, poses a number of challenges for conducting 'best-practice' research. The methodology of this study, outlined in chapter 4, has therefore been designed in response to these challenges and attempts to be mindful of the community which it is designed to investigate.

Chapter 5 is the first of three data analysis chapters and is focused on research question 1. It examines children's early verb productions and considers what factors drive these productions. The first half of this chapter focuses on the structure of children's early verbs given findings in other languages that children often truncate their early words and omit inflectional morphology (e.g. Deen, 2009; Demuth, 1996b). The second part of this chapter considers whether children's early verbs are restricted in terms of semantics and pragmatics similar to findings for English-acquiring children (e.g. Clark, 1993; Huttenlocher, Smiley, & Charney, 1983; Ninio, 1999b) and what impact this may have on the acquisition of verb morphology. Chapter 6 addresses research question 2 analysing the development of Murrinhpatha classifier stem paradigms across the corpus. It presents quantitative and qualitative analysis of children's paradigmatic flexibility in using various classifier stem forms and seeks to identify potential pathways of development in acquiring complex verbal paradigms. The final analysis chapter (Ch. 7) focuses on research question 3, exploring the acquisition of the bipartite stem verb system. It examines the extent to which children are aware of the semantics associated with individual stem elements and the impacts of the structure of this system on acquisition. In particular it focuses on the contrastive use of several classifier stem paradigms and children's errors of commission. Chapter 8 revisits the findings from the previous three analysis chapters and provides discussion in relation to broader empirical findings and theoretical approaches in the field of first language acquisition as well as proposing avenues for future research.

2 Grammatical Background

Murrinhpatha[8] is a polysynthetic non-Pama-Nyungan language spoken in the Daly River region of Australia's Northern Territory. It is one of the few traditional Australian Indigenous languages which continues to be acquired by children (Koch & Nordlinger, 2014). Initially Murrinhpatha was considered to be a language isolate unrelated to any of the surrounding Daly languages (e.g. Tryon, 1974). However, through detailed comparison of complex verbal paradigms Murrinhpatha has been shown to be related to the neighbouring language Ngan'gityemerri (Green, 2003). Together these are referred to as the Southern Daly subgroup.

Murrinhpatha has been the focus of a growing amount of linguistic research although there remains no comprehensive grammatical description. This has included introductory and foundational grammatical descriptions (Street, 1987; Walsh, 2011) as well as more focused research on a variety of areas including nominal classification (Walsh, 1997), person

[8] Murrinhpatha is the current preferred spelling of the language name, however it is also found in the literature in the following forms: *Murrinh-Patha, Murriny Patha, Murinypata* and *Murinbata.*

reference (Blythe, 2009, 2013), syntax (Mujkic, 2013), and description of aspects of Murrinhpatha's complex verb morphology (Blythe, 2010; Forshaw, 2011; Mansfield, 2014b; Nordlinger, 2010a, 2015; Nordlinger & Caudal, 2012; Seiss, 2012; Walsh, 1995). Recently the research of Mansfield has focused on the language and social organisation of young men in Wadeye (Mansfield, 2013, 2014a). This includes the documentation of language change in verbal structures compared with descriptions of the language of older and past generations (Mansfield, 2015; Mansfield & Nordlinger, 2015). The field of Murrinhpatha linguistics has now also expanded to include studies of language acquisition (Forshaw et al., in press; Kelly, Forshaw, Nordlinger, & Wigglesworth, 2015; Kelly et al., 2009) led by the Language Acquisition Murrinhpatha (LAMP) project of which this thesis is a part.

2.1 Phonology and Orthography

The table below from Nordlinger (2015, p. 497) illustrates the Murrinhpatha phoneme inventory using the current orthography of the Wadeye community. This orthography is used throughout this thesis when presenting language examples. Laminals in Murrinhpatha typically vary allophonically between a lamino-dental realisation before back vowels (/u/ and /a/) and a lamino-palatal realisation elsewhere. There are however a number of lexicalised exceptions to this rule such as in the noun classifier *thu* [cu].[9]

Table 1. Murrinhpatha Phoneme Inventory

Consonants	*bilabial*	*alveolar*	*retroflex*	*laminal*	*velar*
voiceless stop	p	t	rt	th	k
voiced stop	b	d	rd	dh	g
nasal	m	n	rn	nh	ng
lateral		l	rl		
flap/trill		rr			
glide	w	r		y	

Vowels	*front*	*back*
high	i	u
low	e	a

[9] The work of Blythe (e.g. 2009) uses a slightly different orthography which formally differentiates between lamino-palatal (e.g. *tj*-) and lamino-dental (e.g. *th*-) consonants. Where examples from other sources do not conform to the above orthography they are changed so as to be consistent.

The remainder of this chapter focuses on the description of verbs and verb morphology with a particular focus on the bipartite stem verb system and characteristics of classifier stem paradigms. For a more general language overview the reader is directed to Blythe (2009 Ch. 6).

2.2 Verbs

Similar to many languages of northern Australia the majority of verbs in Murrinhpatha have a bipartite structure (e.g. McGregor, 2002; Schultze-Berndt, 2000). In most other northern Australian languages with this type of verbal system the two predicative elements are distinct parts of speech and are combined syntactically to form a complex predicate. By contrast in Murrinhpatha and Western and Southern Daly languages these two elements are contained in a single verbal word (Nordlinger, in press). These bipartite stem verbs are constructed of two distinct stem morphs, a classifier stem (also referred to as a 'finite' or 'generic' verb) and a lexical stem (also referred to as a 'coverb'), which occur in discontinuous positions in the verbal template, as shown later in Table 1.

Together the classifier and lexical stems, which I refer to collectively as stem morphology, account for the verbal semantics, argument structure and event denotation of the verb (Nordlinger & Caudal, 2012). These two elements combine in a variety of ways to encode different verbal meanings as explained in further detail in §2.2.3. In the example in (3) the two stem elements have been bolded with the classifier stem always occurring word initially.

(3)

ngam*-mpa-****mut***

1SGS.POKE(19).NFUT-2SG.IO-**give**

'I gave it to you'

(LAMP_20131206_WF_02_V1 00:05:25)

Classifier stems are portmanteau morphs which also encode subject person/number and tense/aspect/mood (TAM). This means that classifier stems form classifier stem paradigms (CSPs) that can encode upwards of 50 morphological property sets (Nordlinger, 2015). The inflectional patterns of these sub-paradigms are explored in greater detail in §2.2.4. There are approximately 38 CSPs (Blythe, Reid, & Nordlinger, 2007). These CSPs have been argued to categorise the event type of the verb according to a number of semantic parameters (e.g. Barone-Nugent, 2008), however the analysis of this system poses a range of problems and a comprehensive analysis cannot be achieved on purely semantic grounds (Nordlinger, 2012a). Where possible these event categories are given in the glosses of classifier stems, however given processes of metaphorical extension and lexicalisation these should not be read literally but as labels. The labels used largely follow those used in various works of Nordlinger (2010a, 2012a, 2015). In addition classifier stems are glossed with numbers following the traditions of previous descriptions (Blythe, 2009; Blythe et al., 2007; Street, 1987; Walsh, 1976). In this thesis I follow the numbering system illustrated by Blythe et al. (2007).

Classifier stems are obligatory in all verbs. 11 CSPs can occur without a lexical stem as simple verbs as shown in the example below.[10] The meaning of CSPs used as simple verbs reflects their meaning in bipartite stem verbs to some extent (Walsh, 1976, p. 212). However the meaning of some simple verbs is markedly different when used in bipartite stem verbs. For example HANDS(8) when used in a bipartite stem verb prototypically means ‘an action done with hands’ but when used as a simple verb means ‘say/talk’.

(4)

Acacia	***kanthin****=pirrim*
name	**3SGS.HAVE(22).NFUT**=3SGS.STAND(3).NFUT

‘Acacia has a guitar’

(LAMP_20131206_WF_02_V1 00:02:02)

[10] The 11 CSPs which can occur as simple verbs are SIT(1), LIE(2), STAND(3), BE(4), ALOFT(5), GO(6), FEET(7), HANDS(8), HANDS:RR(10), HAVE(22) and SAY/DO(34) (Nordlinger & Caudal, 2012).

A number of simple verbs may also be used to construct phrasal verbs. In this construction type the simple verb is typically immediately preceded by a 'preverb' which encodes the main lexical content of the verb (Mansfield, 2016).[11] These differ from bipartite stem verbs as the preverb and simple verb are not morphologically bound. This is shown in (5) where the preverb *walalanhka* encodes the action of waving and immediately precedes the simple verb *pirrim*. This construction is readily used to borrow verbs from both English and Kriol and is a growing verbal structure in Murrinhpatha (Mansfield, 2016).

(5)

walalanhka	***pirrim***
wave	**3SGS.STAND(3).NFUT**

'He's waving'

(LAMP_20131206_WF_02_V1 00:07:46)

In addition to stem morphology Murrinhpatha verbs may include direct and indirect object marking, reflexive/reciprocal markers, incorporated body parts additional tense/aspect/mood and number marking, various adverbial markers and a serialised verb element. This can result in long and complex polymorphemic verbs shown in bold in the examples below. Murrinhpatha verbs may constitute full clauses encoding all core arguments meaning that overt nominal arguments are not required to make a clause grammatical as in (7).

(6)

nanthi	*hat*
CLF:THING	hat

ngungan-ngintha-we-wurl=ngem

1SGS.REMOVE(32).NFUT-DU.F-head-undress=1SGS.SIT(1).NFUT

'We (dual exclusive non-siblings) are taking hats off our heads.'

(LAMP_20131206_WF_01_V1 00:22:33)

[11] Phrasal verbs are referred to by Mansfield (2016) as light verb phrases. In the description of these constructions he refers to simple verbs as light verbs and preverbs as coverbs. I deliberately avoid the use of the term coverb to avoid confusion with the lexical stem which has been described as a coverb in previous descriptions of Murrinhpatha (e.g. Blythe, 2009).

(7)

dani-ngi-riwak-dha-ngintha-dharra

3SGS.POKE(19).PIMP-1SG.DO-follow-PIMP-DU.F-MOVING

'They (dual non-siblings) were following me.'

(Nordlinger, 2010a, p. 326)

The verb has a templatic structure in which affix ordering is governed by morphotactic constraints and not by semantic compositionality and/or syntactic structure (Nordlinger, 2010a).[12] The structure of this template adapted from Nordlinger (2010a) is given below. I divide the verb template in two sections similar to Mansfield (2015). The first section, the verbal Prosodic Word (PWord) begins with the classifier stem and concludes with the lexical stem. The verbal PWord has a bimoraic minimum and predictable penultimate stress when greater than a single syllable (Mansfield, In Prep.a). The second section is a sequence of morphs which are external to the internal PWord. When slots 2, 3 or 4 are overtly expressed in bipartite stem verbs this causes stem morphology to be discontinuous, I consequently refer to these slots together as inter-stem morphology in this thesis.

Table 2. Murrinhpatha Verbal Template

1	2	3	4	5	6	7	8	9		10
Classifier Stem	S.NUM/ DO/IO	RR	IBP/ APPL	Lexical Stem	TAM	ADV	S.NUM/ O.NUM	ADV	=	SCS
Verbal PWord					Suffix Sequence					

Key:

S.NUM:	Subject number marker
DO:	Direct object marker
IO:	Indirect object marker
RR:	Reflexive/reciprocal marker
IBP:	Incorporate body part
APPL:	Applicative
TAM:	Tense/aspect/mood marker
ADV:	Adverbial
O.NUM:	Object number marker
S.CS:	Serial classifier stem

[12] Mansfield (In Prep.b) proposes an alternative description which argues that the position of the lexical stem is determined by prosodic criteria. This description reduces the need for the competition of morphology in certain slots, however it also relies on the existence of templatic verb structures.

Recent research of young men's (18 - 40) speech has shown that the TAM marker shown in slot 6 can occur in a variety of positions to the right of argument number marking in slot 8 as well as to the right of the serial classifier stem in slot 10 (Mansfield, 2015). This ordering is variable across speakers and within individual speaker repertoires. Importantly, variations in the ordering of suffixes do not impact the scope of these morphs consistent with a templatic account. These innovative orderings are also found to some extent in the children's speech described in this thesis. The example in (8) shows the production of a TAM marker to the right of argument number marking by a child aged 4;11.The variation of the ordering of the suffix sequence across generations requires further investigation although does not greatly impact the questions addressed in this thesis.

(8) Mavis 4;11

kanhi-matha	***ngarde-ngime-dha***
	1 8 6
here-INTS	**1DUS.BE(4).PIMP-PAUC.F-PST**

'We were right here'

(LAMP_20131025_WF_01_V1 00:12:39)

There are a number of morphophonemic processes which occur in verbal PWords. These are typically the result of a final nasal of a classifier stem or object marker being followed by an initial consonant of a lexical stem or incorporated body part. This is often found in verbs with non-future classifier stems as these have final nasals in most forms (see §2.2.4). Street (1987, pp. 105–110) provides a list of a number of these processes, although many appear to be lexicalised classifier and lexical stem combinations and may not be generalisable morphophonemic processes (Nordlinger, 2015). Where relevant to discussion the first line of examples shows the surface form of the verb and the second line shows the underlying morphological representation as in (9). In cases where the surface form is not relevant to discussion it may be omitted.

(9)

bangarnurt
bangam-rdurt
1SGS.BASH(14).NFUT-find
'I found it.'

(LAMP_20131105_WF_01_V1 00:29:17)

2.2.1. Complexity in Use

The above preliminary presentation of Murrinhpatha verbs, including in particular the verbal template in table 1 as well as the complex verbal constructions illustrated in (6) and (7), highlight the potential complexity of Murrinhpatha verbs and suggest that verbs have a high morph to word ratio. While such examples capture the potential complexity of Murrinhpatha verbs they do not represent the typical complexity of verbs in everyday use or the typical complexity of verbs used in child-directed speech. Understanding the typical structure of verbs is important given that frequency is argued by many accounts to be a major factor in acquisition (e.g. Ambridge, Kidd, Rowland, & Theakston, 2015; Lieven, 2010).

A study of the typical structure of verbs based on a corpus of 4 adult-to-adult small group conversations and 3 short narratives was undertaken by Forshaw et al. (2012). It examined the morphological structure of 1359 verb tokens. It found that on average, in addition to stem morphs, verbs contained 1.21 overt affixal morphs with the most frequent slots filled being slot 2 (object markers and subject number) and slot 6 (TAM) occurring in 36% and 37% of verb tokens respectively. The study also found that lexical stems also often occur word finally in 41% of all verb tokens despite their position in the middle of the verbal template. This means that in addition to occurring at the end of the verbal PWord they are also regularly located at the end of the verbal complex. This may have an impact on children's early verb productions explored in §5.1 given findings in other languages with complex verb morphology that the position of verb stems impacts acquisition (e.g. C. Pye, Pfeiler, de León, Brown, & Mateo Pedro, 2007).

Throughout this thesis I draw on the findings of the Forshaw et al. (2012) study as an indicator of adult language use and as an indicator of the structure of child-directed speech. The small nature of this study means that is only indicative of adult verb use and a more

comprehensive study may produce different results. While it would be preferable to draw on the findings from a corpus of child-directed speech this research is yet to be undertaken and remains beyond the scope of this thesis. What is utilised is the best available representation of the typical structure of adult verbs.

2.2.2. Prosodic Structure of Verbs

The stress patterns of Murrinhpatha verbs and bipartite stem verbs in particular have received attention from a variety of researchers (Clemens, 2013; Mansfield, 2014a; Street & Mollinjin, 1981; Walsh, 1976). These descriptions, with the exception of Clemens (2013) who included some acoustic analysis,[13] have relied on researchers' non-native speaker impressions about stress placement in words. This has led to a situation where researchers offer different analyses of the prosodic patterns of the same and similar words. This has highlighted the need for reanalysis with the help of acoustic analysis as has proved effective in the analysis of other Australian languages (Bowern, Alpher, & Round, 2013). Despite variation in some findings these studies have generally found that primary stress in verbs typically falls on the penultimate syllable of the verbal PWord. These studies have also proposed a variety of secondary stress marks in Murrinhpatha verbs although this varies from description to description.

More recently, with the support of acoustic analysis, it has been shown that predictable penultimate stress is realised as a pitch peak across Murrinhpatha verbal PWords confirming the most consistent finding of previous descriptions (Mansfield, In Prep.a). This means that although stress is predictable it does not coincide with a specific morphological slot. In the following simple verb examples primary stress falls on the initial syllable of the classifier stem and on the first syllable of the indirect object marker. Stress is indicated throughout this thesis with diacritics when relevant to discussion.

[13] Despite the presence of some acoustic analysis in this study stress was assigned impressionistically (Clemens, 2013, p. 39).

(10)

ˈna-nge
2SGS.SAY/DO(34).FUT-3SG.F.IO
'Say to her.'

(Mansfield, In Prep.b, p. 5)

(11)

mam-ˈpirra
3SGS.SAY/DO(34).NFUT-3PL.IO
'He said to them.'

(Mansfield, In Prep.b, p. 5)

This is also the case in bipartite stem verbs, where stress falls on the penultimate syllable of the PWord, usually the lexical stem. When lexical stems consist of two syllables or more they are the site of primary stress as in (12) & (13). However when lexical stems are monosyllabic the preceding morph carries primary stress (14). This means that while the end of the lexical stem is predictable on the basis of stress the initial boundary of the lexical stem is not predictable in this way. The lexical stems in these examples are bolded.

(12)

*mam-ˈ**patha***	*ka*
3SGS.HANDS(8).NFUT-**make**	car

'He fixed the car.'

(Mansfield, In Prep.a, p. 17)

(13)

kardu	*bangam-**dha**ˈ**wibu**=dim*
CLF:HUMAN	3SGS.BASH(14).NFUT-**light.cigarette**=3SGS.SIT(1).NFUT

'He's lighting up (a cigarette).'

(Mansfield, In Prep.a, p. 17)

(14)

*kanam-ˈnga-**kay***
3SGS.BE(4).NFUT-1SG.IO-**call.out**

'She's calling out for me'.

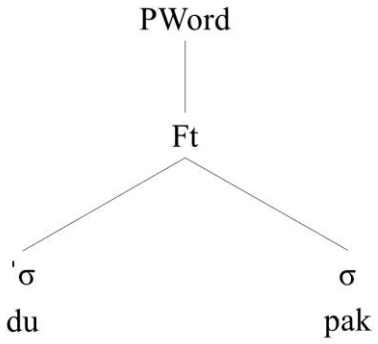
(Mansfield, In Prep.b, p. 12)

A number of accounts of prosodic structure propose that syllables must be grouped into prosodic feet and that these feet then compose prosodic words (e.g. Nespor & Vogel, 1986; Selkirk, 1984, 1986) as outlined in §3.3.1.2. Mansfield (In Prep.a) however claims that there is no direct evidence for foot structure in Murrinhpatha verbal PWords given that he finds no evidence of secondary stress. He suggests that the lack of secondary stress in longer verbs, as indicated by acoustic analysis, is accountable for the variable findings regarding secondary stress in previous impressionistic descriptions. He does however note that some facts are potentially 'indirect' evidence of a trochaic foot structure in Murrinhpatha verbal PWords. These are that stress is penultimate which is suggestive of a head trochaic foot at the end of a PWord and that words have a bimoraic minimum suggesting that words must minimally have at least one foot. Based on this evidence as well as children's productions of early verbs (§5.1) I treat verbal PWords as having a head trochaic foot at their right edge. Given there is no evidence of secondary stress according to recent acoustic analysis and the mixed findings of impressionistic studies I treat syllables preceding the head foot as being prosodified at the PWord level.[14] This structure is shown below for disyllabic, trisyllabic and tetrasyllabic bipartite stem verbal PWords. Children's early production of these structures is examined in (§5.1)

[14] I do believe however that the prosodic structure of long complex verbs would benefit from further analysis.

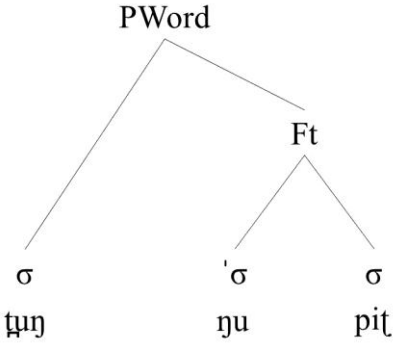
(15) a) Disyllabic verbal PWord

dupak ‘you put it down’



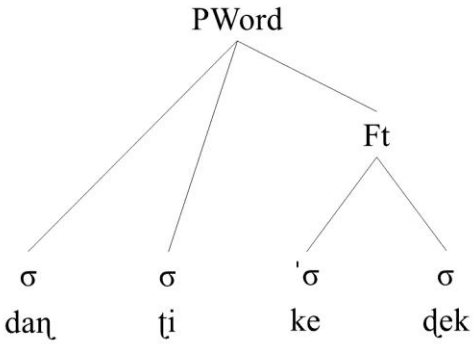
b) Trisyllabic verbal PWord

thungupirt ‘you take it off’



c) Tetrasyllabic verbal PWord

darntikerdek ‘he finished it’



2.2.3. Bipartite Stem Verbs

Bipartite stem verbs are minimally composed of a classifier and a lexical stem. These stems co-vary to encode different verbal meanings with many classifier stems occurring with a variety of lexical stems and vice versa (Nordlinger & Caudal, 2012). In the most transparent constructions the verbal meaning can be understood as being composed of meanings of both the classifier and lexical stem. These individual stem morphs can have clear associated meanings spread across a wide variety of constructions. There is however great diversity

across the verbal system both in terms of flexibility and semantic transparency of individual stems. Flexibility refers to the variety of combinations a classifier or lexical stem can occur in whereas semantic transparency refers to the ease with which a core semantic meaning can be attributed to a stem based on its use in a variety of combinations. The characteristics presented in this section have been explored in detail in other languages of the Daly region Marrithiyel (Green, 1989) and Ngan'gitymerri (Reid, 2011) which have similar bipartite verb systems. Understanding the diverse and varied characteristics of this system is essential in considering how it is acquired.

At the most productive end of the verbal system combinations of classifier and lexical stems are semantically transparent and the individual stems typically have relatively high flexibility. The interaction of the stem elements in terms of semantic transparency is highlighted by the following examples from Nordlinger (2015, p. 494). The verbs in (16a-d) all contain the CSP BASH(14) in combination with a variety of lexical stems. These verbs all encode events of 'bashing' or 'sticking' using some type of instrument. These semantics are associated with the CSP and additional meaning is contributed by the lexical stem.

(16)

a) *bangam-rtal*
3SGS.BASH(14).NFUT-chop

'He chopped it (with an axe).'

b) *bangam-melmel*
3SGS.BASH(14).NFUT-flatten

'He flattened it (with a hammer).'

c) *bangam-warnta*
3SGS.BASH(14).NFUT-split.open

'He smashed it open (with a hammer).'

d) *bangam-let*
3SGS.BASH(14).NFUT-stick

'He stuck it together (with something).'

(Nordlinger, 2015, p. 494)

By contrast the verbs in (17a-d) all contain the same lexical stem *-rtal* in combination with a variety of CSPs. These verbs all encode events of 'breaking something into pieces'. This meaning of 'breaking' is associated with the lexical stem. The CSP in each of these instances further specifies the method by which the thing has been broken. For example CSP POKE(19), which often encodes actions done with or related to the mouth (e.g. Barone-Nugent, 2008), specifies that the thing is broken by the mouth (17d).

(17)

a) *bangam-rtal*
3SGS.BASH(14).NFUT-chop
'He chopped it (with an axe).'

b) *pan-rtal*
3SGS.SLASH(23).NFUT-chop
'He sliced it (with a knife).'

c) *mungam-rtal*
3SGS.BREAK(11).NFUT-chop
'He broke it with his hands.'

d) *dam-rtal*
3SGS.POKE(19).NFUT-chop
'He broke it off with his mouth.'

(Nordlinger, 2015, p. 494)

The individual stems in the above examples also tend to have relatively high flexibility. According to a shared Toolbox database of various Murrinhpatha linguists (Blythe, Nordlinger, Street, Forshaw, & Mansfield, n.d.)[15] the CSPs used in (17a-d) combine with the

[15] Throughout this thesis I often refer to entries from this database which contains entries of lexemes and morphs as well as many language examples. The current database is the amalgamation of the previous Toolbox databases of Joe Blythe and Rachel Nordlinger. It includes many entries taken from the various works of Chester Street (e.g. 2012). More recently contributions to the database have been made by myself and John

following numbers of lexical stems. POKE(19) is the most flexible having been attested with 160 different lexical stems followed by SLASH(23) and BASH(14) which are attested with 113 and 77 lexical stems respectively. The least flexible of these CSPs is BREAK(11) which is only attested with 12 lexical stems. By comparison one of the least flexible CSPs is LOOK(12) which has only been attested with a single lexical stem *-yerr* 'look out' and its reduplicated form *-yelerr*. With regard to lexical stems, *-rtal* 'chop', which is used in (17a-d), has relatively high flexibility combining with 6 different CSPs. By comparison the lexical stem *-dharryit* 'to be cautious' is only attested in combination with a single CSP POKE(19). The flexibility of stems may, to some extent, be related to their semantic transparency, in that the semantics associated with a stem element will be distinguished more easily if it is used in a wide variety of combinations, given of course that the semantics of these combinations are similar in some way. There are however examples where determining the semantics of a flexible stem element is not possible. For example the lexical stem *-bath* has been attested with six CSPs but has no easily discernible semantic core (Blythe et al., n.d.). Since the majority of classifier and lexical stems do not occur on their own, determining their semantics must be achieved through the comparison of various combinations.

Lexical stems, in comparison to CSPs, generally occur in fewer combinations and are semantically less general. This can be attributed to the relative size of each stem category with the class of lexical stems being quite large in comparison to an approximate 38 CSPs. By contrast CSPs tend to have more general semantics allowing them to potentially occur in a wider variety of combinations. These include general meanings such as 'do with hands' for HANDS(8) and 'do with heat' for HEAT(27). Some CSPs have less general semantics and consequently tend to have less flexibility such as WATCH(28) which encodes events of 'watching'. The use of these CSPs is illustrated by the below examples. The classifier stems appear in bold.

Mansfield. This database should never be considered comprehensive and will always be 'work-in-progress'. It does however contain a wealth of information and is quite detailed and extensive. Toolbox[15] is an analysis tool for linguists and is primarily designed to parse and interlinearise text. It is developed by the SIL (Summer Institute of Linguistics) http://www-01.sil.org/computing/toolbox/.

(18) HANDS(8)

a) ***mam***-*mel*
1SGS.HANDS(8).NFUT-flatten
'I flattened it out by hand.'
(Street, 2012, p. 27)

b) ***mam***-*ngintha-yit=ngem*
1SGS.HANDS(8).NFUT-DU.F-hold=1SGS.SIT(1).NFUT
'We (excl.) are holding him.'
(LAMP_20131120_WF_01_V1 00:02:27)

c) ***mam***-*kuruk*
1SGS.HANDS(8).NFUT-fold
'I folded it.'
(Street, 2012, p. 9)

(19) HEAT(27)

a) ***thina***-*nge-thi*
2SGS.HEAT(27).FUT-3SG.F.IO-cook
'You cook it for her.'
(LAMP_20131105_WF_01_V1 01:14:35)

b) *kura* ***ngina***-*yirryirr-nu*
CLF:WATER **1SGS.HEAT(27).FUT**-boil-FUT
'I will boil the water.'
(Street, 2012, p. 83)

c) *ku* *yagurr* ***ningam***-*rdath=dim*
CLF:ANIM goanna **3SGS.HEAT(27).NFUT**-singe=3SGS.SIT(1).NFUT
'He's singeing the goanna.'
(Street, 2012, p. 53)

(20) WATCH(28)

a) ***ngirra****-ngka-nu*
1SGS.WATCH(28).FUT-watch.over-FUT
'I'll watch over it.'

(Street, 2012, p. 36)

b) ***thirra****-ngi-marit*
2SGS.WATCH(28).FUT-1SG.DO-learn
'You learn from me by observation.'

(Street, 2012, p. 25)

c) ***ngirra****-nhi-bath-nu*
1SGS.WATCH(28).FUT-2SG.DO-watch-FUT
'I will watch you.'

(Street, 2012, p. 2)

Another transparent and flexible aspect of the bipartite verb system is the systematic relationship that exists between some CSPs. These are a number of clear patterns where a change in CSP results in a predictable change in meaning of the verb across a wide range of lexical stems. I refer to these as CSP alternations. The acquisition of some of these alternations is explored in §7.2.2. One of the most flexible of these CSP alternations is the reflexive/reciprocal alternation. In Murrinhpatha there is a systematic relationship between pairs of CSPs where a reflexive/reciprocal verb is formed by a predictable change in CSP (Nordlinger, 2011). For example verbs formed with HANDS(8) will form their reflexive/reciprocal equivalents with the CSP HANDS:RR(10) as shown below. The classifier stems appear in bold.

(21)

a) *mi* ***mam****-yeth*
CLF:VEG **3SGS.HANDS(8).NFUT**-slice.into
'He cut the food.'

b) *mange* ***mem****-ma-yeth*
hand **3SGS.HANDS:RR(10).NFUT**-slice.into
'He cut his hand.'

(Adapted from Nordlinger, 2011, p. 722)

In addition to reflexive/reciprocal CSP alternations there are a number of transitive/intransitive alternations where the CSP also impacts the argument structure of the verb. One example of this relationship is found between the CSPs TURN(29) and TURN:INTR(30). For example, in combination with the lexical stem *-wurl* these combinations mean to 'return (an object)' and 'to return' respectively (Street, 2012). These reflexive/reciprocal and transitive/intransitive CSP alternations are listed in the table below. Other CSP alternations are presented when relevant to analysis and discussion in §7.2.2.

Table 3. Reflexive/Reciprocal and Transitive/Intransitive CSP Alternations[16]

Transitive CSP	**RR/INTR Equivalent**
HANDS(8), GRAB(9) & SAY/DO(34)[17]	HANDS:RR(10)
LOOK(13) & BASH(14)	BASH:RR(15)
LOWER(17)	LOWER:INTR(18)
POKE(19) & HEAT(27)	POKE:RR(21)
SLASH(23)	SLASH:RR(24)
TURN(29)	TURN:INTR(30)
REMOVE(32)	REMOVE:RR(33)

When considering the transparent flexible end of the bipartite verbal system it raises questions as to what extent speakers are aware of the potential semantic compositionality of constructions and the role of CSPs in particular. In chapter 7 I investigate when children

[16] These relationships have been identified and inferred from characterisations of CSPs by Mansfield (2014a, pp. 281–282), Blythe et al (2007), Nordlinger (2011, p. 722) and lexical entries by Street (2012).

[17] I am not aware of examples in other studies where HANDS:RR(10) is used as the reflexive/reciprocal equivalent of SAY/DO(34). There is however evidence for this in my own data although further investigation is required to decipher whether these constructions are indeed adult like.

become aware of such associations and whether they overgeneralise CSPs on semantic or frequency grounds, as has been observed for the acquisition of similar systems (e.g. Clark, 1981; Family, 2009; Imedadze & Tuite, 1992) as will be presented in §3.6.

At the less transparent end of the bipartite verbal system combinations of stems are difficult to analyse compositionally. In many instances the combinations may be idiosyncratic meaning that attributing meaning to individual elements is unachievable. Consider for example the set of lexical stems in (22). These have only been attested as combining with the CSP SEE(13) and, where logically possible, with its reflexive/reciprocal equivalent BASH:RR(15). Given the lack of contrastive examples this makes attributing partial semantics to the lexical stem difficult. Instead lexical stem glosses reflect the meaning of the stem combination.

(22) Lexical stems which combine with SEE(13)

a)	*-ndarlarl*	‘be a big rain’
b)	*-ngkardu*	‘look’
c)	*-ngkathap*	‘serve one right’
d)	*-yilil*	‘be in the middle’

(Blythe et al., n.d.)

Determining the core semantic association for CSPs can also prove difficult. If we further consider the verbs which contain CSP SEE(13) a core semantic meaning is not clear. In addition to the above lexical stems, SEE(13) is attested with 10 other lexical stems including those meaning ‘to drink’, ‘to drop’ and ‘to trip’. If there is indeed a semantic core it is likely to be so oblique that it will not be apparent to adult speakers or children acquiring the language. This CSP is glossed as SEE(13) in all combinations to provide consistency across CSP glosses. It does not however imply a semantic analysis but is glossed after the meaning of one of the most frequent bipartite stem verbs which contains this CSP.

Deciphering the relationship between bipartite stem combinations with a shared stem element and distinguishing the prototypical semantics of a particular stem can be problematic. It is often difficult to decide whether individual stems in different environments

should be treated as polysemous or whether these are better treated synchronically as distinct homophonous morphs (Nordlinger, 2012a). Firstly with regard to CSPs it is possible for an individual CSP to be associated with more than one semantic core. For example the CSP POKE(19) is used both in contexts where the action is done with a long pointed instrument as in (23) and also in contexts where the action is done with the mouth as in (24). In the related language Ngan'gityemerri, these meanings would be encoded by two different classifiers (Nordlinger, 2012a). In one analysis it is proposed that the 'mouth' use emerges through various bridging contexts (Barone-Nugent, 2008). CSPs with multiple semantic cores will have reduced semantic transparency in the minds of speakers.

(23)

berengunh	*ngam-rilil*
already	1SGS.POKE(19).NFUT-write

'I've already written it down.'

(Nordlinger, 2012a, p. 6)

(24)

nga-thap-nu	*mani*
1SGS.POKE(19).FUT-taste-FUT	be.able

'I'll taste it.'

(Nordlinger, 2012a, p. 6)

This issue is also sometimes found in relation to lexical stems where the same stem is used in different verbs. Consider the pairs of examples below in (25) and (26). In (25) the verbs with a shared lexical stem mean 'to wake someone (by shaking)' and 'to find'. In (26) the verbs with a shared lexical stem mean 'to bite' and 'to quieten a child'.

(25)

a) *na-ngi-rdurt*
2SGS.HANDS(8).FUT-1SG.DO-wake
'You wake me (by shaking).'

b) *da-ngi-rdurt*
2SGS.BASH(14).FUT-1SG.DO-find
'You find me.'

(Constructed)

(26)

a) *ku* *were* *kanhi-ka* *ba-nhi-lele-nukunu*
CLF:ANIM dog this-FOC 3SGS.BASH(14).FUT-2SG.DO-bite-FUT.IRR
'This dog might bite you.'

b) *kardu* *wakal* *ma-lele-nu*
CLF:HUMAN small 1SGS.HANDS(8).FUT-quieten.child-FUT
'I will quieten the child.'

(Street, 2012, p. 18)

In both these cases it is difficult to determine what the core meaning of the lexical stem might be. Without in depth study of the various uses and contexts in which these stems are used uncovering a semantic association is a futile endeavour. From an acquisition perspective it is perhaps most appropriate to treat these stems as different but homophonous stems rather than the same stem combining with different CSPs given the lack of transparency. It remains possible however that a semantic link could be uncovered through further investigation but this would likely not be salient to children or adult speakers. The impact of phonologically related lexical stems with potential semantic links on acquisition is considered in §7.3.

Furthermore even when a prototypical semantic core of an individual stem is established this may not always be transparent in all stem combinations as is particularly the case for some CSPs. For example the highly flexible CSP HANDS(8) is often used in transitive

constructions encoding events which are prototypically done with the hands as in (27) and (28) (e.g. Barone-Nugent, 2008).

(27)

mam-yerl=dim
3SGS.HANDS(8).NFUT-paint=3SGS.SIT(1).NFUT
'He is painting.'

(Street, 2012)

(28)

ma-thap-nu
1SGS.HANDS(8).FUT-touch-FUT
'I'll touch it.'

(Street, 2012)

There are however combinations in which the verb does not relate to an event done with hands as in (29).

(29)

ma-wuy-nu
1SGS.HANDS(8).FUT-disappear-FUT
'I will disappear.'

(Street, 2012, p. 79)

The bipartite stem verb system of Murrinhpatha is composed of verbs which exist on a continuum of flexibility and semantic transparency. At the most systematic end of this system classifier and lexical stem combinations can be easily understood as semantically

compositional and associating core semantic meaning with individual elements is relatively straightforward. Given the transparency of this part of the system it is anticipated that children will become aware of the bipartite nature of the system and eventually produce bipartite stem verbs by combining classifier and lexical stem elements 'on-line'. The best evidence for this would be the production of novel stem combinations not found in the adult language based on semantic or frequency grounds as observed in similar systems in other languages (§3.6). However many stem combinations are not transparent and must likely be rote-learned by children as fixed lexicalised combinations. In chapter 7 I explore the impact of the differences in semantic transparency and flexibility across the system and consider whether certain parts of the system may be acquired in different ways.

2.2.4. Inflectional Patterns of Classifier Stem Paradigms

As has already been noted in §2.2, classifier stems are portmanteau morphs which encode four subject person categories - 1st person exclusive, 1st person inclusive, 2nd person and 3rd person - three number categories[18] - singular, dual and plural - as well as up to six tense/aspect/mood (TAM) categories (Nordlinger, 2015). This results in complex paradigms which can encode over 50 morphological property sets. The paradigm for SIT(1) adapted from Nordlinger & Caudal (2012, p. 82) as well as the paradigm for BREAK(11) taken from Blythe et al. (2007, p. 8) are shown below. Not all categories are differentiated in all paradigms but these are motivated across the system as a whole (Nordlinger, 2015). For example SIT(1) does not distinguish past forms with homophonous past imperfective and past irrealis forms whereas BREAK(11) lacks existential forms altogether. BREAK(11) also displays homophony in the 1st and 3rd singular categories as well as in dual and plural future forms. There are approximately 38 of these CSPs which are listed in Appendix I (Blythe et al., 2007).

[18] Murrinhpatha also has additional affixal number marking which encodes a distinction between sibling and non-sibling groups and encodes a fourth number category paucal (Nordlinger, 2012b).

Table 4. CSP SIT(1)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngem*	*ngini*	*ngi*	*ngi*	*ngini*	
	2	*thim*	*thini*	*thi*	*thi*	*thini*	
	3	*dim*	*dini*	*pi*	*ki*	*dini*	*kem*
1 INCL		*thim*	*thini*	*pi*	*pi*	*thini*	
DU	1	*ngarrimka*	*ngarrine*	*nge*	*nge*	*ngarrine*	
	2	*nirrimka*	*nirrine*	*ne*	*ne*	*nirrine*	
	3	*pirrimka*	*pirrine*	*pe*	*ke*	*pirrine*	*karrimka*
PL	1	*ngarrim*	*ngarrini*	*nguyu*	*nguyu*	*ngarrini*	
	2	*nirrim*	*nirrini*	*nuyu*	*nuyu*	*nirrini*	
	3	*pirrim*	*pirrini*	*puyu*	*kuyu*	*pirrini*	*karrim*

Table 5. CSP BREAK(11)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*mungam*	*muni*	*mu*	*mu*	*muy*	
	2	*nungam*	*nuni*	*nu*	*nu*	*nuy*	
	3	*mungam*	*muni*	*mu*	*mu*	*muy*	
1 INCL		*thumungam*	*thuni*	*pumu*	*pumu*	*thumuy*	
DU	1	*ngumungamka*	*ngumune*	*ngumu*	*ngumu*	*thumuy*	
	2	*numungamka*	*numune*	*numu*	*numu*	*numuy*	
	3	*pumungamka*	*pumune*	*pumu*	*kumu*	*pumuy*	
PL	1	*ngumungam*	*ngumuni*	*ngumu*	*ngumu*	*ngumuy*	
	2	*numungam*	*numuni*	*numu*	*numu*	*numuy*	
	3	*pumungam*	*pumuni*	*pumu*	*kumu*	*pumuy*	

Note: SG + ngintha (f)/nintha (m) = dual non-sibling. DU = dual sibling. DU + ngime (f)/neme (m) = paucal non-sibling. PL = paucal sibling and plural.

Descriptions of the patterns of CSPs have noted that there is a significant degree of suppletion, homophony and irregularity across and within paradigms (Nordlinger, 2015). In one analysis Walsh (1976) attempts to segment classifier stems into smaller units such that classifier stem forms could be generated according to a set of rules. In doing this Walsh

concludes that the segmentation of classifier stems into smaller parts is not a worthwhile endeavour for synchronic analysis:

> *No attempt is made to provide an analysis of the auxiliary[19] bases into numerous parts although a glance at the auxiliary paradigms…will show that this is possible. What has resulted so far in each attempt is an analytical machinery which hardly justifies the effort (Walsh, 1976, p. 224).*

This position is also found in more recent descriptions such as the following from Nordlinger (2011, p. 708):

> *For the most part classifier stem forms are (synchronically) unanalysable portmanteau morphs… meaning that most of the forms have to be learnt individually.*

Although there are not synchronically regular productive patterns there are a number of semi-regular patterns found across CSPs many of which were noted by Walsh (1976). In attempting to establish a genetic link between Murrinhpatha and Ngan'gityemerri, Green (2003) built upon Walsh's insights of semi-regularity. Green posited a formula for the systematic breakdown of classifier stems in Murrinhpatha and Ngan'gityemerri arguing that these constitute a shared innovation of a Southern Daly language group. This formula, given below, provides an insight into the types of inflectional patterns found within and across CSPs that children may potentially be sensitive to in acquiring the verbal system. Green notes however that this formula is somewhat idealised and that there is a certain amount of fusion which means that segmentation of classifier stems is not always straightforward or indeed even possible.

(30) Classifier Stem Formula (adapted from Green, 2003, p. 131)

Classifier Stem = Subject PRO + ROOT + TAM

[19] Walsh refers to classifier stems as auxiliaries.

If we apply this formula across all Murrinhpatha CSPs a number of patterns emerge with regard to the encoding of subject person and TAM. I refer to these patterns as 'supra-inflection classes'. The supra-inflection classes of interest in this thesis relate to subject person, particularly singular subjects, and the encoding of the non-future tense. It is important to remember that these classes vary in their scope, both in terms of the number of CSPs to which they apply as well as the number of cells to which they apply in a given CSP. The following description of these classes is based on the CSPs given in Blythe et al. (2007). Children may potentially utilise the patterns of these supra-inflectional classes in their acquisition of CSPs as explored in §6.3. Furthermore the type frequency of these inflectional patterns may influence the strength of these patterns on acquisition as proposed by some theoretical approaches (e.g. Bybee, 1995) as presented in §3.5.2.

In terms of singular subject person in the above paradigms we can observe that for SIT(1) 1st singular forms are associated with an initial *ng-*, 2nd singular forms are associated with an initial *th-* and 3rd singular forms either have an initial *d-*, *p-* or *k-*. By contrast for BREAK(11) 1st and 3rd singular forms are associated with an initial *m-* and 2nd singular forms are associated with an initial *n-*. In considering all CSPs in terms of the encoding of singular subject person three supra-inflection classes NG.SBJ, M.SBJ and B.SBJ can be identified.[20] CSPs belonging to the NG.SBJ class, which includes SIT(1) shown above, formally differentiate 1st, 2nd, and 3rd person singular forms. 1st singular is encoded by an initial *ng-* and 2nd singular is encoded by an initial *th-*. 3rd singular forms across this inflection class are more variable and the initial consonant may vary within a CSP across TAM categories. 3rd singular future forms are commonly marked by an initial *k-*. In other forms initial consonants *w-* , *p-* and *d-* often appear to mark 3rd singular. In some cases 3rd singular subject appears to be a zero morph. CSPs belonging to the M.SBJ and B.SBJ classes share a morphomic pattern where 1st and 3rd singular forms are homophonous. In the M.SBJ class, which includes BREAK(11) shown above, 1st and 3rd singular forms have an initial *m-* and 2nd singular forms have an initial *n-*. In the B.SBJ class 1st and 3rd singular forms have an initial *b-* and 2nd singular forms have an initial *d-*. Partial examples of CSPs belonging to each of these three classes are given

[20] Subject person marking in CSPs is typically more regular in the dual and plural categories with 1st person forms marked by an initial *ng-*, 2nd person forms mostly encoded by an initial *n-* and 3rd person forms predominantly marked by an initial *p-* or *k-* as shown in the paradigms for SIT(1) and BREAK(11).

below followed by examples of 1st singular classifier stem forms relating to each of these CSPs.[21]

Table 6. Partial CSPs Belonging to Various Singular Subject Supra-Inflection Classes

NG.SBJ - POKE(19)

	NFUT	PIMP	FUT
1SG	ngam	ngani	nga
2SG	tham	thani	tha
3SG	dam	dani	da

M.SBJ - HANDS(8)

	NFUT	PIMP	FUT
1SG	mam	me	ma
2SG	nam	ne	na
3SG	mam	me	ma

B.SBJ - SEE(13)

	NFUT	PIMP	FUT
1SG	bam	be	ba
2SG	dam	de	da
3SG	bam	be	ba

(31) NG.SBJ

nga-riwak-nu

1SGS.POKE(19).FUT-follow-FUT

'I will follow him'

(Street 2012, p. 56)

(32) M.SBJ

ma-mawatha-nu

1SGS.HANDS(8).FUT-rectify-FUT

'I will rectify it'

(Street 2012, p. 20)

[21] I have chosen to provide truncated paradigms in order to highlight the areas of regularity and to reduce the complexity presented to the reader. Full paradigms are provided in Appendix I.

(33) B.SBJ

ba-gurduk-nu

1SGS.SEE(13).FUT-drink-FUT

'I will drink it'

(Street 2012, p. 9)

The other supra-inflection class to be presented here relates specifically to the forms of non-future classifier stems. Across all CSPs there are four classes that can be identified M.NFUT, N.NFUT, NGAM.NFUT and NGAN.NFUT. As suggested by the formula for classifier stem forms in (30) this inflection class relates to the form of the end of a classifier stem. In the M.NFUT class, which is the most widespread including SIT(1) shown previously, non-future forms have a final *-m*. By contrast non-future forms belonging to the N.NFUT, NGAM.NFUT and NGAN.NFUT classes end in *-n, -ngam* and *-ngan* respectively. BREAK(11) therefore belongs to the NGAM.NFUT class. It should of course be noted that this is not the case for dual forms which have an additional *-ka* after the non-future marker. The following partial CSPs give examples of each of these classes followed by verbs with non-future classifier stem forms relating to each of these CSPs

Table 7. Partial CSPs Belonging to Various Non-Future Supra-Inflection Classes

M.NFUT - SEE(13)

	NFUT	**PIMP**	**FUT**
1SG	bam	be	ba
2SG	dam	de	da
3SG	bam	be	ba

N.NFUT - TURN(29)

	NFUT	**PIMP**	**FUT**
1SG	ngurdan	ngurdini	ngurdu
2SG	thurdan	thurdini	thurdu
3SG	wurdan	wurdini	purdu

NGAM.NFUT - BASH(14)

	NFUT	**PIMP**	**FUT**
1SG	bangam	be	ba
2SG	dangam	de	da
3SG	bangam	be	ba

NGAN.NFUT - SNATCH(9)

	NFUT	**PIMP**	**FUT**
1SG	mangan	me	ma
2SG	nangan	ne	na
3SG	mangan	me	ma

(34) M.NFUT

bam-gurduk
1SGS.SEE(13).NFUT-drink
'I drank it'

(Street 2012, p. 9)

(35) N.NFUT

wurdan-nga-rle
3SGS.TURN(29).NFUT-1SG.IO-scare
'He frightened me'

(Street 2012, p. 57)

(36) NGAM.NFUT

bangam-ma-rta
3SGS.BASH(14).NFUT-hand-enlarge
'enlarged hand'

(Street 2012, p. 57)

(37) NGAN.NFUT

mangan-tha
1SGS.SNATCH(9).NFUT-chase
'I chased him'

(Street 2012, p. 59)

In addition to the above patterns there are a number of other observations that can be made with regard to the pattern of non-future inflection classes. Firstly for many paradigms the future and non-future forms are only distinguished by the addition of the non-future marker. This is seen most clearly above for the partial CSPs POKE(19), HANDS(8), SEE(13), BASH(14) and SNATCH(9). Another characteristic is that some CSPs are only differentiated by their non-future forms. This can be seen above for the CSPs SEE(13) and BASH(14) and is true of the

complete paradigms as well, as listed in Appendix I. The impact of phonologically closely related paradigms is explored in §6.3.2.

A further important characteristic relates to the differentiation of the future (realis) and future irrealis categories. It has been noted by Nordlinger & Caudal (2012, p. 100) that these categories are only distinguished in 3rd person forms, as with SIT(1) shown previously, meaning that it is impossible to distinguish between future realis and irrealis in 1st and 2nd person categories. Recent research of young men's speech by Mansfield (2014a Ch.11) has suggested a collapsing of future and future irrealis categories, with forms previously attested as specifically future irrealis tending to be extended to future realis contexts replacing previous future forms. Given the difficulty in differentiating future realis and irrealis forms partnered with the potential collapsing of these categories and use of irrealis forms in realis contexts I do not differentiate between future realis and irrealis classifier stem forms in analysing children's speech. Instead I code and gloss all these classifier stem forms simply as future. This consequently reduces the number of morphological property sets represented in my coding of classifier stem by 10 so that SIT(1) has 43 morphological property sets instead of 53.

The inflectional patterns of Murrinhpatha CSPs cannot easily be accounted for by a set of morphological rules. Despite this, consideration of these paradigms shows that there a number of semi-regularities both within and across CSPs. I have presented two patterns here relating to the encoding of singular subjects and non-future tense which I refer to as supra-inflection classes. Relatively little is known about how children acquire such complex morphological paradigms and this is investigated in chapter 6. This system may also raise issues for a number of theoretical approaches to the acquisition of morphology which draw a distinction between regular and irregular morphology and tend to focus on how regular morphology is acquired through the acquisition of abstract rules (e.g. Pinker & Prince, 1991) as presented in §3.5.1. The appropriateness of such accounts for the acquisition of Murrinhpatha CSPs is evaluated in §6.5 & §8.3 and alternative usage-based (e.g. Bybee, 1995) (§3.5.2) and protomorphological accounts (e.g. Dressler & Karpf, 1995) (§3.5.3) are considered.

2.3 Summary

In this chapter I have provided an overview of the features of Murrinhpatha relevant to this thesis. Most importantly I have outlined the prosodic structure of verbal PWords, inflectional patterns of CSPs and the key characteristics of the bipartite stem verb system. The prosodic structure of words has been identified by various theoretical approaches (e.g. Demuth, 1996b; Peters, 1985; Slobin, 1985) as impacting children's early productions with factors such as foot structure and stress potentially impacting on children's verb productions (§3.3.1). The factors driving children's early verb productions are considered in chapter 5. The inflectional patterns of Murrinhpatha CSPs are complex and cannot easily be accounted for by a set of general morphological rules creating problems for rule-focused accounts of the acquisition of morphology (e.g. Pinker & Prince, 1991) (§3.5.1). There are however a variety of semi-regular inter- and intra-paradigmatic patterns which children may be sensitive to when acquiring Murrinhpatha verbs as predicted by usage-based models (e.g. Bybee, 1995) (§3.5.2). The development of these structures is considered in chapter 6. Finally presenting the complexities of the bipartite verb system is not a straightforward task given that many aspects of it are still 'underdescribed'. It is clear however that there is a great deal of diversity in the system. At one end stem combinations are semantically transparent and stems tend to be relatively flexible. At the other end of the system stem combinations may be idiosyncratic and stems tend to be less flexible. There is also a great amount of homophony and polysemy across the system which may impact the level of semantic transparency. These differences in transparency and flexibility may have an impact on acquisition as has been observed in the acquisition of bipartite structures in other languages (e.g. Family, 2009; Imedadze & Tuite, 1992) as discussed in §3.6. Understanding the diverse characteristics of this system is important when considering its acquisition by children as explored in chapter 7.

3 Acquisition of Verbs and Verb Morphology

This chapter provides an overview of previous research into the acquisition of verbs and verb morphology. It presents findings from the study of a wide variety of languages and presents influential theories in the field relevant to this thesis. This discussion raises questions and provides insights into how Murrinhpatha bipartite stem verbs are potentially acquired and builds the theoretical background for the analysis and discussion of the acquisition of Murrinhpatha verbs in chapters 5, 6, 7 and 8. Given the importance of a typological approach to language acquisition in determining what is, and what is not language specific to the process of language acquisition, I also survey programs and work that have championed a typologically diverse approach in the field.

The chapter is divided into five main sections. §3.1 surveys studies and programs over past decades which highlight the importance of typological diversity and the study of smaller and less studied languages in improving our understanding of language acquisition. §3.2 briefly considers the definition of the category 'verb' in acquisition research and lays out arguments for the adoption of a specific definition for use in this thesis. §3.3 focuses on the

issue of early segmentation and children's early verb productions. It presents crosslinguistic findings and considers various theoretical accounts including those highlighting prosodic/phonological (e.g. Demuth, 1996b; Peters, 1985; Slobin, 1985) and/or morphosyntactic factors (e.g. Rizzi, 1993; Salustri & Hyams, 2006; Wexler, 1998). §3.4 surveys studies focused on verb acquisition and theories of word learning. In particular it examines what is known about children's early verbs with regard to their semantics and pragmatics and how this potentially relates to the development of verb morphology. §3.5 evaluates theoretical approaches concerning the acquisition of inflectional morphology and offers predictions regarding the acquisition of Murrinhpatha classifier stem paradigms. It also presents a measure of inflectional diversity - *Normalised Mean Size of Paradigm* - (Xanthos & Gillis, 2010) to be used in analysis in chapter 6 and considers issues of measuring inflectional diversity in acquisition corpora. §3.6 considers studies of the acquisition of constructions similar to Murrinhpatha bipartite stem verbs. Although little study into the acquisition of such structures has been undertaken, findings from the acquisition of similar structures provides useful insight into how Murrinhpatha bipartite stem morphology may be acquired. §3.7 states in greater detail the research questions to be addressed in this thesis in reference to the background presented in this chapter.

3.1 Crosslinguistic Study of Language Acquisition

A fundamental question in language acquisition research is how children are able to cope with the immense amount of variation in the structure of the world's languages (Bowerman, 2011; Evans & Levinson, 2009; Slobin, 1985b; Stoll & Lieven, 2013). Despite this variation, typically developing children are able to acquire any of the world's languages, which form a central part of their own unique social world, using the same biological apparatus. It has been shown through the study of typologically different languages that different languages pose different types of problems for acquisition (Slobin, 1985b). Typological differences across languages provide clues as to the factors that may influence acquisition and have been shown to impact acquisition in similar ways (Bowerman, 2011).

The crosslinguistic study of language acquisition in past decades has largely been driven by the work of Slobin and colleagues. They sought to investigate the impact of different formal linguistic structures on the processes of acquisition. Slobin (1973) argued that the semantic notions expressed in early child language are shaped by cognitive

maturation, meaning that they develop in children at the same time regardless of the child's first language/s. Since these semantic notions are encoded by different linguistic structures in different languages, the comparison of the acquisition of semantic notions crosslinguistically allows for the comparison of the impact of the linguistic structures used to encode these notions on acquisition. This approach led to the Berkeley four language project, a typological comparison of language development in English, Italian, Serbo-Croatian and Turkish (Slobin, 1982) and the now classic series *The Crosslinguistic Study of Language Acquisition, Volumes I-V* (Slobin, 1985a, 1985b, 1992, 1997a, 1997b) which included chapters focused on the acquisition of more than 20 typologically diverse languages including the Australian language Warlpiri (Bavin, 1992) and the polysynthetic language West Greenlandic (Fortescue & Lennert Olsen, 1992). These volumes also contained a number of theoretical chapters based on findings from a wide range of languages. The development of acquisition theories from a typologically broad empirical perspective is one of the strongest aspects of the research of Slobin & colleagues and stands in contrast to research in the field which often attempts to develop theoretical approaches based on a small sample of languages and then apply these universally. The empirical findings of Slobin and colleagues continue to be of great value to the field although the research program with regard to cognitive maturation is no longer actively pursued (Bowerman, 2011).

Another influential approach which addresses the existence of global diversity in acquisition has been language socialisation (Ochs & Schieffelin, 1982; Schieffelin & Ochs, 1986). Where the research of Slobin and colleagues focused on the impact of typological differences on language acquisition, language socialisation focused on the impact of crosscultural differences. Ochs & Schieffelin developed an analytical framework based in linguistic anthropology which was designed to highlight that language acquisition cannot be separated from the sociocultural context in which it occurs. This approach was effective in dispelling universal language development theories based on a small range of languages. For example, the idea that a special child-directed speech register is found in all cultures and is potentially obligatory for normal acquisition was shown to be false (Ochs, 1988; Schieffelin, 1990).

These crosslinguistic and crosscultural approaches highlighted the importance of considering a diverse range of languages and cultures in improving our understanding of language acquisition. Despite this recognition research of 'smaller' languages and cultures in

particular has remained relatively rare (Kelly et al., 2015). This is likely because these languages are less accessible to acquisition researchers due to their location and the fact they are not spoken by researchers themselves as first languages. There have however been a number of notable exceptions of extensive work on 'smaller' languages such as Demuth's work in Sesotho (Demuth, 1984, 1986, 1992a, 1992b), Brown's longitudinal work on Tzeltal (P. Brown, 1997a, 1998, 2008), Allen's research on Inuktitut (Allen, 1996, 1998, 2013), and in an Australian context Bavin's documentation of children's Warlpiri (Bavin, 1987, 1992, 2013).

In recent years there has been a renewed interest in the longitudinal study of the acquisition of 'smaller' and less-studied languages including work on the documentation and acquisition of Chintang (Stoll et al., 2012), and longitudinal acquisition studies of North East Cree (Rose & Brittain, 2011), Ku Waru (Rumsey, San Roque, & Schieffelin, 2013), Swahili (Deen, 2005) and Q'anjob'al Maya (Mateo Pedro, 2015). This growing interest has also been reflected in Australia with the 1st and 2nd stages of the Australian Child Language Acquisition project (Simpson & Wigglesworth, 2008). This research is distinct from the current study in that it has tended to focus on Australian Indigenous contexts where traditional languages are no longer being acquired by children. Instead the focus has been on children using varieties of Kriol (Disbray, 2008; Dixon, 2015; Moses, 2009) and mixed languages (O'Shannessy, 2006). This project also has a markedly different set of research questions to the current study, focussing on documenting the range of language input to indigenous children and its impact on language acquisition, as well as considering the impact of children's linguistic repertoires on their ability to participate linguistically in a variety of classroom contexts.

Acknowledgement of the importance of studying language acquisition from a typological crosslinguistic perspective has been the driving factor in some recent and emerging research programs. The Crosslinguistic Project on Pre- and Protomorphology in Language Acquisition founded by Wolfgang Dressler in 1994 has sought to investigate the acquisition of morphology from a crosslinguistic typological perspective considering findings from various language types based on "constellations of typologically relevant linguistic properties" (Dressler, 2007, p. 3). This program has emphasised the importance of the study of morphologically rich languages although acknowledges that the typological variables focused on are a product of the languages for which data is available. This problem of 'convenient' sampling in crosslinguistic studies is being addressed by the recently founded

ACQDIV program led by the Psycholinguistics Laboratory at the University of Zurich (http://www.acqdiv.uzh.ch/en.html). Based on a method of 'fuzzy clustered sampling' using a dozen typological variables expected to have an impact on acquisition (Stoll & Bickel, 2013a) this program aims to investigate processes of language acquisition based on longitudinal naturalistic data from 5 clusters of typologically maximally diverse languages. Clusters are composed of corpora of two languages with a preference for the use of pre-existing corpora. The ten languages included in this study are Indonesian, Turkish, Japanese, Russian, Sesotho, Yucatec Maya, Chintang, North East Cree, Inuktitut and Dëne Sųłiné with longitudinal acquisition corpora already existing for all languages except Dëne Sųłiné.

Despite renewed interest in the crosslinguistic study of language acquisition, including a focus by a number of researchers on morphologically complex languages (e.g. Bittner, Dressler, & Kilani-Schoch, 2003a; Deen, 2005; Krajewski, Lieven, & Theakston, 2012; Rose & Brittain, 2011; Stoll et al., 2012) the study of the acquisition of verbs and verb morphology continues to be dominated by findings from a small number of typically isolating languages. With regard to the acquisition of the verb lexicon there is a clear lack of typological diversity. In two volumes dedicated to the lexical acquisition of verbs (Hirsh-Pasek & Golinkoff, 2006; Tomasello & Merriman, 1995) chapters are dominated by studies of English acquiring children with only a few chapters which consider the acquisition of languages such as Japanese and Chinese (Imai, Haryu, Okada, Lianjing, & Shigematsu, 2006) and a small number which take a broader crosslinguistic perspective (e.g. Gentner, 2006). The lack of diversity is also prevalent in studies of the acquisition of verbal morphology. Stoll (2015, p. 357) notes in discussion of the acquisition of inflectional morphology.

> *"There is only a severely limited sample of languages for which we have longitudinal data available and this small sample is very much biased towards the Indo-European languages of Western Europe"*

Similarly Bittner et al. argue "that a cross-linguistic perspective on the early emergence of verb inflection and paradigm construction is still lacking…" (2003b, p. xi). Research in this area has seen a great amount of time dedicated to investigation of the English past tense

(McClelland & Patterson, 2002; Pinker & Ullman, 2002). This preoccupation with English verb inflections has been viewed as 'unfortunate' by some who argue that languages with greater morphological complexity should be more central to the study of the acquisition of morphology (Krajewski et al., 2012). As noted by Crago & Allen (1998, p. 272) "[p]olysynthetic languages offer a rich and almost totally unexplored source of data relevant to language acquisition." It should of course also be noted that a great deal has been learned about language acquisition through the study of 'large' languages spoken by researchers themselves. Indeed the study of the acquisition of morphology was spurred by R. Brown's (1973) seminal longitudinal study of morphological acquisition in English.

This thesis, which focuses on the acquisition of verbs and verb morphology, continues in the tradition of Slobin's crosslinguistic endeavour focusing on the specific problems posed for acquisition by certain linguistic structures. It adds to the growing typological diversity of the field by documenting the acquisition of one of the few traditional Indigenous Australian languages that continue to be acquired by children. It provides new insights into a language type that is underrepresented in acquisition research, one that is Australian and polysynthetic. This study also continues in the tradition of R. Brown (1973) in using the analysis of longitudinal spontaneous speech data to examine the acquisition of morphology in a specific language.

3.2 What is a Verb?

Definitions of what constitutes a verb in acquisition studies vary. Definitions tend to fall into two broad categories, pragmatic and formal. A pragmatic definition defines a word based on its use by a child in context rather than its formal characteristics. For example Tomasello (1992, p. 11) defines a verb as "any word that the child uses to predicate a process of something, regardless of that word's status in adult language." According to this definition adult prepositions such as 'off' are treated as verbs in utterances such as *hat off* , meaning 'take the hat off' (Tomasello, 1992). According to this definition the below use of the Murrinhpatha word *ngapa* 'shoulders'[22] would be considered a verb as Emily uses it to ask her mother to pick her up and carry her.

[22] More specifically this is the area around the neck where children may be carried (Street, 2012).

(38) Emily 3;1

mama ***ngapa***
Mo **shoulders**

'mum shoulders'

(LAMP_20130502_WF_01_V1 00:40:56)

By contrast a formal definition defines a verb on the basis of formal characteristics of the adult language. A word produced by a child is considered to be a verb if the corresponding word in the adult language is a verb according to relevant morphosyntactic and semantic criteria. In this sense the category of verb refers to a grammatical category. This type of definition is often not made explicit by researchers.

The particular definitions adopted by researchers are understandably dependent on the research questions being addressed. For example if the aim is to consider the acquisition of a particular linguistic structure the definition is more likely to be 'formal' and based on morphosyntactic criteria. If, however, the research is focused on the development of a particular concept or function the definition is more likely to be semantically, pragmatically and socially centred. In the analysis of the Murrinhpatha data I adopt a formal definition based on relevant morphosyntactic criteria as the focus of my research is the acquisition of specific linguistic structures. Verbs according to this study include bipartite stem verbs (39), simple verbs (40) and phrasal verbs (41). The structures of these verbs are detailed in §2.2.

(39)

ban-pak
1SGS.LOWER(17).NFUT-put.down

'I put it down'

(LAMP_20131206_WF_01_V1 00:17:03)

(40)

thama-nu
2SGS.SAY/DO(34).FUT-FUT
'You do it'

(LAMP_20131206_WF_01_V1 00:10:47)

(41)

walalanhka *ngibimka*
wave 1SGS.STAND(3).NFUT
'We (incl.) are waving'

(LAMP_20131206_WF_01_V1 00:12:14)

3.3 Early Verb Production

It is well established that children's early word productions regularly differ from those of adults, including the omission of segments and syllables (e.g. Demuth, 1996b). This is also the case for children's early verb productions, in particular it has been noted that children omit inflectional morphology (e.g. R. Brown, 1973). The nature of children's early verb productions has been of great interest to researchers focusing on the acquisition of verbs with complex morphology as these can be long words that are often truncated by children. In polysynthetic languages verbs can be long and complex, constructed of multiple morphs capable of encoding what in languages such as English would be an entire sentence (Evans & Sasse, 2002). Consequently children's early verbs in polysynthetic languages such as Mohawk (Mithun, 1989) are typically truncated in some way. The aims of research regarding the structure of early verb production have been first to describe the empirical facts of children's early verb productions and then to explain the factors and principles which underlie such productions.

Theories which attempt to account for children's early verb productions tend to fall into two broad approaches. The first focuses on phonological and prosodic features of the adult target language (§3.3.1). This includes appealing to theories of perceptual salience (Peters, 1985; Slobin, 1985), which argue that certain elements of a language and parts of words are more prominent for children leading to these being produced earlier relative to

other less prominent elements. Other related approaches cite the impact of prosodic structure (e.g. Demuth, 1996b, 2006) and a potential minimal word constraint (Demuth & Fee, 1995) as impacting on children's early productions.

The second broad category of approaches, discussed in §3.3.2, argue that children's early verb productions are impacted primarily by morphosyntactic development. These approaches include appealing to innate categories such as STEM/ROOT which privilege the learning of stem morphology over inflectional affixes (Courtney & Saville-Troike, 2002), as well as proposals that children's early verbs are underspecified leading to the omission of tense and agreement marking (Schütze & Wexler, 1996). The following sections present prominent theories from these two broad approaches and consider relevant empirical findings from a number of languages with a focus on morphologically complex languages.

3.3.1. Phonological & Prosodic Accounts

3.3.1.1 Perceptual Salience

Perceptual salience has been used by several researchers to explain children's early verb productions in a variety of languages (Kelly et al., 2014). Perceptual salience in acquisition typically refers to elements of speech which are more prominent for children in language input. Perceptually salient speech elements may include stressed syllables and the beginnings and endings of words. Proponents of perceptual salience argue that elements of speech which are salient are more likely to be produced earlier in development than those which are less salient (e.g. Mithun, 1989; C. Pye, 1983; C. Pye et al., 2007). For example when children produce truncated words they tend to preserve stressed syllables and omit non-stressed syllables. It is therefore argued that stressed syllables are salient to the child language learner. There is some variation with regard to the types of cues that researchers include under the banner of perceptual salience but generally this includes auditory properties of the language input such as prosody and word and phrase position as well as factors of frequency and morphosemantic transparency, although see Courtney & Saville-Troike (2002) who differentiate perceptual and semantic salience.

The work of Peters (1985) and Slobin (1985) has been influential in identifying perceptually salient cues in language. Based on findings from a wide variety of languages this

research proposes a number of *Operating Principles* which children are hypothesised to use in first extracting chunks from the speech stream and then segmenting these to uncover morphosyntactic patterns of the language being acquired. Of the operating principles proposed three in particular are highlighted as being particularly salient to children crosslinguistically (Slobin, 1985). These principles, given below, are often referred to in studies which rely on the explanatory power of perceptual salience (e.g. Mithun, 1989; C. Pye, 1983; C. Pye et al., 2007).

(42) Prominent Factors of Perceptual Salience

STRESS - Stressed syllables are salient

BEGIN - The beginning of extracted units are salient

END - The end of extracted units are salient

It has been found in a number of languages with complex verb morphology that children tend to preserve stressed syllables as well as the ends of words. Early verbs of children acquiring the polysynthetic language Mohawk were found to be one syllable in length (Mithun, 1989). This was always the stressed syllable in the adult target form despite the fact that this was not always part of the verb stem. Pye (1980a, 1983) found for children acquiring Quiché that children's initial verbs tended to be the final syllable of the adult target form which was also stressed. As with Mohawk this syllable did not always form part of the verb stem, suggesting that stress and word position drive children's initial productions of complex verbs in these languages. In both languages verb morphology is described as developing leftwards by syllables from the initially truncated form. Pye (1983, p. 589) describes this as "in effect working from the back of the verb to the front" and suggests that the child has at this stage not yet morphologically decomposed the verb, instead treating it as an unanalysed chunk (MacWhinney, 1978). Similar findings have also been observed in the acquisition of North East (NE) Cree, (Terry, 2010) a polysynthetic language of North America, Chintang (Stoll et al., 2012), a polysynthetic Sino-Tibetan language and Q'anjob'al (Mateo Pedro, 2015), an agglutinative Mayan language with complex verb morphology. In Q'anjob'al children preserve word final stressed syllables, whereas in Chintang children appear to pay particular

attention to the ends of complex verb forms even though they are not consistently a locus of stress. In NE Cree children tend to preserve stressed syllables irrespective of their word position which may be word final, penultimate or antepenultimate.

The influence of perceptual salience has also been noted for the acquisition of complex verbal morphology in Navajo and Quechua (Courtney & Saville-Troike, 2002). Verb roots in each of these languages typically occur at the periphery of verbs; word finally in Navajo and word initially in Quechua. In both these languages children were found to produce 'bare verb stems' – verb stems stripped of any affixes – although these were much more frequent in the Quechua data. This is likely caused to some degree by the salient peripheral position of verb roots, allowing them to be segmented more easily. Additionally, morphological and syllabic boundaries generally coincide in both languages making the verb stems more morphologically transparent and more easily isolated. This suggests that another factor influencing children's early verb productions is the transparency of morphological elements. If verb stems have a consistent structure and align with syllable boundaries this may lead to their early segmentation and the production of bare stems. The production of bare stems in Navajo and Quechua however does not align entirely with cues of perceptual salience as bare stems do not align with phonological prominence; tone prominence in Navajo and primary stress in Quechua.

The early segmentation and production of stem/root morphology is also attested in other languages with complex verb morphology including Tzeltal (P. Brown, 1997b) and Inuktitut (e.g. Crago & Allen, 2001; Crago, Allen, & Pesco, 1998). In Tzeltal children first produce bare verb roots despite the fact that the word position and stress associated with these roots would predict this not to occur. The prosodic structure of Tzeltal verbs is argued to mask the identity of verb roots which have a CVC structure, with the final consonant of the root plus a following suffix or particle, not the root, receiving prosodic prominence (P. Brown, 1997b). It should however be noted that roots do occur at the beginnings and ends of verbs 42% of the time in a sample of child-directed speech and it is acknowledged that this may aid the early segmentation of verb roots. Additionally P. Brown (1997b) suggests that frequent backchanneling in Tzeltal – repeating part of the preceding utterance – highlights the verb root in contrast to changing affixes.

Inuktitut acquiring children also initially produce uninflected verb roots. This includes the production of *piarajausiit* 'baby words' many of which occur both with noun and verb morphology, as well as the production of adult verb roots which tend to be used as either requests or demands (Swift, 2004). This is suggestive of a link between the pragmatic function of children's verbs and the acquisition of inflection, see §3.4.2.4. It is relatively unclear whether the early segmentation of bases is supported by cues such as stress as this is not addressed in the numerous studies which consider the development of Inuktitut verbs (e.g. Allen, 1998; Crago & Allen, 2001; Skarabela & Allen, 2004; Swift & Allen, 2002). Verb roots are however word initial (e.g. Swift, 2004) which may impact their early segmentation.

Courtney & Saville-Troike (2002) argue that the early segmentation and production of verb roots in some languages is evidence of early morphological analysis of complex word forms and the impact of morphosyntactic factors on early verb productions. The fact that stem morphology is preserved and inflectional morphology is more likely to be omitted is considered to be evidence of an innate category of ROOT, following Pinker (1984). The existence of this category, in partnership with cues of perceptual salience, is used to explain why children produce bare verb stems despite never hearing them in adult speech. This approach is considered further in §3.3.2.1.

It is apparent that the contributions of particular cues of perceptual salience vary across languages. Furthermore the different cues identified by various studies interact with one another. Stress appears to be a more prominent cue in languages like Mohawk and NE Cree where the stem morphology is not morphologically transparent. By comparison in languages such as Navajo and Quechua where syllable and morphological boundaries coincide and the stem occurs in a salient position at a word edge, stress is a less prominent cue. This is consistent with Peters (1985), who suggests that when multiple cues combine the impact of saliency will be enhanced.

The differences in early verb productions crosslinguistically may be accounted for to some extent by differences in the nature of non-stem verb morphology across languages. Stoll et al. (2012) argue that because non-stem verb morphology in Chintang is clearly affixal and there is almost no overlap between noun and verb morphology (Bickel et al., 2007) this

makes segmentation of stems more difficult. Comparatively, non-stem verb morphology in Mayan languages such as Tzeltal is more clitic-like and less clearly associated with verbs. P. Brown (1998, p. 716) states that "much of the obligatory inflectional morphology, as well as some other non-obligatory but very frequent morphology, applies both to nouns and to verbs [in Tzeltal]". These factors promote the transparency and independence of verb stems in Mayan languages and potentially encourage the production of bare verb stems.

The variable impact of a specific cue of perceptual salience was considered in a study of five Mayan languages. Pye et al. (2007) examined early verb production in Tzeltal, Tzotzil, Quiché, Q'anjob'al and Yucatec and focused on the impact of verb roots occurring in word final position, which is generally considered to be salient to children. They found a positive relationship between the production of bare roots by children and the frequency with which verb roots occur word- and phrase-finally in adult speech corpora. Children acquiring languages in which verb roots appear more frequently at the right word edge (e.g. Tzeltal & Tzotzil) were found to produce a greater number of bare verb roots in early production. This suggests that it is the structure of the target language influencing the early stages of production rather than the fact that the verb root constitutes a salient semantic kernel of the verb or evidence of an innate category of ROOT (Courtney & Saville-Troike, 2002). Unfortunately this study does not take into account the impact of stress and its variation across the languages considered. This is left for future research but it is important to note that stress was identified as a guiding cue for early verb production in Quiché (C. Pye, 1983), one of the languages considered by Pye et al. (2007).

With regard to the role of perceptual salience in the acquisition of Murrinhpatha a number of predictions can be made. As was outlined in §2.2.1 lexical stems, which are likely semantically heavier, often occur at the right edge of verbs in adult speech (Forshaw et al., 2012) and always occur at the right edge of the verbal PWord (Mansfield, In Prep.b). Lexical stems are also often the site of primary lexical stress which falls on the penultimate syllable of the verbal PWord. Furthermore, lexical stems have relatively fixed forms which may make them more morphologically transparent. This combination of cues suggests that lexical stems will be perceptually salient to children and may lead to the production of bare lexical stems despite the fact that such lexical stems are almost never heard in isolation in the adult target language. The early production of stem morphology in Murrinhpatha is complicated however

by the structure of bipartite stem verbs, which also include a classifier stem element which contributes to the argument structure and semantics of the verb (e.g. Nordlinger & Caudal, 2012). The classifier stem by comparison is not a site of stress and has variable forms as it encodes subject person/number as well as TAM. This suggests that despite being a stem morph it is not likely to be salient. The early production of Murrinhpatha verbal PWords and the potential role of perceptual salience is explored in §5.1.

3.3.1.2 Prosodic Licensing Model

Another approach that aims to explain the productions of children's early words is the Prosodic Licensing Model, also referred to as the Metrical Omission Model (e.g. Deen, 2005). This model was initially proposed by Gerken and colleagues (Gerken, 1987a, 1987b, 1991, 1996; Gerken, Landau, & Remez, 1990; Gerken & McIntosh, 1993) and more recently has been most actively pursued in the research of Demuth and colleagues (Demuth, 1996b, 2006, 2014; Demuth & Fee, 1995; Lleó, 2006; Lleó & Demuth, 1999). This approach argues that children's early productions are sensitive to the prosodic structure of the language which they are acquiring. Children are sensitive to these structures from an early age. As they develop they gradually incorporate more structure into their lexical representations. Differences in children's early productions crosslinguistically are accounted for by differences in the prosodic structures of languages (e.g. Demuth, 1996b). This approach therefore aims to be universal in scope and importantly is not isolated to children's production of verbs but production of prosodic words and phrases more generally.[23]

This approach builds on research in metrical phonology regarding the prosodic structure of language (Nespor & Vogel, 1986; Selkirk, 1984, 1986). In order to investigate these productions researchers appeal to the prosodic hierarchy where phonological or prosodic words (PWords) are constructed of feet which are constructed of syllables and finally moras as shown by the following hierarchy adapted from Demuth (2001, p. 5).

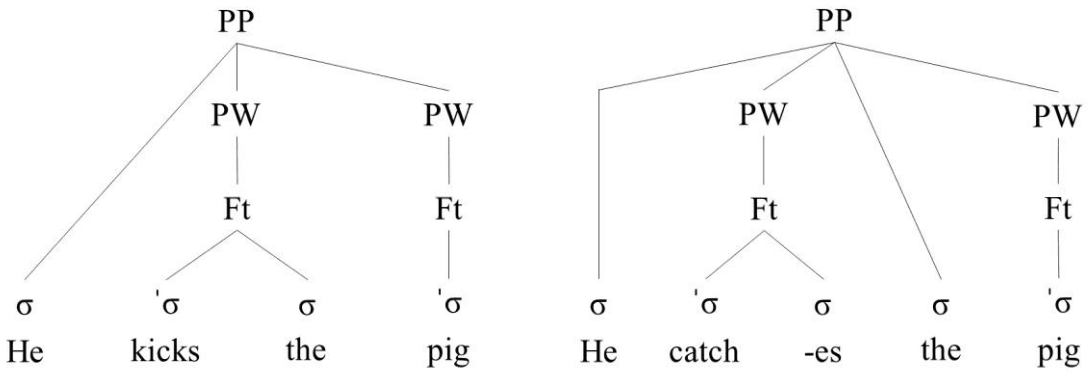
[23] My analysis of the Murrinhpatha child language corpus is however restricted to verbs.

(43) Prosodic Hierarchy

Utt	Utterance	*I think Sue likes bananas*
IP	Intonational Phrase	*Sue likes bananas*
PP	Phonological Phrase	*likes bananas*
PW	Prosodic Word	*bananas*
Ft	Foot	*nanas*
σ	Syllable	*nas*
μ	Mora	*na*

The Prosodic Licensing approach was initially proposed by Gerken (1991) to explain why English acquiring children omit pronouns and other function morphemes in some contexts but not others. She found using an experimental imitation task that children tended to omit weak syllables particularly when they occurred in an unfooted environment. This finding was more clearly replicated by Gerken (1996) where children's imitations of sentences like those in (44a, b) were compared. Eighteen children aged between 2;1 and 2;3 participated and were found to preserve the object article more often when it formed part of a trochaic foot as in (44a) compared with when it was unfooted in (44b).

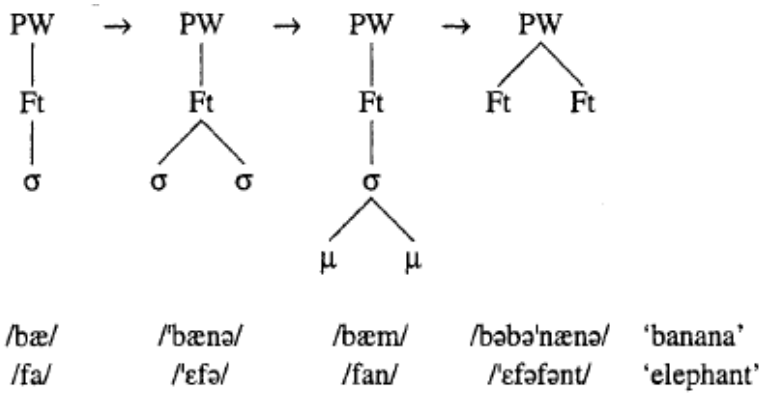
(44) a) b)



(adapted from Gerken, 1996, p. 688)

It has been claimed that children gradually learn to exploit the different levels of the prosodic hierarchy initially focussing on the levels of the PWord and below (Demuth, 2001). Demuth & Fee (1995) identify four stages in the acquisition of prosodic words in English. Firstly children produce CV syllables, then disyllabic feet, then monosyllabic bimoraic feet then words composed of multiple feet which form part of a phonological phrase as shown below.

(45) Stages in the Development of English PWords (Demuth, 2001, p. 8)



Demuth (2001) argues that children remain at stage two, the Minimal Word Stage, for several months. At this stage she argues that children are sensitive to a minimal word constraint which requires that a PWord must be minimally and maximally a binary foot. In English this may be either a monosyllabic bimoraic foot or a disyllabic trochaic foot. Some children initially prefer to produce disyllabic feet as coda consonants can be more difficult to produce during earlier stages of development (Demuth & Fee, 1995). This leads children to occasionally produce disyllabic forms for monosyllabic targets (46a) as well as children producing disyllabic minimal words for both disyllabic (46b) and trisyllabic targets (46c) as shown in the examples below for PJ aged 1;10 (Demuth & Fee, 1995). Similar findings are also found for children acquiring Dutch (Fikkert, 1994).

(46) PJ 1;10

a) [ˈmɛnə] /wel/ ‘whale’

b) [ˈgɛdi] /ˈkændi/ ‘candy’

c) [ˈpisæ] / pəˈtrɪʃə/ ‘Patricia’

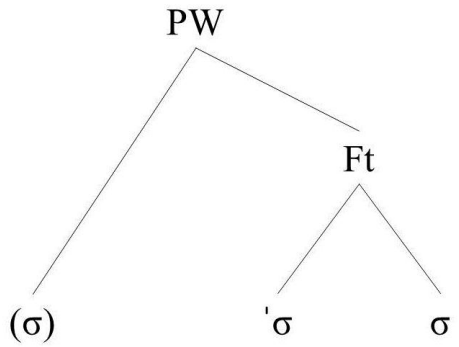
The construction of feet differs crosslinguistically. Whereas Dutch and English allow disyllabic trochaic feet and bimoraic feet, Sesotho, a Bantu language, only permits trochaic feet and Quiché Mayan has iambic feet. These differences in foot structure result in different minimal word effects in children’s early word production (e.g. Demuth, 1996b). Children’s early words in Sesotho are typically disyllabic trochees. By contrast early words in Quiché may be monosyllabic stressed syllables where the final stressed syllable of the adult target word is preserved. This difference in the structure of children’s early words is associated with a difference in foot structure in the relevant languages. It remains to be investigated however whether word minimality effects impact the acquisition of other languages. Furthermore, issues such as morphological transparency, the nature of non-stem morphology and also discourse pragmatic factors may interact with these prosodic constraints.

Further work in this area has also considered children’s acquisition of words greater than a foot. Demuth (2001) provides an account of PWord development for one Spanish acquiring child Sofia between the age of 1;8 and 2;3. She argues that a number of different prosodic constraints impact Sofia’s PWord production and that she gradually acquires additional prosodic structures. This longitudinal data is drawn from a study by Gennari & Demuth (1997).

Words in Spanish allow primary lexical stress on any of the last three syllables although stress is typically found on the penultimate syllable (J. Harris, 1983). Given this we might anticipate that Sofia would tend to produce predominantly trochaic feet in her early word structures. However Sofia produces disyllabic words where the initial syllable is stressed as well as those where the ultimate syllable is stressed. In addition to these productions Sofia produces a number of trisyllabic target words with penultimate stress. These are often reduced to disyllabic forms with the initial weak syllable being omitted. Demuth (2001) argues that these various productions can be accounted for by a single

prosodic structure shown in (47). This structure captures the finding that Sofia often truncates trisyllabic wordforms by omitting the initial unfooted weak syllable similar to findings for English (e.g. Gerken, 1996) and Dutch (Fikkert, 1994). It also recognises that Sofia is able to produce some trisyllabic wordforms with this structure at this stage indicated by the parentheses. This structure also allows for the production of two types of disyllabic words, those with initial stress, where the final two syllables of the structure are utilised and those with final stress where the initial two syllables of the structure are utilised.

(47)



Additional support for the existence of this structure is also found in Sofia's production of tetrasyllabic word targets with the prosodic structure S-w S-w where the right most foot is the head (Demuth, 2001). Sofia truncates these words either omitting the entire initial foot (48a) or producing a trisyllabic wordform omitting the initial syllable (48b). These examples show that Sofia's word productions are sensitive to the above prosodic structure. Similar constraints are also observed in Sofia's production of tetrasyllabic multimorphemic forms in particular lexical items with determiners. These are reduced to trisyllabic productions. Interestingly when the determiner is disyllabic the initial syllable is omitted (49a) whereas when the determiner is monosyllabic the vowel, or an approximation thereof, is maintained (49b). This suggests that the initial syllable in the above structure is a prosodic clitic limited to a single syllable. This clitic is prosodified as part of the PWord. Since Sofia does not yet allow tetrasyllabic PWords these multimorphemic target forms are truncated in a similar way to tetrasyllabic monomorphemic words.

(48) Tetrasyllabic Monomorphemic Word Targets (Demuth, 2001, p. 10)

a)	[ˈdoro]	/ˌinoˈdoro/	‘lavatory’
b)	[kaˈlera]	/ˌeskaˈlera/	‘stairs’

(49) Tetrasyllabic Multimorphemic Targets (Demuth, 2001, p. 12)

a)	[naˈmaka]	/ˌuna ˈmoto/	‘a motorbike’
b)	[eˈmeka]	/ˌla muˈɲeka/	‘the doll’

The prosodic constraints approach neatly accounts for Sofia’s data. However although it allows for the variability in the production of specific lexical structures it does not propose a solution with regard to what factors influence this variation. See §3.3.3 for discussion of variability of children’s early word forms.

The production by Sofia in (49b) in which the determiner is reduced to an epenthetic vowel is not uncommon in language acquisition. There are a number of cases crosslinguistically in which developmentally a syllable may initially tend be omitted before being produced as an epenthetic vowel or ‘filler syllable’ (these typically have a V or CV structure) and finally being produced as a well formed syllable. The production of such unglossable syllables have been discussed as ‘filler syllables’ (Peters, 2001), ‘shadow vowels’ (Demuth, 1992b), ‘monosyllabic place holders’ (Bottari, Cipriani, & Chilosi, 1993) as well as ‘additional elements’ (Veneziano & Sinclair, 2000). Children vary in whether or not they produce filler syllables (Peters & Menn, 1993) which is potentially due to the ‘output style’ of the particular learner (Peters, 2001). The status of such syllables largely depends on the theoretical approach of the researcher. In a prosodic approach their production is evidence of children’s awareness of the prosodic patterns in the language they are acquiring.

The prosodic licensing approach (e.g. Demuth, 2001) argues that children’s word productions are sensitive to the PWord structures that children have acquired. If a child has not yet acquired the structure of the target word then they will alter the production of that word to match a structure which they have already acquired. This can be understood as the target word not being prosodically licensed by the child’s current understanding of prosodic structure. As children learn more about their language they will acquire the various different

prosodic structures allowed. These stages of development are however not discrete as shown by the variation in production of particular prosodic structures (Demuth, 2001).

In §5.1.3 I explore whether prosodic constraints are found to impact the production of children's early bipartite stem verbs in Murrinhpatha. There are minimal word effects in adult Murrinhpatha which require monomorphemic words to either be bimoraic or disyllabic (Mansfield, In Prep.b). If monosyllabic words have no coda the vowel must be lengthened in order to satisfy a bimoraic minimum as in other Northern Australian languages (B. Baker & Harvey, 2003). Verbal PWords which are two syllables or longer have penultimate lexical stress forming a trochaic head foot at the right edge of the PWord. I follow Mansfield's findings (Mansfield, In Prep.a) that verbal PWords do not have secondary stress. The prosodic structure of verbal PWords in Murrinhpatha is outlined in greater detail in §2.2.2. A prosodic licensing approach predicts that children's early productions of verbal Pwords will be sensitive to the prosodic constraints of adult Murrinhpatha. Evidence of this would be that errors of omission are related to prosodic structure as opposed to morphological structure.

3.3.2. Morphosyntactic Accounts

The proposals accounting for children's early verb productions, and more broadly word productions, presented in the previous sections have highlighted the role of phonological and prosodic factors. Alternatively, it has been argued that children's early verb productions are sensitive to morphosyntactic factors. These approaches tend to focus on findings that inflectional morphology is omitted in early stages of verb development and that children initially produce particular types of verb structures including bare stems (e.g. Courtney & Saville-Troike, 2002), root infinitives (e.g. Rizzi, 1993; Wexler, 1998) and imperatives (e.g. Salustri & Hyams, 2003). These structures all typically have little or no inflectional morphology leading to hypotheses that their early production may be due to a single underlying cause (Salustri & Hyams, 2006).

Morphosyntactic accounts of children's early verb productions are particularly attractive to researchers working within a syntactically focused generative framework. Many of these approaches argue that children's errors are due to children's syntactic representations being underspecified or truncated in some way. This may be due to the underspecification of specific features such as argument agreement or tense (e.g. Schütze & Wexler, 1996) or the

truncation of underlying tree structures (e.g. Rizzi, 1993). This theoretical position allows for continuity between child and adult grammars, which are in this case only minimally different, as well as allowing for the innateness of some form of Universal Grammar (e.g. Pinker, 1984). That is, children are considered to be equipped with the basic structures of the adult grammar, but deficiencies in these representations result in children's production errors such as the omission of inflectional morphology.

3.3.2.1 Perceptual Salience & Grammar

The production of bare verbs has already been noted in §3.3.1 for a number of languages (e.g. Courtney & Saville-Troike, 2002; Crago & Allen, 2001). From the perspective of explanations grounded in either perceptual salience (e.g. Peters, 1985) (§3.3.1.1) or prosodic licensing (Demuth, 2001) (§3.3.1.2) the early production of bare verbs is due to the prosodic/phonological structure of verbs in the adult language leading the child to first produce the part of the verb consistent with a stem/root. However, the operating principles proposed by Slobin (1985) and Peters (1985), which include perceptual salience, have received considerable criticism (e.g. Bowerman, 1985; Pinker, 1989b). Central to these critiques is that, while operating principles may explain what children do, they do not explain how children are doing it with regard to mental representations and processes central to language acquisition. Pinker (1989b) in particular argues that although these principles provide insights into general developmental patterns they do not explain why these patterns come about. What is missing from such accounts from a nativist perspective is some theory of grammar with guiding syntactic principles at a deep-structure level.

The incorporation of 'grammar' into a salience account is essentially the approach taken by Courtney & Saville-Troike (2002) in their analysis of early verb production in both Navajo and Quechua. As mentioned previously in §3.3.1.1, children in both languages produce bare verb stems. The extraction of these elements is aided by perceptual salience as the stems occur at word edges. The stems are also morphologically transparent as syllable and morphological boundaries coincide. It is argued, however, that if perceptual salience were the sole driving force behind production this would also lead to the production of bare affixes by children, which is not attested in their data. The absence of bare affixes is claimed to be due to the existence of an innate grammatical notion of ROOT/STEM, following Pinker (1984). According to Pinker, when acquiring inflectional morphology, children first store

collections of phonologically and semantically similar wordforms called miniparadigms. These word forms are organised according to linguistically relevant innate features. Children then extract phonetic material in common across a miniparadigm and store this element in the lexicon with the appended feature of ROOT/STEM. This process is presented in greater detail in §3.5.1. Importantly in this approach bare stem production is promoted both by factors of salience as well as factors of the underlying grammar and the processes by which morphology is acquired. In languages in which bare stems aren't produced this may be due to stem morphology being more opaque and difficult to segment given that all children will have access to the same innate grammatical features.

3.3.2.2 Root Infinitives & Analogue Hypotheses

A number of syntactic based approaches developed in response to findings that children acquiring a number of predominantly Western European languages produce root infinitives (e.g. Rizzi, 1993; Wexler, 1998). Root infinitives are verbs with infinitival morphology used in a matrix clause, resulting in the use of infinitival morphology where finite morphology is anticipated (Hoekstra & Hyams, 1998), as shown by the examples below. This stage of development is often referred to as the optional infinitive stage where children produce both finite and infinitival verb forms (Wexler, 1994). One of the major challenges for these approaches has been to explain why an optional infinitive stage is observed in many languages although at different rates and why it is not observed in others (Ambridge & Lieven, 2011, p. 149).

(50) German

Thorstn	*das*	*haben*
name	that	have-INF

(Poeppel & Wexler, 1993)

(51) Dutch

Papa	*schoen*	*wassen*
daddy	shoes	wash-INF

(Weverink, 1989)

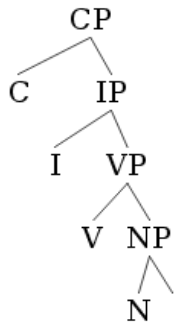
(52) French

Michel	*dormir*
name	sleep-INF

(Pierce, 1992)

One such approach is Rizzi's (1993) *Truncation Hypothesis*. It argues that the top node of every adult sentence is CP. Children however may choose any node as the top of their tree and as a result do not project above this node. This means that if a child produces an utterance whose top node is VP or NP, according to the tree structure in (53), inflection will be omitted by the child since the tree does not project up to IP. Variation in the use of inflection is observed because children may choose any node as their top node including CP, resulting in an adult-like utterance. The mechanism which requires that CP is always the top node is argued to have matured by age 5 and consequently errors of omission of inflection are no longer produced (Deen, 2009). Although this account explains the production of both inflected and root infinitive forms at the same stage of development, as structures may be truncated or fully projected, it does not account for other findings such as the fact that root infinitives tend to be more frequent in a given language when subjects are omitted (e.g. Wexler, 1998).

(53)



Other approaches have argued that the optional infinitive stage is due to the fact that children optionally omit or underspecify certain features in finite contexts. Perhaps the most

successful of these proposals has been the Agreement/Tense Omission Model (ATOM) (Schütze & Wexler, 1996; Wexler, 1998). This model argues that while all parameters are correctly set by the optional infinitive stage, children optionally omit agreement marking and/or tense in finite contexts. In addition to accounting for the optional infinitive stage it also accounts for the fact that subjects tend to be omitted in root infinitive contexts. See Ambridge & Lieven (2011, pp. 145–150) for further discussion of the strengths and weaknesses of this model.

Although root infinitives are frequent in some languages such as German and Dutch they are not found in all languages. Murrinhpatha for example does not have infinitival verb forms, meaning that children cannot pass through an optional infinitive stage in its 'pure' sense. It has been argued however that in languages that lack a root infinitive other constructions may be analogous. Salustri & Hyams (2003, 2006) propose that in null subject languages such as Italian, Spanish, Catalan, Slovenian and Hungarian the imperative is analogous to the root infinitive given the early predominance of imperative forms. They argue that the imperative is similar to root infinitives in other languages as both are 'irrealis' with directive illocutionary force and are tenseless. It is suggested that root infinitives are used ahead of imperatives in languages such as German, as "the derivation of a root infinitive is more economical than an imperative derivation in that imperatives involve verb movement (to Mood and Force) while the root infinitive does not" (Salustri & Hyams, 2006, p. 177). The *Imperative Analogue Hypothesis* makes two major predictions which could potentially apply to Murrinhpatha. The first is that imperatives will occur significantly more often in child language than in adult language. The second is that imperatives will be used significantly more frequently in null subject languages than in root infinitive languages as both fulfil a similar function. Interestingly this hypothesis does not predict that imperative verbs will be overextended and used in inappropriate contexts (Salustri & Hyams, 2006). This is markedly different from the characteristics of an optional infinitive stage where non-finite verbs are used in finite contexts (Wexler, 1994). This hypothesis remains attractive however as it allows for the wider application of theories which account for the optional infinitive stage.

It has also been argued with regard to English that children's bare verb productions are analogous to root infinitive constructions (Wexler, 1994). Wexler argues that the production of bare verbs in English is due to the same underlying mechanism that causes the

production of root infinitives in other languages. If this is the case models such as ATOM may potentially account for the production of bare verbs in other languages including Navajo, Quechua and Inuktitut discussed previously. Interestingly, common to all these forms - root infinitives, imperatives and bare verbs - is the absence of inflectional morphology obligatory in other verb constructions. The appropriateness of models such as ATOM for explaining the Murrinhpatha child language corpus is considered in §5.1.2.

3.3.3. Accounting for Variability in Early Verb Production

It is an empirical fact observed in the previous sections that variability exists in children's early verb productions. Children produce both inflected and uninflected verb forms at the same age. For example research into the acquisition of Sesotho (Demuth p.c. as cited in Deen 2005:20) shows that a child aged 2;1 produces the target form for 'I finished' in four different ways. The first two child productions (55a, b) omit the initial subject agreement prefix, while in (55c, d) this prefix is realised as a filler syllable (e.g. Peters, 2001).

(54) Adult Target

AT: ke-qet-il-e
SA-finish-prf-IND
'I finished'

(55) Child Production

a) *qetile*

b) *ketile*

c) *eketile*

d) *aketile*

Theories must be able to allow for this variability and many do. In a prosodic licensing model (§3.3.1.2) this is accommodated through the use of parentheses in children's prosodic

representations indicating that children gradually incorporate more structure into their prosodic representations (e.g. Demuth, 2001). The ATOM (Schütze & Wexler, 1996; Wexler, 1998) presented in §3.3.2.2 accounts for variation by allowing for certain functional categories to be optionally omitted. However theories should also ideally account for why variation occurs. What factors impact production so that in one instance a child may produce a well formed verb but in another instance they may omit part of the same or similar verb?

A number of potential explanations for why such variation occurs have been proposed. Perhaps the most prominent is that children's verb learning and the acquisition of inflectional verb morphology is item-based (e.g. Tomasello, 2000a). According to such usage-based approaches (e.g. Bybee, 1995) children will initially only use inflectional morphology on specific verbs before extending this to additional verbs on the basis of schemas, see §3.5.2. Children initially do not have knowledge of the inflectional system and this emerges gradually. This gradual emergence accounts for the variation in production across lexical items. It does not however account for why children may vary their production of an individual verb, unless of course these represent distinct unrelated items at this stage.

This variation has also been explored in studies of the acquisition of inflectional morphology in Inuktitut (Skarabela & Allen, 2004; Swift & Allen, 2002). This research, based on the analysis of naturalistic production data of four children aged between 2;0 and 3;6, considers the influence of structural as well as discourse-pragmatic and emotional factors on the omission of inflectional morphology. Swift & Allen (2002) found that although no single factor was able to account entirely for the omission of inflection, children were more likely to produce uninflected verbs for 1st and 2nd person subjects as well as for 3rd person subjects when the referent was contextually salient due either to previous linguistic mention or joint attention from the interlocutors indicated by eye-gaze. That is, omission of inflection was more likely when the subject referent was salient in the interactional context. They also investigated whether use of the verb in the preceding context influenced children's productions. This however did not account for the omission of inflection. Similar findings are also reported by Skarabela & Allen (2004) in an analysis of the same data set. The consideration of such factors is an appealing avenue for future research and potentially has the ability to complement theories which aim to account for the production of early verbs and the acquisition of inflectional morphology. At this stage the influence of such factors remains underexplored.

3.4 Verb Lexicon in Acquisition

Verb acquisition in relation to theories of word learning has received less attention than might be expected. Theories of 'word learning' have been largely driven by analysis of how children acquire nouns. This is much to the frustration of researchers who believe that verbs form an important part of the word learning picture.

> *Objects are boring; they just sit there. Events and actions are where the action is - literally. That is why it so puzzling that probably 90% of all of the work done on children's early word learning focuses on nouns… (Tomasello & Brandt, 2009:113).*

There has however been a growing amount of research focused on verb acquisition over the past two decades. Most notably two edited volumes (Tomasello & Merriman 1995, Hirsh-Pasek & Golinkoff 2010) and a multiple diary study by Naigles et al (2009). In particular, socio-pragmatic (Tomasello, 2000b) and emergentist approaches (e.g. Hollich, Hirsh-Pasek, & Golinkoff, 1997; Maguire, Hirsh-Pasek, & Golinkoff, 2006) to word learning have presented a more inclusive theoretical perspective in terms of parts of speech when compared to theories of word learning heavily reliant on constraints or principles (e.g. Clark, 1983; Markman, 1987; Markman & Hutchinson, 1984). There has also been considerable interest in the hypothesis that children's early word learning has a noun bias (e.g. Gentner, 1982, 2006; Tardif, 1996). Despite this growth in research much of what is known about how children acquire verbs is still largely based on findings from studies of English undertaken more than twenty years ago (e.g. Bowerman, 1974; Clark, 1993; Huttenlocher et al., 1983; Tomasello, 1992). There is a need for greater research to be undertaken in this area especially from a crosslinguistic and broader theoretical perspective.

Research of verb acquisition has made a number of findings regarding the pragmatic and semantic characteristics of children's early verbs. These have included claims that children's early verbs may be semantically or pragmatically restricted in some way (Clark, 1993; Huttenlocher et al., 1983). In some instances these restrictions have been claimed to influence children's acquisition of syntactic frames (Ninio, 1999b). The following sections present key findings regarding the semantic and pragmatic nature of children's early verbs. I

also consider whether these characteristics influence children's grammatical development (§3.4.2.4) exploring the potential link between pragmatic function and the acquisition of linguistic structures which has typically been overlooked in acquisition research (Cameron-Faulkner, 2014).

3.4.1. Semantics of Early Verbs

Interest in the semantics of children's early verbs has largely been driven by claims that children's early verbs are predominantly 'general-purpose' verbs (Bloom, 1991; Clark, 1978, 1993).

> *For talking about actions, [children] frequently rely at first on general-purpose verbs like do, make, get and go. They use these verbs for talking about many different activities … These verbs are gradually displaced as children add more specific verbs to their repertoire and use those instead (Clark, 1993, p. 30).*

These general-purpose verbs, often referred to as 'light verbs', are argued to be acquired earlier due to their semantic generality. They can be used in a wide variety of contexts and can be used in place of semantically more specific verbs (Bloom, 1991; Clark, 1978, 1993). Although it is acknowledged that more specific or heavier verbs are also used early in development (Clark, 1978; Tomasello, 1992), light verbs are argued to predominate initially (Clark, 1993). There is no consensus as to the definition of what does and does not constitute a light verb (Theakston, Lieven, Pine, & Rowland, 2004). However they typically have a high token frequency and are dependent on context for their interpretation. Despite reference to this claim by many researchers, typically those who disagree with it (e.g. P. Brown, 1998; Theakston et al., 2004), it is not often investigated empirically.

There are a number of arguments that call this claim into question and propose that light verbs are not privileged with regards to being learned earlier than semantically more specific verbs. Firstly there is doubt as to whether this claim, initially based in studies of English, is crosslinguistically valid. P. Brown (1998), considering the acquisition of nouns and verbs in Tzeltal, shows that many of children's first verbs are semantically specific, such

as ‘to eat tortillas’ and ‘to peel fruit’. Another major criticism stems from the recognition that light verbs tend to be highly frequent in the language children hear (Theakston et al., 2004). Consequently it is unclear when considering naturalistic samples whether light verbs are acquired earlier due to their semantic generality or whether this is due to frequency. This is problematic as high frequency verbs in Child Directed Speech (CDS) have been shown to be positively correlated with order of acquisition (Naigles & Hoff-Ginsberg, 1998). It is difficult however to tease apart these two factors as words which have relatively generic semantics also tend to be relatively frequent in language use (Ninio, 1999a).

The hypothesis that children acquire light verbs before semantically more specific verbs could potentially have interesting implications for Murrinhpatha. While the majority of Murrinhpatha verbs have a bipartite stem structure, a subset of classifier stems may be used without lexical stems as simple verbs (e.g. Walsh, 2011) as described in §2.2. A number of these simple verbs have relatively general semantics encoding meanings including *go, say* and *do*. If children do tend to acquire light verbs first, we might anticipate that simple verbs are acquired early, especially given that they are also morphologically less complex than bipartite stem verbs as explored in §5.2.

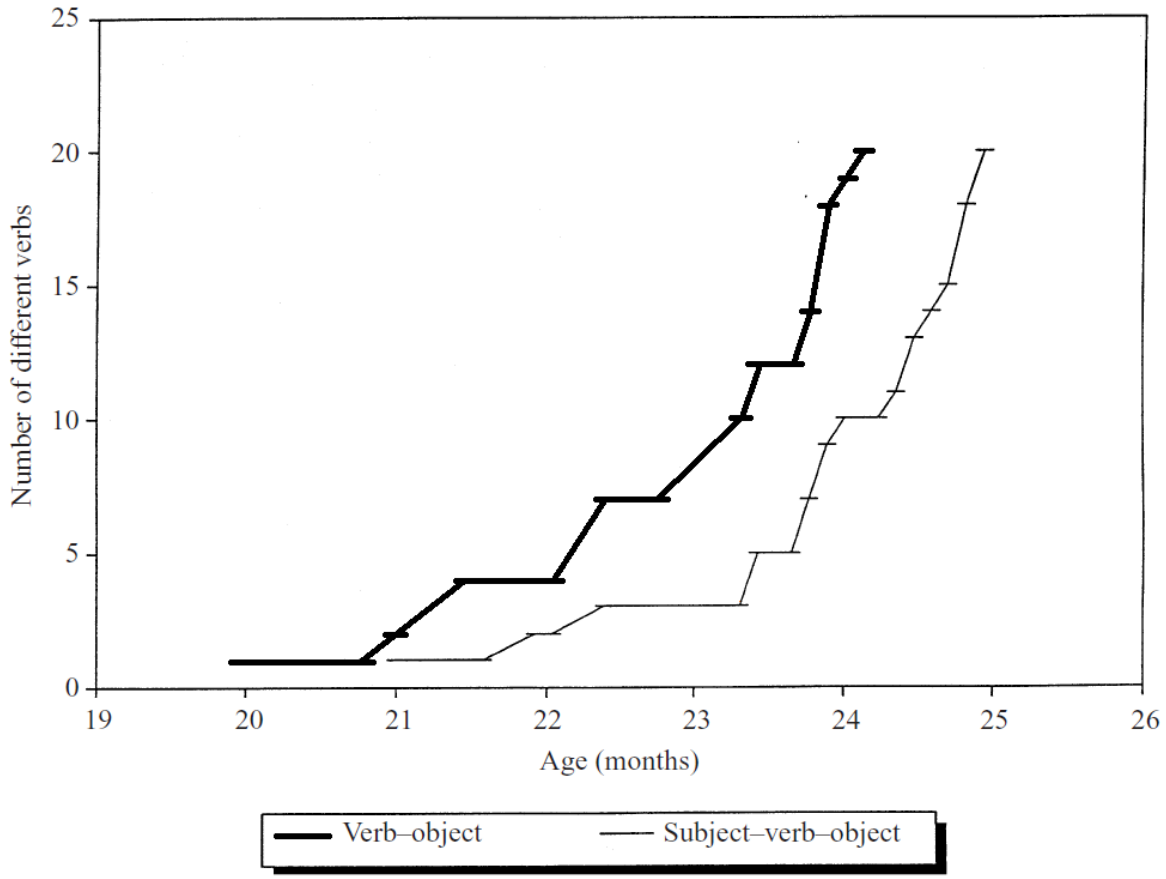
3.4.1.1 Light-Verbs-as-Pathbreakers

A particularly interesting area of verb acquisition and semantics in the literature is the relationship between verb acquisition, semantics and syntactic development. A number of studies have argued that ‘light verbs’ have a privileged status in children’s early syntactic development (Chenu & Jisa, 2006; Goldberg, Casenhiser, & Sethurmann, 2006; Ninio, 1999a, 1999b; Pinker, 1989a). Of particular interest to the study of the acquisition of Murrinhpatha bipartite stem verbs is the proposal by Ninio (1999a, 1999b) that light verbs act as ‘pathbreakers’ for children to acquire abstract syntactic frames. The term pathbreaker is used in this context to refer to a verb which helps children to initially learn a specific syntactic structure before extending this structure to use with other verbs.

The light-verbs-as-pathbreakers proposal is as follows. Ninio’s (1999b) initial study investigated the acquisition of VO and SVO syntactic frames using longitudinal data of 16

children, 1 acquiring English and 15 acquiring Hebrew as a first language.[24] The study tracked children's uses of different transitive verbs used in each of these frames. It found that the more verbs that a child was able to use in a certain syntactic frame, the quicker they were able to acquire the new verbs in this frame. This is shown in the graph below for Ruti, one of the Hebrew acquiring children. Initially Ruti only used one or two verbs in a particular frame. As more verbs were acquired the rate at which new verbs were used in that syntactic frame increased suggesting transfer of abstract syntactic knowledge from initial item-based learning.

Figure 2. Cumulative Number of Different Verbs in VO and SVO Word Combinations Produced by Ruti as a Function of Age (adapted from Ninio, 1999b, p. 627)



[24] The English acquiring child is 'T' whose language development is described in Tomasello (1992).

The verbs initially used in these frames tended to be semantically light, highly frequent and 'pragmatically important' verbs. These initial verbs are claimed to act as pathbreakers, with children inducing general principles and patterns from these word-combinations over a period of time that then facilitate further learning. Ninio also points out that these pathbreaking verbs are also verbs that tend to be grammaticalised crosslinguistically to encode transitivity suggesting that they encode transitivity in a relatively 'pure' fashion. This is characterised as follows:

> *…the grammaticalization evidence … suggests that the relevant verbs express this notion of transitivity in some manner which is closer to the surface than in other transitive verbs. Grammaticalized lexemes have to undergo semantic bleaching in order to be applicable to a wide range of different contexts, and the more specific the original semantics of a verb, the less likely it is that the verb would be a good candidate for grammaticalization. This means that the verbs we are concerned with tend to have extremely general meanings; most of their semantics consists of some schematic notion of transitivity, with the addition of a minimal specific element. This is what makes them into, relatively speaking, the most GENERIC transitive verbs available in language (Ninio, 1999b, p. 639).*

The fact that light verbs tend to be frequent in the input aids acquisition of these syntactic frames as it means that children acquire the 'best models' of the frame first rather than initially learning to produce verbs which may be less transparent (Ninio, 1999a).

There has however been some criticism of the light-verbs-as-pathbreakers approach. Firstly the methodology used by Ninio means that the vast majority of children's verb use was not captured. At most participants were recorded 40 minutes a week meaning that verbs that were produced only infrequently are likely not to have been observed (Naigles et al., 2009). A multiple diary study of Naigles et al., which tracked the first 10 uses of 34 frequent verbs including many light verbs, found no evidence that light verbs had a pathbreaking function finding that they were not acquired earlier, nor did they display greater syntactic or morphological flexibility. Secondly Snedeker and Gleitman (2004) propose that the fact that light verbs do not have specific meanings means that it would be difficult for children to infer

the meaning of these verbs in interaction. They argue that the acquisition of light verbs is dependent on the acquisition of syntactic frames rather than the other way round. If this were the case we might expect the relevant syntactic frames to be produced with heavy verbs initially before being produced with light verbs. This is however not born out in either the Ninio (1999a, 1999b) or Naigles et al. (2009) studies.

The 'pathbreaking' hypothesis provides some interesting ideas for how children may acquire certain aspects of Murrinhpatha verbs. For example CSPs are collections of a large number of inflected forms which encode a range of morphological property sets. It is possible that the encoding of various features is initially associated with particular CSPs. These CSPs could act as morphological pathbreakers with children transferring the knowledge of these features to other CSPs. The pathbreaker CSPs are likely to be those that are used frequently. If CSPs do act as pathbreakers in this way we would anticipate that certain CSPs will show earlier cell diversity in terms of the morphological property sets they encode. Furthermore the emergence of new features will be linked to particular CSPs before becoming more widespread. This hypothesis in relation to the acquisition of CSPs is explored in §6.4.

3.4.2. Verbs and Pragmatic Development

3.4.2.1 Pragmatics of Early Verbs

There has been little research into the relationship between children's pragmatic development and verb acquisition. This is due both to a lack of focus on the acquisition of verbs as well as research into pragmatic development tending to focus on the development of certain functions rather than linguistic structures. Despite this there are a small number of claims that have been made regarding the pragmatics of children's early verbs based on studies of English acquiring children. The most prominent are that children's early verbs have a 'self-action' bias (Huttenlocher et al., 1983) and that children's early verbs are best learned in non-ostensive contexts (Tomasello, 1995). More recently research has focused on the extent to which children's early verbs are pragmatically restricted (e.g. Cameron-Faulkner, 2012; Naigles et al., 2009).

The claim that children's early verbs have a 'self-action' bias is regularly attributed to a foundational study by Huttenlocher et al. (1983). This study considered the production and

comprehension of verbs in experimental and naturalistic settings "to determine whether verbs are first produced for actions of self or other and whether adult action categories arise earlier for movements than for change" (p. 82). In the naturalistic recordings of mother-child dyads they found that the 16 children in their study, aged 1;11-2;4, "rarely used verbs to encode observed behaviour" (Huttenlocher et al., 1983, p. 84). This has led to claims that children's verbs are initially used to encode their own actions rather than those of others. This claim however is somewhat misleading as it suggests that children in the original study used verbs predominantly to refer to their own actions. In actual fact the study found that 90% of utterances containing verbs were produced when the child was 'participating' in the action 'in some way' (Huttenlocher et al., 1983). This phrase 'in some way' is extremely important as it includes verbs were the child is not acting, as is shown by the table below.

Table 8. Context of Production for Action Verbs (Huttenlocher et al., 1983, p. 84)

Child is participant	Frequency	Child is not participant	Frequency
	Shorter MLU group		
Acting	169	Observed action	25
Not acting	109	Picture	5
Pretense	6	Pretense	1
Unknown status	9	Unknown status	14
Errors	7	Errors	1
Total	300		46
	Longer MLU group		
Acting	443	Observed action	25
Not acting	156	Picture	28
Pretense	43	Pretense	1
Unknown status	3	Unknown status	7
Errors	12	Errors	2
Total	657		63

Note. MLU = mean length of utterance. Total number of verbs = 1,066: 346 for the shorter MLU group and 720 for the longer MLU group.

In the shorter MLU group 109 or 32% of 'action' verbs were coded as the child 'not acting' and in the longer MLU group this figure was 156 or 22%. Although these figures still show that the majority of verbs did encode action from the child – 56% in the shorter MLU group and 67% in the longer MLU group – a substantial number of verbs did not. With regard to these verbs Huttenlocher et al. state:

> *When the child was not acting, but was still participating in some way, by far the most frequent utterances were requests. Requests are usually marked by the child's attempting to carry out an action, reaching, and/or whining. The most common requests were for an action to be carried out on an object (e.g., "Open door," "Mommy open"), but some requests were for an action relative to the child (e.g., "Carry me") (1983, p. 85).*

These findings show that while children's early verbs are often used to refer to their own actions they are also regularly used to request action from a caregiver. Therefore the characterisation of children's verbs having a self-action bias is less pronounced than is often presented. Consider the following statements regarding this finding which overstate the extent of a self-action bias.

> *Our earlier work…showed that verbs first acquired in the early multiword period were initially applied only to self-action, both in production and comprehension, and when applied to self-action were produced prior to acting (Smiley & Huttenlocher, 1995, p. 30).*

> *Children's earliest uses of conventional verbs have been found to refer primarily to their own rather than another's actions (Naigles et al., 2009, p. 4).*

Instead this finding is better characterised as a 'self-interest' bias. English acquiring children's early action verb productions[25] tend to encode events where the child is the agent

[25] The original study also considered children's verb comprehension however this claim is more often made in reference to children's verb productions.

and events where the child is requesting a primary caregiver to act. Children do not typically use verbs to describe the actions of others that do not involve the child. These findings are characterised well by Edwards and Goodwin (1986) who argue that the nature of children's verb use is rooted in the child's communicative needs. Children's attention is typically centred on their own actions in the immediate environment, which will involve the assistance of others to do things they can't do and gain permission for their own actions.

> *Many words in early speech are performatively self-directive, or encode practical difficulties, physical constraints, or prohibitions on freedom of action. Other words are used to direct and coordinate joint attention to or action upon the physical world, or to request actions from others. It is these pragmatic aims which underlie the patterning of children's early reference to self actions and the actions of others" (Edwards & Goodwin, 1986, p. 270).*

Another prominent claim regarding pragmatics and verb learning relates to the pragmatic contexts in which children acquire verbs. This issue was initially pursued in research by Tomasello and colleagues (Tomasello, 1992, 1995; Tomasello & Kruger, 1992). They claimed, using experimental techniques and naturalistic data, that children predominantly heard verbs in non-ostensive contexts, namely contexts in which the event is either not yet commenced or has been completed. In fact in one study 70% of verbs directed at children were used in non-ostensive contexts, 60% when the action encoded by the verb was impending (Tomasello, 1995, pp. 121–123). These were typically requests for the child to act (e.g., *Put the toy on the shelf*) or anticipation of the child's intention to act (e.g., *Oh, you're going to put it on the shelf*). This research found that children were particularly successful at acquiring verbs in the impending action context. This was shown experimentally by comparing children's ability to acquire novel verbs when the action encoded by the verb was either impending, ongoing or completed. If children are best at acquiring verbs in such contexts we might also anticipate that children also use their early verbs in such contexts. That is, children's early verbs may be more likely to encode impending actions compared with ongoing or completed actions. There has however been little empirical research in this area regarding children's production. Smiley & Huttenlocher (1995) in discussing the findings of previous research (Huttenlocher et al., 1983), do however state that children's

verbs which encode their own actions are uttered before these actions are performed. Furthermore the finding that children also use early verbs to make requests for action from caregivers (Huttenlocher et al., 1983) is further evidence that children produce verbs in impending action contexts. This hypothesis however remains to be explored systematically or from a crosslinguistic perspective. It is considered with regard to the Murrinhpatha data in §5.2.

A recent detailed study, which in part considered the pragmatics of early verb use, tracked the first 10 spontaneous uses of 34 common verbs by 8 'European American' children acquiring English as a first language (Naigles et al., 2009). The data for this study was collected through diaries kept by each of the children's mothers. One of the aims of the study was to determine the pragmatic and semantic flexibility of children's early verbs. This addressed questions including whether children's early verbs are restricted with regard to the function of the utterance or the agent of the event being encoded. The study considered actor flexibility of children's early verbs in light of claims that children's early verbs have a self-action bias (Huttenlocher et al., 1983). The data considered was found not to support the existence of a self-action bias in children's early verbs although on average children's verbs encoded their own actions 51% of the time. This however is only slightly less than what is reported for verb production by Huttenlocher et al. (1983). As mentioned previously, the production section of this study found that 56% of children's verbs in the shorter MLU group referred to their own actions. Consequently the findings of Naigles et al. are largely consistent with the findings of Huttenlocher et al. (1983).[26]

Naigles et al. (2009) measured pragmatic flexibility by assigning all utterances containing verbs one of two functions. Utterances were coded as either 'commands' or 'descriptions' by the mothers keeping the diaries. It was found that 'commands' accounted for 45.4% and 'descriptions' accounted for 53.2% of all utterances containing verbs.[27] The majority of verbs tracked were not restricted in terms of their pragmatic function, with most verbs used by most children as both commands and descriptions. This coding taxonomy has been criticised as being too broad and unclear (Cameron-Faulkner, 2012). In particular the category of 'descriptions' appears to act largely as an elsewhere category in contrast to the

[26] The discrepancy claimed by the authors may be due to a misinterpretation of the original findings of Huttenlocher et al. (1983), perhaps in part due to the confusing language used to describe it.
[27] The remaining 1.4% of utterances did not receive a pragmatic coding value.

seemingly more coherent category of 'commands'. I agree with this criticism, especially considering the very limited presentation of these categories provided by the authors as given below.

> *…the mothers were instructed on (a) what constituted commands (e.g., ''When your child is trying to get you or someone else to do-or stop doing-something'') and descriptions (e.g., ''When your child is telling you about an object, event, or relation'')…(Naigles et al., 2009, p. 25)*

> *Each verb use was coded as a command or description (these accounted for over 98% of all utterances), and for each command, the addressee was noted. To illustrate, in Instance 1 of Table 2, Heather says ''Pull'' as a command to her mother to pull a chair; in Instance 3 she says ''I pulling'' as a description of her own actions with the toy car. (Naigles et al., 2009, p. 27)*

Given the above explanations, commands is a relatively sound category. It is unclear however what the range of pragmatic functions the 'descriptions' category may represent. It would minimally include both statements of intent to act by the child as well as descriptions of their own as well as others' actions. It is likely that such a minimal coding system was adopted due to the fact that mothers, and not trained researchers, were the coders in this instance. The study does however find that 'commands', which are assumedly requests for the addressee to act, are a frequent function of children's early verbs. This is consistent with the findings of Huttenlocher et al. (1983), although commands appear to be somewhat more frequent in the study of Naigles et al. (2009).

3.4.2.2 Coding Taxonomies and Pragmatic Development

As interest has grown in researching children's pragmatic development so have the number of coding taxonomies used to quantify this development with claims that there is almost a one-to-one relationship between researchers and coding taxonomies (Cameron-Faulkner, 2012). Despite a plethora of coding taxonomies many are based in Speech Act theory. Due to

the number of studies using such an approach as well as the acknowledged link between speech acts and sentence types crosslinguistically (König & Siemund, 2007; Levinson, 1983; Sadock & Zwicky, 1985) I also base my analysis of the function of early verbs loosely in Speech Act theory (§5.2). This allows for better comparability with other studies as well as highlighting the potential link between the pragmatic characteristics of early verbs and the acquisition of verbal morphology (§3.4.2.4).

Speech Act theory developed from an understanding that language can be used to perform actions, highlighted by Austin's distinction between constative and performative utterances, see Cummings (2013) for a brief introduction. Speech Act theory built upon ideas from philosophy regarding the importance of language use over language form (Wittgenstein, 2009 [1953]). Austin (1962) argued that three acts or 'forces' are simultaneously present in any utterance. These are the 'locutionary act', equivalent to the linguistic form, the 'illocutionary act', the speaker's intent or purpose in producing the utterance and the 'perlocutionary act', the impact of the utterance on the hearer. Searle (1969) built on the work of Austin focussing primarily on the 'illocutionary act' and developing a taxonomy of illocutionary acts (Searle, 1976). This taxonomy, often referred to as a taxonomy of speech acts, is regularly used as a theoretical starting point in current child language studies of pragmatic development (Cameron-Faulkner, 2014).[28] This taxonomy consists of five speech act categories which are shown below, as given in Cameron-Faulkner (2014, pp. 39–40).

i. **Representatives (e.g. assertions, claims, statements)**
   These types of utterances reflect a word to world relationship in which the speaker indicates their belief of how they perceive the world to be.
   e.g. *This is a very interesting point.*

ii. **Directives (e.g. commands, requests, orders)**
   Speakers employ these types of speech acts in order to change a state of affairs via the hearer. Consequently directives are instances of the speaker attempting to make the world fit the word with the hearer responsible for the shift.
   e.g. *Please come and see me as soon as possible.*

[28] There are howver a number of studies considering children's pragmatic development that are not based in speech act theory including Cameron-Faulkner (2012), Halliday (1975) and Naigle set al. (2009).

iii. **Commissives (e.g. promises, offers, threats)**

Commissives are used by speakers in order to communicate their intention to act. These speech acts are used to make the world fit the word, but in contrast to directives it is the speaker that is responsible for the shift.

e.g. *I'll pick up the papers this afternoon.*

iv. **Expressives (e.g. thanking, praising, blaming)**

Expressives are used in reference to psychological states and as such cannot be categorised according to the world/word distinction. Therefore expressives are claimed to display a null/empty direction of fit.

e.g. *Many thanks for your positive comments.*

v. **Declaratives (e.g. official conventional acts such as nomination, hiring and firing, openings of institutions)**

The final category of speech acts contains those typically used in formal settings to bring about changes in the current state of affairs. In the case of declaratives the direction of fit is both words to world and world to words.

e.g. *I declare this store open.*

I discuss children's early verbs in Murrinhpatha in §5.2 based largely on the five categories of Searle's taxonomy above. In practice this means I focus on the speech acts of representatives, directives and commissives as the other two categories are not attested in my corpus in relation to verb use. It should be noted that a much more comprehensive coding taxonomy, the Inventory of Communicative Acts (Ninio & Wheeler, 1984) based in speech act theory, has been developed for use in language acquisition studies. Given the fine-grained nature of this taxonomy, which includes 64 speech act categories, it is not suitable for the current study. The size of the Murrinhpatha child language corpus, outlined in §4.7, means that the use of such a system may result in more general patterns of pragmatic use not being identified.

Given the above taxonomy it is possible to reclassify the general findings regarding the function of early verbs presented in §3.4.2.1. Early verbs were found to be used to request action from the addressee being referred to either as 'requests' (Huttenlocher et al., 1983) or 'commands' (Naigles et al., 2009). Therefore it can be said that children's early verbs are

used as ‘directives’ according to the above taxonomy. Early verbs were also described as encoding children’s own actions by both Huttenlocher et al. (1983) and Naigles et al. (2009). It is unclear however what the intent of the child is in producing such utterances. The child may use such utterances to state their intention to act (commissive), to assert a claim about their own performed action (representative) or indeed as a request for some action from the addressee (directive). Consequently reclassifying these findings is somewhat problematic. However, since children have been shown to learn verbs well in impending action contexts we may predict that early verbs are used as commissives with children describing their own impending action. The use of verbs as commissives is indeed found to some extent by Smiley & Huttenlocher (1995). Naigles et al. (2009) also found that children’s early verbs may be used to describe the action of third persons such as siblings and pets also present in the recording environment, suggesting early verbs can be used in representative utterances. It is unclear in the discussed studies the stage at which certain speech acts are used and also their frequency of use since the categories used tend to conflate even this three way distinction of representatives, directives and commissives. The use of each of these categories in relation to Murrinhpatha verbs will be considered in §5.2.

One major stumbling block to the use of speech act coding systems in acquisition research is that it requires researchers to make judgements about children’s intentions. This is clearly problematic as it is difficult for researchers to accurately judge a child’s intentions based on their utterances and behaviour. It is useful in assessing a child’s intentions to consider other participant responses to the child as these may provide a guide to the child’s intention. This itself however is also problematic as caregivers reactions tend to favour the categories of directives and commissives (Bruner, 1975). It may also be useful to consider the child’s response to the interpretation of their initial utterance by another participant as this provides an indication as to whether or not the caregiver has correctly interpreted the child’s initial intention (Cameron-Faulkner, 2014). Although there are clear limitations to such an approach they do not greatly devalue the findings from such analysis.

3.4.2.3 Speech Act Development

Studies aimed at identifying key developmental trends in children’s pragmatic development grounded in speech act theory have tended to focus on the development of particular types of speech acts. For example the study of the production of directives by children has received

considerable crosslinguistic attention with studies of children acquiring French (e.g. Ryckebusch & Marcos, 2004), Greek (Georgalidou, 2008), Japanese (Nakamura, 1999), Swedish (Aronsson & Thorell, 1999), Norwegian and Hungarian (Hollos & Beeman, 1978) and Sherpa (Ciesielski, 2015). These studies typically show that children produce directives from an early age and that children are sensitive to sociolinguistic factors influencing the use of directives in their culture (Küntay, Nakamura, & Ateş Şen, 2014). This is consistent with findings that early verbs may be used as directives. Other types of speech acts that have been studied from an acquisition perspective include requests (e.g. Ervin-Tripp, 1986), apologies (e.g. Ely & Gleason, 2006; Long, 2010), greetings (e.g. Greif & Gleason, 1980) and promises (Astington, 1988; Bernicot & Laval, 2004).

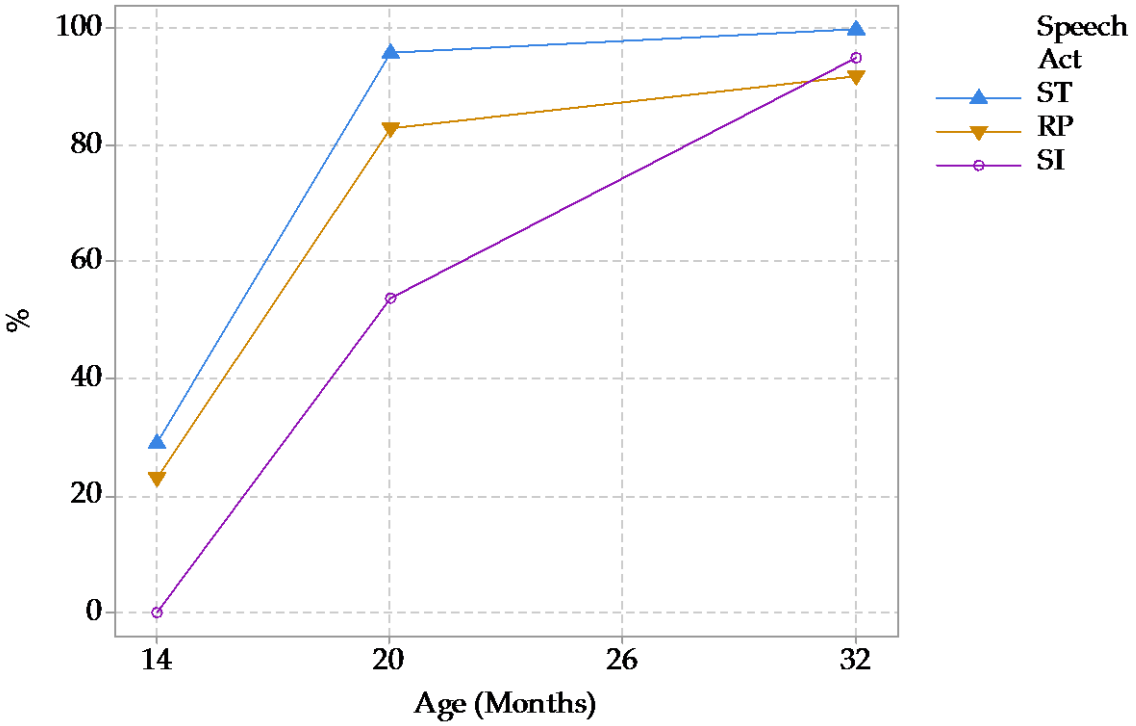
A notable example of a study which provides a comprehensive account of speech act acquisition is Snow, Pan, Imbens-Bailey & Herman (1996). Using the extensive coding taxonomy developed by Ninio & Wheeler (1984), this study considered the development of the 'expression of communicative intents' in 52 child-caregiver dyads at 14, 20 and 32 months.[29] They found that the frequency and interpretability of 'communicative attempts' increased over the 18-month period. Early communicative attempts were limited to a small set of communicative interchanges *(Negotiating Immediate Activity, Discussing Joint Focus, Directing Hearer's Attention, Marking)* whereas older children's speech act repertoires were more diverse. With regard to the speech acts associated with utterances it is somewhat difficult to make generalisations given the large number of coding categories, a point acknowledged by the authors. It is possible however to consider at what stage children began to use certain speech act categories that have been associated with early verb use in the previous discussion. It is important to remember however that these utterances do not necessarily contain verbs.

Early verbs have been identified previously in this chapter as encoding representatives, directives and potentially commissives (§3.4.2.2). These categories are closely related to categories in the larger taxonomy used by Snow et al (1996). 'ST - State or make a declarative statement' is the most prototypical representative category. 'RP - Request/Propose/Suggest Action' refers to directing the addressee to act and is the most prominent directive category. 'SI - State Intent' refers to stating intent to carry out an act by

[29] The caregivers were predominantly mother's with the exception of two sessions which were conducted with fathers. Of the 52 dyads recorded at 14 months this reduced to 48 at 20 months and 37 at 32 months.

the speaker and is roughly equivalent to the commissive category. The figure below shows the percentage of children that produced at least two utterances coded as the categories ST, RP and SI at each age (adapted from Snow et al., 1996, p. 72). It illustrates that most participants did not produce these speech acts at 14 months and no children produced a commissive (SI) utterance. At 20 months of age a high percentage of participants produced representatives (ST) and directives (RP), whereas only approximately half of all participants produced commissives (SI). This rose to 95% of participants by 32 months. This suggests that directives and representatives may be used earlier by children than commissives. It also shows that children typically produce the types of speech acts argued to be encoded by early verbs from a young age. Unfortunately the study does not provide information regarding the frequency of use of each category or whether the utterances contain verbs.

Figure 3. Percentage of Children Producing Speech Act at Least Twice



3.4.2.4 Speech Acts and Grammatical Development

The above sections have presented findings, largely based on studies of English acquiring children, regarding children's pragmatic development in general and more specifically regarding the pragmatic function of children's early verbs. This raises questions as to whether verbs are used in pragmatically similar ways by children across languages and cultures. It also raises the question as to whether the pragmatic function of early verbs has a relationship to the linguistic structure used to express these functions and ultimately whether this influences children's grammatical development.

The link between speech acts and sentence types is crosslinguistically well established with recognition that speech act types are encoded in the linguistic structure of languages (e.g. König & Siemund, 2007; Levinson, 1983; Sadock & Zwicky, 1985). In particular three basic sentence types, differentiated in most if not all of the world's languages, are strongly associated with types of speech acts as shown below (König & Siemund, 2007).[30] These sentence types are distinguished in languages by different formal means including word order, inflectional affixes, particles and intonation. There are of course many cases when a sentence type does not produce the speech act with which it is typically associated. The classic example is that declaratives may be used as requests such as when someone says 'It's cold in this room' in order to get an addressee to close a window. These secondary functions are expressed indirectly and are based on inferences heavily reliant on context within an interaction and do not undermine the unmarked relationships between sentence types and speech acts given below.

Table 9. Sentence Types and Associated Speech Acts

Sentence Type	**Speech Act**
Declarative	Representatives
Interrogative	Questions
Imperative	Directives

[30] The speech act category of 'questions' is not included in the taxonomy of five categories utilised in this thesis (§3.4.2.2). I adopt the taxonomy of Searle (1976), as presented by Cameron-Faulkner (2014). I treat the category of questions as being subsumed by these five categories. Questions are categorised according to these five categories depending on their illocutionary force.

These insights regarding adult speech raise the question as to whether this link is also found in children's speech and whether the early development of a certain speech act category may in some way lead to the earlier development of a particular sentence type than might otherwise be expected on formal grounds.

Although not tied to the development of speech acts, there are a number of pertinent examples in the literature where a linguistic structure is acquired earlier or later than might be expected due to its associated function. Demuth (1989) found that the passive was acquired relatively early in Sesotho in comparison to languages such as English and Hebrew. She suggests this is because of the important functional role of passives in Sesotho which are used to question subjects and to answer subject questions. Demuth also argues early acquisition is linked to frequency as passives in Sesotho are used relatively frequently in adult speech and child directed speech. This means children have ample opportunity to practice passive comprehension and subsequently produce them. By contrast it has been shown that the ergative is acquired later than expected on formal grounds in Samoan. Ochs (1988) argued that the ergative marker was acquired later compared to other languages, namely Kaluli (Schieffelin, 1985) and Quiché (C. Pye, 1980b) due to its sociolinguistic status. The ergative marker, in the context of the Western Samoan village of Falefaa described by Ochs, was used more by men, as well as being used more often in speech to non-family members as opposed to 'household intimates'. This meant that children, who spent most of their time with their mothers and at home, were typically exposed to ergative-poor environments leading to later acquisition of the marker. The driving force in both the Sesotho and Samoan examples is frequency of use in the child's environment. Importantly these studies explain why the particular structures being investigated are frequent or infrequent illustrating that an understanding of the sociolinguistic context can provide valuable insight into grammatical development.

Based on these findings it is possible that if a child produces a particular speech act from a young age this may lead to the early acquisition of constructions associated with this function. For example, it has been claimed that cross-linguistically children produce directives from an early age (e.g. Küntay et al., 2014). Indeed the work of Bates et al. (1975, 1976) showed that the production of directives precedes the use of verbal language with

Italian acquiring children producing directives[31] through preverbal gestures before being able to express this intent through speech. Potential evidence that this may lead to the early acquisition of imperative constructions is found in a number of languages including Italian (Salustri & Hyams, 2003) where imperative constructions are acquired early.[32] This is particularly interesting when considering the acquisition of verbal inflection crosslinguistically as imperative verbs are reported to be used frequently in children's early verb productions in a number of typologically diverse languages including Italian, as previously mentioned, Finnish (Laalo, 2003; Toivainen, 1981), Yucatec (Pfeiler, 2003), Sesotho (Demuth, 1992b), Inuktitut (Crago & Allen, 2001), Georgian (Imedadze & Tuite, 1992) and Warlpiri (Bavin, 1992). These findings are suggestive of a potential link between pragmatic development and the acquisition of verbal inflectional systems. Interestingly a directive function has also been linked to children's use of root infinitives (Salustri & Hyams, 2006).

There are also other factors that likely contribute to the early acquisition of imperative verbs in some languages. Imperative verbs have been reported to be frequently used in child-directed speech (CDS). In a study of 12 mothers CDS in English it was found that 9% of all utterances were imperative constructions (Cameron-Faulkner, Lieven, & Tomasello, 2003, p. 850). These constructions usually contained one of a small set of semantically relatively general verbs including *come, look, put, go* and *get*. For Italian it has been found that imperative verbs account for up to 15% of all verb use in CDS compared with 6% in adult-directed speech (Belletti & Guasti, 2015). The frequency of imperative verbs in language input may therefore contribute to their earlier acquisition. Interestingly the study of English verb use by Cameron-Faulkner et al (2003) suggests that children do not use imperative constructions frequently. This is however at odds with other findings regarding the production of imperatives by English acquiring children which show that these are used frequently from an early age (e.g. Vasilyeva, Waterfall, & Huttenlocher, 2008).

Another possible factor that may aid the early acquisition of imperative verb forms is that in inflecting languages they are typically morphologically simpler than other inflected

[31] Referred to as proto-imperatives and proto-declaratives although both were used to gain action or attention from a caregiver.

[32] Salustri & Hyams (2003) attribute the early use of imperative verbs in Italian to the fact that children underspecify inflectional agreement marking in early verb production linking this to the Root Infinitive Hypothesis as outlined in §3.3.2.2 (Schütze & Wexler, 1996).

forms (König & Siemund, 2007). It is frequently found that imperative forms do not have affixes encoding person, number and gender as well as tense and aspect. Indeed it is not uncommon in the world's languages for imperative verbs to be equivalent to bare verb stems (König & Siemund, 2007). Therefore imperative verbs may be acquired earlier not only due to the influence of a child's pragmatic development and their frequency in CDS but also due to their relative morphological simplicity. Indeed imperative verb forms in Murrinhpatha are morphologically relatively simpler than many other verb forms although they are still inflected for subject person/number and TAM given the portmanteau nature of the classifier stem. Imperative verbs in Murrinhpatha are minimally constructed of a classifier stem encoding a 2nd person subject and future tense[33] and a lexical stem. It is however also important to note that the early production of imperative verb forms has not gone unnoticed by generative researchers who propose a much different story to account for these findings (Salustri & Hyams, 2003, 2006) as discussed previously in §3.3.2.2.

3.5 Acquisition of Verbal Morphology

The previous sections have focused on the structure (§3.3) as well as the semantic and pragmatic characteristics (§3.4) of children's early verbs. I now turn my attention to the acquisition of inflectional morphology and more specifically the acquisition of inflectional verb morphology. The study of the acquisition of inflection has often focused on the English past tense (e.g. McClelland & Patterson, 2002; Pinker, 2006; Pinker & Ullman, 2002). This has led to some theoretical approaches initially being developed to account for empirical facts associated with the acquisition of a specific morph in a single language and then being made to fit findings from other languages. Given the diversity of the world's languages such approaches are not easily generalisable (Stoll & Bickel, 2013a). Theories need to account for the acquisition of morphology from a typologically diverse range of languages (Bittner et al., 2003a; Kelly & Nordlinger, 2013; Stoll, 2015; Stoll & Lieven, 2013) as different morphological systems pose different challenges for acquisition (Bowerman, 2011; Peters, 1997; Slobin, 1985). The lack of study of diverse morphological systems has also meant that little is known about how children acquire different types of systems. For example there has

[33] Nordlinger & Caudal (2012) argue that classifier stems in imperative constructions encode future irrealis TAM. I however do not differentiate the encoding of future and future irrealis by classifier stems in this thesis as dicussed in §2.2.4.

been limited research regarding the acquisition of large and complex verbal paradigms in polysynthetic languages such as Murrinhpatha (Stoll, 2015).

As with other debates in linguistics, research concerning the acquisition of inflection is largely divided between Nativist/Generativist and Connectionist/Usage-Based accounts (Ambridge & Lieven, 2011). The former assumes that linguistic knowledge is to some extent innate. By contrast the latter assumes that linguistic knowledge is not innate and that grammar must be learned, driven by input from the specific language being acquired and emerging from the child's usage. In §3.5.1 and §3.5.2 I now provide a brief overview of the central elements of these two approaches with regard to the acquisition of morphology and consider the questions raised for their application to various languages including Murrinhpatha. I then consider the findings of a crosslinguistic project of Protomorphology (Bittner et al., 2003a; Dressler & Karpf, 1995) focused on the acquisition of inflectional morphology (§3.5.3). Finally in §3.5.4 I present a measure of inflectional diversity that will be used to quantify morphological development in the Murrinhpatha child language corpus.

3.5.1. Nativist/Generativist Approaches

Central to many Nativist approaches is the notion that the formation of inflected wordforms is rule-based. It should of course be noted that there is no intrinsic reason why a nativist approach would need to assume rule-based learning (Stoll, 2015). These approaches rely on a clear psychological distinction between regular and irregular morphology where irregular forms are retrieved directly from the lexicon rather than being formed 'on-line' (Clahsen, 1999; Pinker & Prince, 1991; Prasada & Pinker, 1993). Pinker & Prince (1991) exemplify this distinction most clearly with the English past tense. Past tense forms which are regularly inflected (e.g., *walk-walked*) are governed by a symbolic rule which attaches a suffix *–ed* to an uninflected base form. This process is undertaken in an innate morphological module. Conversely irregular past forms (e.g., *sing-sang*) are stored in the lexicon. When a base form has an irregular counterpart the retrieval of an irregular form blocks the regular morphological process from occurring. This has led to such approaches being referred to as Dual-Mechanism/Route models (Clahsen, 2006).

Key support for this model and in particular support for an abstract rule for the production of English past tense comes from findings that children as young as 4 are able to

form a regular past tense form for nonce verbs (Berko, 1958). Given the nonce verb *rick* children are able to produce the past tense form *ricked* arguably through the application of a simple rule of suffixation. The productive power of this rule is further evidenced by the fact that children may overextend the regular rule to irregular verbs (e.g. Cazden, 1968; Marcus, 2000; Marcus et al., 1992). English acquiring children may for example produce a past tense form such as *comed* instead of the correct target form *came* by applying the regular past tense suffixation rule to the base form *come.* Connectionist proposals (e.g. Bybee, 1995; Rumelhart & McClelland, 1986) however also aim to account for these empirical findings, see §3.5.2.

Dual-Mechanism models face a clear problem in accounting for how children can acquire large inflectional paradigms with complex patterns of allomorphy and syncretism where there are no clear default rules and no clear distinction between regular and irregular morphology. For example, nouns in Polish are inflected for both number (singular and plural) and seven different cases. Krajewski et al. (2012) argue that there is often not precise criteria for determining the correct ending which could constitute an abstract rule. This means 'irregular' inflections, such as for masculine inanimate nouns in the genitive singular, would need to be stored in the lexicon. Furthermore there is no evidence to suggest that these are acquired differently, with regular endings not showing greater levels of productivity (Dąbrowska, 2001, 2004). A similar problem is raised for the acquisition of Serbian noun morphology by Mirković, Seidenberg & Joanisse (2011), who argue that it is simply a challenge for a rule-based approach to describe such systems. If the rule systems required to account for such systems are so complex then how would we expect children to acquire them?

The characteristics of large inflectional paradigms, such as those found in Murrinhpatha verbs, which are problematic for Dual/Mechanism accounts include high levels of irregularity, homonymy of forms, lack of paradigmatic iconicity, lack of default rules and the large number of forms to be acquired. All these factors contribute to the overall complexity of the system (e.g. Stoll, 2015). The question of how adult speakers store and produce such complex inflectional paradigms has been explored by Mithun (2010) for speakers of two unrelated polysynthetic languages, Central Alaskan Yup'ik and Mohawk. Mithun argues that if inflection is rule-based then inflected word paradigms should not be defective, that is, all cells should be able to be produced by a speaker through the application of the relevant rules. However through elicitation of complex paradigms from adult speakers

'gaps' were found to exist where a speaker could not produce a relevant form or was unsure of the form they produced. This suggests that speakers store inflected forms, and that they are not generated by rules. Speakers 'search their memories for echoes of existing forms' (Mithun, 2010, pp. 134–135). Interestingly the gaps identified in paradigms varied across speakers further supporting a storage account. Accounting for individual differences in storage of wordforms is much more straightforward than accounting for variable gaps through the existence of variable abstract rules. Mithun's findings support claims that frequently used word forms are more likely to be stored in the lexicon whereas rarer forms are more likely to be produced through analogy with other existing forms (Bybee, 1995; Bybee & Hopper, 2001).[34]

Similar findings of individual variation in cell production have also been attested in Murrinhpatha classifier stem paradigms (Mansfield, 2014a; Mansfield & Nordlinger, 2015). This variation appears to be largely associated with age with younger male speakers producing different cell forms compared with older speakers. These changes appear to be motivated through analogy with other stored forms, which once again provides issues for a primarily rule-based approach to inflection.

Another issue for dual-mechanism approaches is that drawing a clear distinction between regular and irregular morphology can be difficult. This is not only an issue for more complex morphological systems it is also an issue for the English past tense. A number of 'irregular' past tense forms in English display an amount of 'semi-regularity' with phonologically similar base forms undergoing similar changes (e.g. *feel-felt, kneel-knelt; drink-drank, shrink-shrank*). Further evidence showing that irregular forms are at least sub-regular has been found in several studies which show that adult speakers can extend sub-regular patterns to nonce stems (e.g. *spling-splung*) (Bybee & Moder, 1983; Kim, Pinker, Prince, & Prasada, 1991; Prasada & Pinker, 1993). These findings have led dual-route approaches to accept that irregular forms stored in the lexicon are not stored in isolation. These wordforms have associative links similar to connectionist models that account for these effects (Pinker, 2006; Pinker & Prince, 1991). However, as noted by Bybee (1995) these approaches do not clearly explain how such associative patterns operate, treating such wordforms as peripheral to the main process of acquiring inflection, which is rule-based.

[34] Mithun (2010) refers to the production of forms through analogy as the use of 'rules'. This type of process however is typically referred to as a 'schema-based' approach in first language acquisition.

There is however compelling evidence from the investigation of neuropsychological dissociations that there is indeed a psychological distinction between regular and irregular morphology in English speakers. In a study of people with anomia, a condition where people may have trouble retrieving words but are able to produce grammatically fluent speech, Ullman et al. (1997) asked participants to complete a *wug-test* fill-in-the-blank task like that shown below. They tested regular, irregular and nonce verbs and found that irregular verbs were more difficult to produce and that participants also regularised irregular forms such as *swam* being produced as *swimmed.*

(56)

"Everyday I *dig* a hole. Just like everyday, yesterday I _____ a hole."

(Ullman et al., 1997, p. 268)

Furthermore research concerning the production of regular and irregular English past tense forms by people with agrammatism, a deficit in stringing words together into grammatical sequences, has produced opposite findings. These participants struggle with *wug-tests* and do not regularise irregular forms (Marin, Saffran, & Schwartz, 1976; Ullman et al., 1997). These findings suggest that there is a clear distinction in how regular and irregular morphology is processed with certain dissociations impacting production of certain types of morphology.

These findings and indeed the interpretation of these findings has however been disputed (Bird, Lambon Ralph, Seidenberg, McClelland, & Patterson, 2003; McClelland & Patterson, 2002). This has seen the English past-tense debate grow into the research areas of language disorders associated with brain injuries as well as neuroimaging of 'normal' as well as atypical populations. This has resulted in studies which support a psychological distinction between regular and irregular morphology (Jaeger et al., 1996) and those that do not (e.g. Bird et al., 2003; Faroqi-Shah, 2007; Justus et al., 2011; Justus, Larsen, de Mornay Davies, & Swick, 2008). Studies of this distinction between regular and irregular morphology in languages other than English have been largely isolated to well-studied languages easily accessible to researchers, such as German (e.g. Beretta et al., 2003) and Spanish (de Diego

Balaguer et al., 2006). Unfortunately the use of more sophisticated techniques does not seem to have led to greater clarity in this debate.

Although the outcome of such a debate is intriguing it does not solve the problem that a rule-based approach has in terms of its crosslinguistic application, especially for complex inflectional systems. As noted by Stoll & Bickel (2013a, p. 3) "[t]he postulation of a general rule-based learning mechanism … and the distinction between regular and irregular forms … is most likely an artefact of English grammar." This highlights the problem of basing theoretical approaches on a typologically limited sample. Indeed it may be that the acquisition of abstract rules is not appropriate for the acquisition of some inflectional systems and that these may be better learned through associative networks. This however does not rule out the possibility that abstract rules may be learned in circumstances where a clear default does exist, such as the English past tense.

The discussion of the dual-mechanism approach has thus far focused on the psychological reality of regular and irregular morphology. A dual-mechanism account must of course also account for how abstract rules are acquired by children. A prominent 'top-down' proposal of this process has centred around the notion of 'miniparadigms' first proposed by Pinker (1984, p. 180) within the framework of Lexical Functional Grammar and later adopted to some extent by studies grounded in a theory of Protomorphology (Bittner et al., 2003a; Dressler & Karpf, 1995), see §3.5.3. According to this process children first learn inflected wordforms as chunks (MacWhinney, 1978). These are then organised into lexically specific miniparadigms and only later, after children have constructed a critical mass of miniparadigms and successfully analysed these into their morphological elements, do children begin to abstract symbolic morphological rules.

Pinker (1984, Ch. 5) proposes that the organisation of miniparadigms, collections of phonologically and semantically similar words, is driven by children's ability to append feature equations to whole wordforms. Based on the meaning of a particular utterance the child infers a linguistically relevant feature, for example case (exploiting syntax-semantics correspondences such as *agent = nominative*), and then creates an equation which expresses the value of that feature. This equation is appended to the inflected wordform and the wordform is entered into the miniparadigm based on the feature equation. For example in Murrinhpatha the child may build the following miniparadigm for the intransitive verb 'to

return'.[35] The child may correctly hypothesise, on the basis of use, that a relevant linguistic feature is SBJ and organise the miniparadigm as below.

Table 10. Miniparadigm I 'to return'

SBJ	1	2	3
	ngurdiwurlnu	thurdiwurlnu	purdiwurlnu

Miniparadigms of course must be expandable so that children can incorporate additional inflected wordforms. This process relies on the *Unique Entry Principle* (Pinker, 1984, p. 177) which states that each cell of an adult paradigm may only be filled by a single form. According to this principle if a child attempts to enter a wordform into a cell and that cell is already filled the child should either replace the existing form, if the new form has a greater strength; maintain two forms in the cell for the time being if both forms are of similar strength; or hypothesise a new feature equation for this form based on inferences of meaning. If a new feature equation is hypothesised these new features should be included as dimensions in the miniparadigm. Continuing our example a child may hear the new form *thurdiwurlnukun* in relation to a 2nd person subject. This would result in one cell of the current paradigm having more than one form as shown below.

Table 11. Miniparadigm II 'to return'

SBJ	1	2	3
	ngurdiwurlnu	thurdiwurlnu/thurdiwurlnukun	purdiwurlnu

The child could potentially hypothesise a new equation of linguistically relevant features to account for this new wordform such as SBJ and MOOD. This would then result in the addition of a new dimension to the miniparadigm to incorporate the extra feature as shown in the following table. The 1st and 2nd person subject forms would be organised in the miniparadigm

[35] Note that this is not intended as an analysis of Murrinhpatha verbal structures but simply to show how a hypothesis testing model might operate for Murrinhpatha verbs.

according to greater phonological and semantic similarity with the 2nd person subject realis verb form. If the child makes an incorrect hypothesis it is argued that additional input into the miniparadigm will result in multiple forms in individual cells as well as unfilled cells and the *Unique Entry Principle* (Pinker, 1984, p. 177) will force the child to test a new hypothesis.

Table 12. Miniparadigm III 'to return'

SBJ	**1**		**2**		**3**	
Mood	**Realis**	**Irrealis**	**Realis**	**Irrealis**	**Realis**	**Irrealis**
	ngurdiwurlnu	---	thurdiwurlnu	thurdiwurlnukun	purdiwurlnu	---

On the basis of growing miniparadigms children then begin to abstract general paradigms which can be used to fill out other incomplete miniparadigms and form the basis for symbolic rules (Pinker, 1984, Ch.5). Initially children find the 'phonetic material in common'[36] across all cells in a word specific paradigm and store this element in the lexicon with the appended feature STEM or ROOT. The child then also extracts similar phonetic material based on the features encoded by the various paradigm dimensions (e.g. SBJ). Where this is unsuccessful, for example in cases of fusional morphology, similar phonetic material can be extracted based on more than one feature dimension at a time (e.g. SBJ+MOOD). The extracted material is stored in general paradigms. The child then constructs word structure templates which encode how STEMS and AFFIXES are to be combined (Pinker, 1984, p. 190). These are the basis of abstract inflectional rules.

The first major criticism of such an approach is that it assumes that the child has an innate knowledge of "the overall structure of the grammar [in this case Lexical Functional Grammar], the formal nature of the different sorts of rules it contains, and the primitives from which those rules may be composed" (Pinker, 1984, p. 31). This means that the 'linguistically relevant features' used by children to organise miniparadigms are innately available to the child and they are selected on the basis of input. This potentially greatly simplifies the acquisition task for the child as the range of features that may be encoded is greatly reduced,

[36] Note Pinker uses this term "as a placeholder for more precise notions to be taken from a theory of phonology" (1984, p. 188).

whereas a usage-based model would argue that these emerge through language use (e.g. Bybee, 1995).

The other major criticism, as has been discussed previously in this section, is that this approach focuses on the acquisition of abstract rules. Rule-based approaches are better suited to certain types of morphological systems (Stoll & Bickel, 2013a). It is difficult to generalise these to less regular inflectional systems where the rules needed to account for such patterns are so complex that it does not seem likely that children could acquire them (e.g. Krajewski et al., 2012; Mirković et al., 2011). Large inflectional paradigms which lack defaults and clear paradigmatic iconicity are likely not easily acquired solely through a rule-based approach although some of the processes noted by Pinker (1984, Ch.5) may play some role in the acquisition of such a system.

This process of deciphering morphological structure beginning with word-specific paradigms and emerging general paradigms also raises questions about the specific pathway of such development. Just as English inflectional morphology tends to be acquired in a certain sequence (Berko, 1958; R. Brown, 1973; de Villiers & de Villiers, 1973), complex inflectional paradigms may develop according to an identifiable trajectory. For example, certain sections or dimensions of miniparadigms may develop first if children's verb use is restricted with regard to the types of inflectional features encoded. Alternatively development of verbal paradigms may be more variable with different pathways emerging for different verbal paradigms. These issues are explored with regard to the development of Murrinhpatha CSPs in chapter 6.

3.5.2. Connectionist/Usage-Based Approaches

In contrast to nativist dual-mechanism approaches largely focused on the application of symbolic rules and the distinction between regular and irregular morphology (e.g. Pinker & Prince, 1991), single mechanism usage-based approaches do not require symbolic rules and argue that all morphology is learned through powerful 'general learning mechanisms' (Bybee, 1995). Such approaches do not appeal to the existence of innate grammatical features or morphological modules. Instead, on this view grammar emerges from language input and use. For an introduction to such approaches in the broader field of language acquisition see Behrens (2009).

The network model (Bybee, 1985, 1995; also Köpcke, 1998), which aims to account for the acquisition of inflectional morphology, proposes that schemas emerge from associations made among related inflected wordforms. Wordforms stored in the lexicon have varying degrees of lexical strength. This strength is largely due to a word's token frequency. The more frequent a term is in the input the easier it will be for children to retrieve. It will also have a greater autonomy, meaning that it will have weaker lexical connections with other words. This predicts that irregular forms should be frequent forms otherwise they may potentially become regularised (Bybee, 1995).

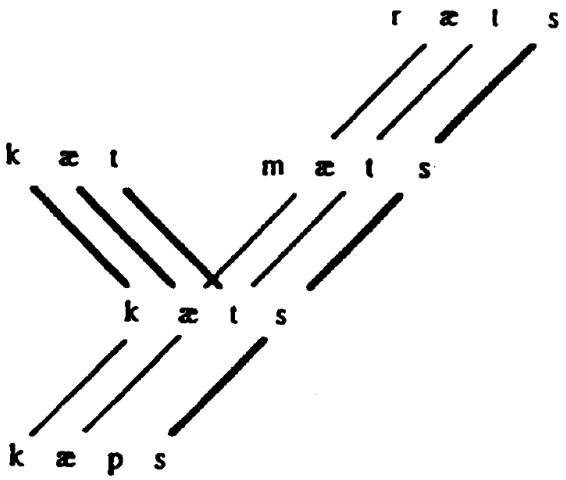
Wordforms with similar phonological and semantic features will develop lexical connections. The strength of these connections will vary depending on the type and number of features shared. Wordforms in the lexicon are not decomposed into stems and affixes, as in the approach of Pinker's miniparadigms, but instead schemas emerge where what is common across wordforms remains specified and in the place of varying material an abstract slot emerges (Bybee, 1995).

There are two types of schemas which illustrate how words can relate to one another. These are source-oriented and product-oriented. Source-oriented schemas are generalisations relating pairs of *basic* and *derived* words (e.g. *dance-danced*), similar to miniparadigms. Product-oriented schemas, on the other hand, are generalisations of sets of derived forms such as *strung, stung, flung, clung, hung etc.* These schemas are represented by the diagram below where 'cat' and 'cats' constitute a source-oriented schema whereas the other wordforms 'rats', 'mats', 'caps' as well as 'cats' constitute a product-oriented schema.

The relative strength of these schemas is dependent on type frequency. If a schema has more members it is argued to have greater strength and is consequently more likely to be applied to new wordforms (Bybee, 1995). This strength is also dependent on the variability of items within a schema. If the wordforms contained in the schema are all very similar, this makes it less likely that it will be extended to new items (Bybee, 1995). This approach is consequently able to account for perceived differences in the acquisition of regular and irregular morphology in languages such as English. 'Regular' morphs, such as the past tense suffix *-ed*, have a much higher type frequency and thus are anticipated to be overextended to 'irregular' wordforms. This approach also neatly captures 'sub-' and 'semi-regularities', which are typically treated as a more peripheral issue in a dual-mechanism approach, and suggests that children are able to harness these semi-regular patterns in the acquisition of

morphology (Bybee, 1995). Regularity is consequently not treated as a dichotomy of regular and irregular patterns, but all morphology is placed on a continuum of regularity governed largely by factors of type and token frequency.

Figure 4. Sets of Lexical Connections Yielding Word-Internal Morphological Structure (Bybee, 1995, p. 429)



Such an approach predicts that the acquisition of morphological systems proceeds in a piecemeal and gradual fashion, with researchers claiming that this differentiates it from a rule-based approach (Berman, 2004; Krajewski et al., 2012; Ravid, 2004). The restricted lexically-based nature of morphological acquisition has been identified by many researchers for a variety of languages including English (Tomasello, 1992), Italian (Pizzuto & Caselli, 1992), Brazilian Portuguese (Rubino & Pine, 1998), Spanish (Aguado-Orea, 2004), Palestinian Arabic (Ravid & Farah, 2009) and Polish (Krajewski et al., 2012); although see Courtney & Saville Troike (2002) regarding Navajo and Quechua. This approach could also potentially support proposals that specific wordforms act as pathbreakers in development (see §3.4.1.1) although it does not assume that these be semantically general as proposed by Ninio for syntactic development (1999b). It should however be noted that testing such predictions is difficult in studies using smaller datasets given that rarer forms will not be captured and this may result in less morphological flexibility being observed (Naigles et al., 2009).

I am however unconvinced that a dual-mechanism approach could not also predict the gradual emergence of morphology especially if this approach is 'top-down', where children initially store unanalysed inflected wordforms and then general paradigms are gradually hypothesised on the basis of lexically specific miniparadigms. Under such an approach (e.g. Pinker, 1984) morphology could also emerge in a piecemeal fashion. If a symbolic rule was indeed hypothesised this would not necessarily apply across all STEMS belonging to a lexical category, as segmentation may not yet have occurred for this lexical item. In this respect these approaches appear quite similar in nature. Strong source-oriented schemas are reminiscent of symbolic rules, in fact rules are allowed in some network proposals (Köpcke, 1998) and both approaches allow for the role of 'sub-' or 'semi-regularities' through associative networks. The key distinctions left between the approaches are that where a dual-mechanism approach focuses predominantly on the rule-based regular end of the system, likely due to influence of English as a language of study, single-mechanism approaches focus more on the semi-regular aspects of systems and, as a result, are able to accommodate a wider variety of morphological systems. Another key difference is that a usage-based approach gives a central role to type and token frequency in both the organisation and acquisition of morphological systems whereas the alternative appeals to innate categories and features. Finally, usage-based accounts must presume a great capacity for memory. Whereas a rule-based approach modularises inflected wordforms requiring less storage since these can be formed online, a usage-based account must allow for a speaker to store extremely large amounts of often minimally different wordforms (e.g. source-oriented schemas). These competing theoretical accounts are considered with regard to Murrinhpatha throughout chapters 6 to 8.

3.5.3. Protomorphology

Protomorphology is a theoretical approach to the acquisition of morphology which argues for the existence of an emergent autonomous morphological module (Bittner et al., 2003a; Dressler, 2012; Dressler & Karpf, 1995). This approach differs from nativist accounts (e.g. Pinker, 1984) in arguing that a morphological module is emergent rather than innate, but also differs from a Network model (e.g. Bybee, 1995), which does not propose modularity of linguistic subsystems. This approach has been used as the theoretical basis for a wide ranging crosslinguistic research project led by Wolfgang Dressler concerning the acquisition of

inflectional morphology by children aged 1;2 - 3;0 (Bittner et al., 2003b; Dressler, 1997). This project aims to uncover universal, language-specific and typological generalisations regarding the acquisition of inflection.

The theory of Protomorphology is based in Natural Morphology (Dressler, Mayerthaler, Panagl, & Wurzel, 1987) with its three subtheories of universal markedness, typological adequacy and language-specific system adequacy. Central to the theory of typological adequacy is the idea of linguistic types as ideal constructs. Natural languages approach these linguistic types to varying degrees. As a result of the languages studied Protomorphology has largely focused on the impacts on the acquisition of morphology of three linguistic types; inflecting-fusional, agglutinating and isolating. These three types are considered to constitute the ideal end points of two scales shown below, along which languages can be sorted in terms of their nominal and verbal inflectional systems. These classifications of inflectional systems allow researchers to consider how different typological variables influence acquisition. Polysynthetic languages are underrepresented in this approach. With regard to the below scales the verb systems of polysynthetic languages would fall to at the right end of (57a) and would vary in terms of their position on (57b) depending on the verbal morphology of the specific system.

(57) Ideal linguistic type scales (Dressler, 2005, p. 8)

a) *isolating* ↔ *inflecting-fusional*

b) *inflecting-fusional* ↔ *agglutinating*

Another key concept for Protomorphology is that of self-organisation (Dressler & Karpf, 1995; Karpf, 1991). This is used to explain how the morphological module emerges. According to this concept children interact selectively with their linguistic environment. This interaction is guided by the properties of input, as well as the child's own current linguistic repertoire. On the basis of these interactions, including both 'uptake' and 'production', children construct patterns with regard to both 'item-based' (source-oriented) and more abstract (product-oriented) representations (Dressler & Karpf, 1995). This pattern selection is guided by factors of token frequency and saliency. As the complexity of these pattern

inventories increases this leads to the need for modularisation into complementary systems in order to reduce the processing load (Dressler & Karpf, 1995). Therefore the question regarding acquisition of specific inflectional systems concerns when this modularisation occurs and the impact of universal, typological, and language-specific factors on this process of modularisation.

Early morphological development is divided into three phases; Premorphology, Protomorphology and Morphology Proper (Dressler, 1997). The first phase of Premorphology is a rote-learning phase where children show no evidence of knowledge of the morphological system. During this phase children produce both uninflected and inflected forms as unanalysed chunks (MacWhinney, 1978) and typically have only one rote-learned form per lemma.

The second phase of development, Protomorphology, is when children begin to make generalisations across rote-learned forms. It is characterised as follows:

> *The protomorphological phase of language acquisition can be defined as the period when the system of morphological grammar and of its subsystems starts to develop without having reached the status of modules and submodules. In this period, children start to construct creatively morphological patterns of rules, many of them overgeneralised, i.e. with unrestricted productivity (Dressler, 1997, p. 11).*

The onset of Protomorphology in a number of investigations including for Yucatec (Pfeiler, 2003), French (Kilani-Schoch, 2003), German (Bittner, 2003), Spanish (Aguirre, 2003) and Croatian (Katičić, 2003) has been shown to be simultaneous with the emergence of 'true miniparadigms'. True miniparadigms are defined as:

> *...corresponding to a non-isolated set of minimally three phonologically unambiguous and distinct inflectional [word]forms of the same lemma produced spontaneously in contrasting syntactic or situative contexts in the same month of recordings (Bittner et al., 2003b, p. xvi).*

The relationship of Protomorphology and true miniparadigms is appealing, as logically a child cannot abstract across word-specific paradigms until these paradigms themselves are acquired. It must be noted however that the identification of true miniparadigms will be dependent on the nature of the corpus being investigated. These will likely be identified earlier in a larger more dense corpus and later in a smaller less dense corpus.

The final phase of development in this approach is 'Morphology Proper'. This is essentially the acquisition of adult-like morphology and is a placeholder for a logical endpoint in development. At this stage the morphological module and its submodules are fully formed and autonomous.

The approach of Protomorphology has been quite successful in comparing how different typological variables impact the acquisition of systems. It has shown for example that children learning morphologically rich languages tend to become aware of morphology earlier than children acquiring languages with little morphology, and acquire these systems at a faster rate (Laaha & Gillis, 2007; Xanthos et al., 2011).[37] This means that children will tend to reach a protomorphological stage earlier when acquiring agglutinating and inflecting languages compared to more isolating languages. It has also solidified previous findings that more agglutinative morphological systems are acquired more easily than those systems which are more inflecting-fusional. This finding was first noted in relation to the acquisition of Turkish, a language with regular agglutinative morphology (Aksu-Koç & Ketrez, 2003; Aksu-Koç & Slobin, 1985). Agglutinating languages tend to have greater morphological transparency as well as a preference for one to one mappings between form and function (biuniqueness). Furthermore there is a tendency for 'constructional iconicity' (Mayerthaler, 1987), where unmarked categories tend to have featureless encoding while more marked categories are overtly encoded. The roles of these factors is supported by findings that greater morphosemantic transparency makes morphology more perceptually salient for children (§3.3.1.1). A protomorphology approach importantly links these observations to larger typological variables.

Murrinhpatha is a language with rich verbal morphology which is both agglutinating and fusional in parts. The above typological tendencies predict that children acquiring

[37] This does not entail however that systems will be mastered earlier given that rich morphological systems are much larger.

Murrinhpatha will reach the protomorphological stage relatively early given the richness of the morphological system. A further prediction is that the more agglutinative parts of the system will be acquired before the more fusional parts. This however is not addressed in this thesis as I focus predominantly on the fusional parts of the Murrinhpatha verbal complex such as classifier stem paradigms (Ch. 6). With respect to Murrinhpatha classifier stem paradigms (§2.2.4) miniparadigms may develop at an early stage due to the fact that paradigms have many different members (Bittner et al., 2003b). However the abstraction of patterns from these paradigms may be delayed due to the lack of regular patterns across paradigms and their fusional nature. Furthermore the fact that there are approximately 38 CSPs in Murrinhpatha which encode the same inflectional features of subject person/number and TAM reduces the level of biuniqueness in the system. These predictions are evaluated in chapter 6.

3.5.4. Quantifying Morphological Development

In analysing the acquisition of inflectional morphology it is common for various statistical measures to be employed. These may be used to compare cross-sectional samples and/or to track the development of an individual across a corpus. In longitudinal studies many measures aim to capture the increasing complexity or richness of children's use of inflectional morphology often referred to as 'inflectional diversity'. There is however no commonly accepted measure of inflectional diversity in the field. In my analysis of the development of inflectional diversity in Murrinhpatha classifier stem paradigms I adopt a modified measure of *Normalised Mean Size of Paradigm* (Xanthos & Gillis, 2010) presented below. For discussion of the development and need for this measure the reader is referred to (Xanthos & Gillis, 2010).

Traditionally a common and straightforward measure of inflectional diversity/flexibility has been to calculate the number of inflected wordforms per lemma (e.g. Küntay & Slobin, 1996; Ogura, Dale, Yamashita, Murase, & Mahieu, 2006). Xanthos & Gillis (2010) refer to this metric, which is a type of type-token ratio, as the *Mean Size of Paradigm* (MSP). It is defined by the following ratio where $|F|$ represents the number of wordforms (types) and $|L|$ represents the number of lemmas (types) contained in a given sample.

(58) *Mean Size of Paradigm*

$$\text{MSP:} \quad = \frac{|\,F\,|}{|\,L\,|}$$

It is well established however that type-token measures such as MSP are dependent on sample size (Malvern, Richards, Chipere, & Duran, 2004; Tomasello & Stahl, 2004; Tweedie & Baayen, 1998). Xanthos & Gillis (2010) address this by proposing a measure of 'Normalised MSP'. This measure uses a method of statistical 'bootstrapping' (Baayen, 2008) in which a number of subsamples are taken from a given sample *without replacement* for which MSP is to be calculated. MSP is calculated for each of these subsamples. The mean value of MSP for this group of subsamples is then reported.

Criteria for determining the optimal size of the subsample *S* are not given by Xanthos & Gillis (2010) although they do provide some discussion of impacts to be considered when setting the value of *S*. Firstly *S* must be equal to or lower than the sample size of the smallest sample to be measured. If *S* is set to a larger number it will produce a value closer to the MSP of the entire sample. If *S* is set lower it will provide a better estimate of the variance of the sample. There is consequently a trade off in setting the value of *S* in terms of capturing variance of a sample and the diversity of the entire sample. The setting of *S* for the current study is discussed in §6.1.

Xanthos & Gillis (2010) propose that the number of subsamples *B* to be calculated should be a function of the size of the sample *N* and the size of the subsample *S*. The number of subsamples to be constructed is calculated as *B: = N/S* rounded to the closest integer. This is so that on average each token is only sampled once in the whole set of subsamples. This method however is too unstable for the current study as shown in §6.1. Instead a decision was made to set the number of subsamples to 100. This follows the approach of Malvern et al. (2004) who calculate inflectional diversity over 100 subsamples using their own measure. In terms of MSP this will have the effect of producing a more stable value of MSP particularly when the value of *B* is quite low as is the case in some instances. I adopt this adapted measure of *Normalised MSP* in order to quantify the development of inflectional diversity in classifier stem paradigms across the corpus (§6.1 & §6.2).

A number of recent studies investigating the acquisition of inflectional morphology by measuring inflectional diversity have proposed comparing 'matched' child and adult language samples (Aguado-Orea, 2004; Aguado-Orea & Pine, 2015; Krajewski et al., 2012). These aim to control for factors such as range of vocabulary, knowledge of inflections as well as sample size. Analysis is restricted to verbs which occur at least twice in both the matched adult and child samples. Furthermore only the use of inflectional morphology known to be used by children of this age is considered. This means that what is being evaluated is the flexibility of inflectional morphology known by the child compared with an adult sample, rather than attempting to evaluate the child's knowledge of a range of inflectional forms. This seeks to address the question of whether children's use of inflectional morphology is lexically restricted or used more proficiently in an adult like manner across a wider variety of words. The paradigmatic richness of the sample is evaluated by comparing the number of different inflections used per verb. The child's usage is then compared to that of the 'matched' adult sample. Although such an approach is not appropriate for the purposes of the current study, as it requires a 'matched' adult sample, it does nicely control for the impact of context on the use of inflectional morphology. The current study can however compare the diversity of classifier stem cell use across the focus children who are all recorded in relatively similar contexts. I consider how best to compare matched samples in this study in terms of controlling for lexical diversity in §6.2.

3.6 Acquisition of Bipartite Constructions

A central question to be addressed in this thesis is how children acquire Murrinhpatha bipartite stem verbs. As outlined in §2.2.3 the majority of verbs in Murrinhpatha are complex predicates with a bipartite stem structure composed of a portmanteau classifier stem and a lexical stem (Nordlinger, 2010b; Street, 1987; Walsh, 1976). Together these stem elements encode the semantics and argument structure of the verb. These verbs vary greatly in their morphosemantic transparency. While some stem combinations are transparent and semantically compositional other combinations are opaque. I seek to examine when children become aware of the bipartite nature of Murrinhpatha verbs and whether they construct verbs based on semantic compositionality, or whether classifier and lexical stem combinations are rote-learned and stored as single units (Ch. 7).

There has been no previous account of the acquisition of this sort of bipartite verb system in the literature. However, work on the acquisition of other bipartite construction types that share similarities with bipartite stem verbs may provide some insight into the acquisition of bipartite stem verbs in Murrinhpatha. Here, I consider research into the acquisition of compounding, light verb constructions, preverbs and separable verbs. These constructions are similar to Murrinhpatha bipartite stem verb constructions in that they are formed from two elements both of which contribute to the core semantics of the final word or phrase. In each of the construction types considered constructions range from those which are semantically compositional to frozen idiomatic combinations similar to Murrinhpatha bipartite stem verbs.

The first construction to be considered here, compounding, has received the most attention in the language acquisition field. Compounding is a word formation process where a single word is constructed of more than one free form typically from open word classes. Compounds are distinguished from phrases on phonological, morphological, morphosyntactic and semantic grounds, see Aikhenvald (2007). Study of the acquisition of compound word forms has tended to focus on N-N compounds and has predominantly been driven by studies in English (Clark, Frant Hecht, & Mulford, 1986; Clark, Gelman, & Lane, 1985; Nicoladis, 2002), although studies have been undertaken for a number of other languages including French (Nicoladis, 2002), Swedish (Mellenius, 1997), Hebrew (Berman & Clark, 1989), German (Dressler, Lettner, & Korecky-Kröll, 2010), Mandarin Chinese (Chen, 2008, 2016) Estonian and Russian (Argus & Kazakovskaya, 2013). Berman (2011) and Nicoladis (2007) have both provided overviews of research in this area which I draw on here.

A major aim of a number of compounding studies has been to ascertain when children acquire the ‘general principles’ of compounding in their language. Evidence of children’s understanding of compound structures is often considered to be illustrated by the production of novel compounds not found in the target language as well as children’s ability to understand novel compound structures. Furthermore research has sought to identify the relevant factors which explain differences in the acquisition of compound structures in different languages (e.g. Berman, 2011).

Children’s initial productions of compound wordforms are generally assumed to be unanalysed chunks (MacWhinney, 1978). These are frozen forms with no internal structure in the minds of children. The stage at which children become aware of the principles of

compounding in a specific language is argued to be dependent on the frequency and productivity of compound structures in the language being acquired (Nicoladis, 2007). If compounding is a relatively frequent word-formation process, as it is in English, children will begin to acquire the guiding principles of compound structures at an earlier age. Indeed English acquiring children are found to produce novel noun-noun compound structures in spontaneous speech before age 2 (Clark, 1981), this is also the case for Swedish acquiring children (Mellenius, 1997). By contrast children acquiring languages in which noun-noun compounding is less frequent such as Hebrew produce novel compounds later in development, in this case around age 5 (Clark & Berman, 1987).

Krott & Nicoladis (2005) and Nicoladis & Krott (2007) have also shown that children are sensitive to the frequency with which elements occur in compound structures. In studies of French and English acquiring monolingual children they asked children to explain existing noun-noun compounds. They found that children were more likely to use compound elements in their explanations when that element occurred frequently in noun-noun compounds. That is, when that element had a high type frequency in noun-noun compound structures. This is consistent with Bybee's network model of inflectional acquisition (1985, 1995) discussed previously in §3.5.2, which states that patterns with high type frequency are more salient for children. This suggests that the acquisition of the principles of noun-noun compounding are acquired in a piecemeal fashion with more productive patterns being acquired earlier.

Another factor which has been suggested to influence the acquisition of the principles of compounding is morphosemantic transparency (Argus & Kazakovskaya, 2013; Dressler et al., 2010). Compounds are considered to be transparent when their meaning is compositional, that is, it is clear what part of the whole meaning each element encodes. If the meaning of the word-form is only semi-transparent, for example it is unclear what the meaning of one of the elements is, this may make uncovering the principles of compounding more difficult. Transparency should of course be considered at both a local and system level. A language may have a small number of transparent combinations but many more semi-transparent or opaque compounds. In this respect the characteristics of the broader system will likely influence acquisition.

Berman (2011) has also argued that typological factors play a role in the acquisition of compound structures in addition to frequency and semantic transparency. In comparing the development of English and Hebrew children she notes that when children produce lexical

innovations English acquiring children favour juxtaposing two words whereas Hebrew acquiring children prefer to coin new words through affixation. She suggests this is in part due to the fact that English is a more isolating language whereas Hebrew is more synthetic. Consequently she argues that children are more likely to attend to the relations between words when acquiring English whereas children will attend more to relations 'inside' words when acquiring Hebrew (Berman, 2011, pp. 319–321).

Another structure that has been noted as being somewhat similar to the bipartite verbal systems of Northern Australia are the complex separable verbs of some Germanic languages (Schultze-Berndt, 2003). The acquisition of Germanic separable verbs has been investigated to some extent by Behrens (1998). This study examined the acquisition of 'particle' and 'prefix' verbs, where particle verbs (which include separable verbs) are those in which a separable particle combines with a verb root to encode verbal meaning such as English *ring up* or German *um-ziehen* 'to move residence' and where prefix verbs are verbs where an identifiable prefix cannot be separated from the verb root as in English *uncover* and German *be-sprechen* 'to discuss'. The acquisition of these complex structures was investigated for English, German and Dutch using longitudinal corpora of ten monolingual children between age 1;2 and 4;0 (Behrens, 1998). Behrens argues that "children must discover the compositional nature of complex verbs as well as the regularities underlying the resultant meaning, even if it is not fully compositional" (1998, p. 686) since adult proficiency requires the knowledge of productive patterns. It is also suggested that the more productive parts of the system, that is the parts of the system with many combinations and greater morphological transparency, are more likely to be stored as distinct elements.

The main findings of this study are firstly that the greater structural complexity of prefix and particle verbs does not delay production (Behrens, 1998). This is not surprising given that children's early productions of such forms are likely unanalysed chunks and consequently children aren't yet aware of their greater morphological complexity. This leaves open the question of when children acquire the underlying semantic compositionality of these verbs. Unfortunately this question is not readily explored by this study.

Secondly the frequency of complex verbs was found to impact acquisition similar to findings for compound constructions. For example in cases where the adult language has a substantial number of particle verbs children will also use a greater number of particle verbs. Interestingly, Behrens (1998) does not highlight children's production errors as was the case

in many compounding studies (e.g. Clark, 1981). It is however noted that two children produced novel prefix verbs towards age 4. This may suggest that the acquisition of semantic features associated with individual morphs of prefix verbs is only acquired after age four and therefore is not captured by this study. This is understandable given that prefix verbs in particular in these languages tend to be more opaque. This highlights the role of morphosemantic transparency in the acquisition of the principles underlying such structures.

The impact of structural complexity, frequency and semantic transparency on acquisition has also been considered in an investigation of the acquisition of Light Verb Constructions (LVC) in Persian (Family, 2009).[38] This study considers spontaneous production data from two children over a seven month period, aged 1;11 and 4;1 at the inception of data collection. Persian has around 120 simple verbs. The majority of verbal notions however are expressed by phrasal LVCs through the combination of a simple verb and a preverbal element which may be nominal, adjectival or prepositional.[39] Simple verbs in this environment are referred to as light verbs. The semantics of the resulting construction is often not the sum of its parts but may be semi-transparent or opaque. Similar to Murrinhpatha, these elements can co-vary resulting in differences in verb meaning. Light verbs may form *notional islands* where they may have a number of general meanings which can be identified across collections of associated constructions. Consider the following examples with the light verb *keʃìdœn* whose meaning as a simple verb is 'to pull'.[40] When the preverbal element is a smokeable substance or a smoking instrument as in (59), the resulting meaning is to smoke that substance or to smoke with that instrument. If however the preverbal element is something constructed along a path or perimeter as in (60) the meaning will be to build that structure.

[38] The acquisition of light verb constructions has been studied in other languages such as Cypriot Greek (Grohmann & Leivada, 2013) however these systems have less in common with Murrinhpatha bipartite stem verbs and consequently focus on different issues compared with those addressed here.
[39] This construction shares similarities with light verb phrases in Murrinhpatha as presented in §2.2, although light verb phrases in Murrinhpatha appear to have much greater semantic transparency (Mansfield, 2016).
[40] It cannot be assumed that a simple verb will have the same semantic denotation in both simple verb and light verb constructions.

(59) Persian Light Verb Constructions with Light Verb PULL (adapted from Family, 2009, p. 143)

a) hæʃiʃ keʃidæn
hash PULL
'smoke hash'

b) sigar keʃidæn
cigarette PULL
'smoke cigarettes'

c) pip keʃidæn
pipe PULL
'smoke a pipe'

(60)

a) jade keʃidæn
road PULL
'make a road'

b) divar keʃidæn
wall PULL
'build a wall'

c) nærde keʃidæn
fence PULL
'put up a fence'

This study found that LVCs were not acquired later than simple verbs despite their greater complexity, similar to findings for particle and prefix verbs in English, Dutch and German (Behrens, 1998). This study also considered children's errors and found that both children produced novel combinations of light verbs and preverbal elements considered to be errors in the adult target language (Family, 2009, pp. 146–149). These errors were however relatively rare in the corpus although a percentage is not reported. The older child produced 15 errors and the younger child just 4 errors of this type.

It was found that on occasion some light verbs were replaced by the most 'frequent and general' light verb *kærdæn* 'to do' (Family, 2009, p. 146). In the below example the child combines the light verb 'to do' with the word meaning 'somersault' to encode the meaning 'do a somersault'. However the correct LVC would use the light verb *zædæn* glossed as HIT. It is not clear however what the type or token frequency of the light verb HIT is. Also it should be noted that the frequency referred to by Family (2009) in relation to light verbs is based on the children's own productions rather than frequency counts resulting from a corpus of adult- or child-directed speech.

(61) 4;1.19 (Family, 2009, p. 146)

**nobæti*	*qaelt*	*mikonim*
turn.taking	somersault	PROG-DO.PRS-1P

'Let's take turns doing somersaults.'

The study also found evidence of the overgeneralisation of light verbs on semantic grounds. For example the older child innovatively combined the word 'beep' with the light verb COME to mean 'hear a beep'. This light verb however can only be used in this way to encode the perception of "basic non-tactile stimuli with no specified source or specific quality" (Family, 2009, p. 147). This shows that the child understands that the light verb can be used to refer to perception but has not yet learned the restrictions around what types of perception it can refer to. This example suggests that the child is aware to some extent of the semantics associated with the light verb. It also suggests they are constructing meaning from the two elements rather than treating all LVCs as rote-learned combinations. The study also finds that this type of 'productive capacity' is more prevalent in the older child suggesting that the uncovering of semantics associated with light verbs may take some time (Family, 2009). It appears however, that children mostly produce the expected combinations in light verb constructions and that overgeneralisations are limited due to the lack of semantic transparency in much of the system.

The acquisition of Georgian preverbs briefly discussed by Imedadze & Tuite (1992) is another area that deals with similar issues to light verb constructions, compounding and

separable verbs. Preverbs in Georgian are proclitics which attach to a verb stem. These are originally derived from nouns and adverbs (A. Harris, 2003). They can be used to encode locations or direction of motion and in such cases the choice of preverb is semantically motivated and transparent. However the meaning of many preverb-verb combinations is not predictable from the meaning of the individual parts (A. Harris, 2003). Preverb-verb combinations in these instances must assumedly be rote-learned by children. Consequently, similar to the acquisition of light verb constructions in Persian, the variation in semantic transparency across the system may lead to variation in the acquisition of certain preverb-verb combinations.

Based on diary studies Imedadze & Tuite (1992) report that children frequently produce preverb-verb combinations that do not occur in the adult language, although it is unclear just how frequent such errors are. These errors are argued to be due to analogy with existing forms. In the following example a child produces an innovative preverb-verb combination ‘up-covering’ meaning ‘to cover up’, in opposition to the acceptable combination ‘down-covering’ meaning ‘to uncover’. This suggests that children are aware of the semantic principles which guide at least the transparent part of the system.

(62) (Imedadze & Tuite, 1992, p. 68)

Ke [3;2;18]: *saban-is* *da=χureba-Ø* *ar* *i=c=i=s,*
blanket-GEN covering-NOM not know:3sgS:3O:PRES
da ***a=χureba-Ø*** *ar* *i=c=i=s* (K:75)
and “uncovering”-NOM not know:3sgS:3O:PRES
‘He doesn’t know how to cover himself with a blanket or how to uncover himself’.

Imedadze & Tuite also cite previous research that finds that when verbs are able to combine with a variety of preverbs children will use the combination ‘most familiar to them’ in place of other combinations (Choloqashvili-Karchauli, 1960). This suggests that children may initially be unaware of the semantic role of the preverb and may instead focus on the core meaning of the verb rather than the modification by the preverb. Further study is needed to determine how the varying semantic transparency and frequency of preverbs may impact

acquisition. It does appear however that, at least for some combinations, children are aware of guiding combinatorial principles and that meaning may be constructed rather than being associated exclusively with rote-learned combinations.

The findings of the studies surveyed above identify a number of factors that may influence the acquisition of Murrinhpatha bipartite stem verbs. Three main factors were examined, namely 1) the frequency of a given structure within a language, 2) the combinatorial type frequency of individual elements in the relevant construction and 3) the morphosemantic transparency of the relevant construction. In terms of the first factor the majority of verbs in Murrinhpatha have a bipartite stem structure. Therefore we can expect that the greater morphological complexity of these verbs compared with simple verbs will likely not delay their acquisition. Indeed since children likely initially treat these structures as unanalysed chunks these structures will not yet have greater morphological complexity for children.

With regard to the second factor the type frequency of certain classifier and lexical stems will likely play a role in acquisition. Individual classifier and lexical stems vary greatly in terms of their flexibility, see §2.2.3, and thus it is expected that the compositional nature of bipartite stem verbs will first be acquired for combinations with flexible stem elements. Furthermore we might anticipate that particularly frequent and semantically transparent classifier stems may be overgeneralised as they are flexible and have relatively general semantics similar to findings regarding the acquisition of light verb constructions in Persian (Family, 2009).

The final factor of morphosemantic transparency raises a number of questions for the acquisition of Murrinhpatha considering that many stem combinations can be described as semi-transparent or opaque. This may mean that uncovering the compositional nature of productive parts of the system is delayed compared with a hypothetically more uniform transparent system, or that these principles are learned differently for different parts of the same system. Indeed the studies of Persian light verb constructions (Family, 2009) and Georgian preverbs (Imedadze & Tuite, 1992) highlight the impact morphosemantic variability can have on acquisition with suggestions that some parts of the system may be compositional but a certain amount of the system must be rote-learned. This issue of productivity was also highlighted in approaches to the acquisition of inflectional morphology where inflectional patterns ranged from transparent and regular to irregular (Bybee, 1995;

Prasada & Pinker, 1993; Stoll, 2015). The question for the acquisition of Murrinhpatha bipartite stem verbs is when children become aware of the regular part of the system and ultimately whether such forms are processed in a different way to lexicalised combinations.

The studies considered here have also highlighted the importance of errors of commission as evidence of knowledge of underlying combinatorial principles or patterns (Berman, 2011; Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). Children were found to overgeneralise the semantically more general element of certain systems, such as preverbs in Georgian and light verbs in Persian, on the basis of semantics associated with these elements or on the basis of frequency of these elements (Family, 2009; Imedadze & Tuite, 1992). This leads to the question of whether children acquiring Murrinhpatha produce innovative stem combinations and what factors drive such productions. Such combinations will provide evidence as to whether children are aware, to some extent, of the compositional semantic nature of Murrinhpatha bipartite stem verbs. I will also consider the extent to which children are able to co-vary stem elements to encode differences in meaning and what types of differences in meaning are the first to be acquired. These questions are addressed in chapter 7.

3.7 Thesis Outline & Research Questions

This chapter has outlined research in first language acquisition relevant to this thesis. Firstly it has provided a brief recent history of projects focused on a crosslinguistic typological approach to the study of acquisition and the importance of findings from less-studied languages (§3.1) before focusing on the acquisition of verbs more specifically. It has considered findings related to children's initial verb productions, both in terms of the initial truncation of verb forms and omission of verbal elements (§3.3) and their semantics (§3.4.1) and pragmatics (§3.4.2). It has also presented various findings regarding the acquisition of inflectional morphology and highlighted problems presented for various theories when accounting for the acquisition of morphologically complex languages, particularly for languages with extensive paradigmatic richness and irregular or semi-regular morphology (§3.5). I have also briefly considered methods used to quantify children's morphological development such as Normalised MSP (Xanthos & Gillis, 2010) and the use of 'matched' samples (e.g. Krajewski et al., 2012) (§3.5.4). Finally despite the lack of acquisition studies of bipartite stem verbs I have presented findings from the acquisition of other types of

constructions which share some similarities with Murrinhpatha bipartite stems verbs including compound word structures (Berman, 2011), Persian light verb constructions (Family, 2009), German separable verbs (Behrens, 1998) as well as Georgian preverbs (Imedadze & Tuite, 1992) (§3.6).

In the remainder of this thesis I first present the methodology used for this study. Chapter 4 lays out the motivation for and implementation of a 'semi-naturalistic' longitudinal study of children's Murrinhpatha acquisition conducted in Wadeye (Northern Territory, Australia). It highlights issues associated with conducting such a project in a location with which the researcher is not familiar and with a language that the researcher does not speak. Many of these issues, although somewhat generalisable, are local ones that were dealt with on a daily basis by myself, research assistants, participants and their families. I examine the notion of 'best-practice' research with regard to the broader field of first language acquisition, the specific context in which this study was undertaken and my own background as a 'researcher'.

Chapter 5 focuses on children's early verb productions predominantly between the age of 1;9 and 3;0. I initially focus on the shape of children's early verbs. It has been identified for many languages that children initially truncate their early verb productions (e.g. Demuth, 2006) as discussed in §3.3. This is a particularly pertinent question for children acquiring polysynthetic languages where verbs can be long polymorphemic words. In particular it has been found that children may initially omit inflectional morphology and preserve stem morphology leading to the production of bare stems in some languages including those which are morphologically complex. I consider what children preserve and what they omit from their early verb productions in Murrinhpatha. I then evaluate the ability of various approaches and factors which may be driving these tendencies such as perceptual salience (e.g. Slobin, 1985), prosodic licensing (e.g. Demuth, 2001) and morphosyntactic factors (e.g. Salustri & Hyams, 2006; Wexler, 1998) to account for the empirical findings (§5.1).

I then consider the semantics and pragmatics of children's early verb use (§5.2). I investigate whether or not children's early verbs tend to be semantically 'light' general-purpose verbs, as has been claimed for English (e.g. Clark, 1993). I also address whether simple verbs, which tend to have more general semantics, are acquired earlier than bipartite stem verbs. In English children's early verbs have been claimed to be used for a limited

number of functions (e.g. Huttenlocher et al., 1983). This includes use as directives to make requests for action and attention from a hearer as well as commissives which encode the impending action of the child (e.g. Naigles et al., 2009). With the help of a speech act framework I examine the types of functions children encode through their early verb use and whether verbs tend to be used for certain types of functions (§5.2). I finally consider whether the types of functions typically encoded by early verbs influence the types of verb constructions children acquire (§5.2.3).

Chapter 6 addresses the question of how children acquire large verbal paradigms by focusing on the acquisition of Murrinhpatha classifier stem paradigms. In §6.1 and §6.2 I initially focus on quantifying the development of inflectional diversity across the corpus using an adapted measure of Normalised MSP (Xanthos & Gillis, 2010). This is achieved through the use of a 'matched' sample which restricts analysis to a small number of frequent and flexible classifier stem paradigms. Through the analysis of this sample I consider whether certain parts of classifier stem paradigms are learned first or whether development is more sporadic (§6.2.2). Specifically are certain subject or TAM categories encoded in children's verbs earlier than others? I also consider the ability of various approaches concerning the acquisition of morphology (e.g. Bybee, 1995; Pinker & Prince, 1991) to account for the development of CSPs identified (§6.5). In §6.4 I briefly examine whether certain classifier stem paradigms may act as morphological pathbreakers, see §3.4.1.1, in the sense that they show greater inflectional diversity.

Chapter 7 examines children's contrastive use of bipartite stem morphology. It focuses on children's use of classifier stem paradigms with different lexical stems and considers whether there is evidence that children construct verb semantics and argument structure from these two stem elements or whether these are learned as single linked elements. In examining contrastive use I also consider the overall structure of the bipartite stem system exploring whether children acquire more productive parts of the system in a different or similar way to parts of the system which are more idiosyncratic (§7.2). I also explore children's errors of commission with regard to bipartite stem combinations (§7.3). These types of errors including the overgeneralisation of stem elements and the production of novel stem combinations provide the clearest insight into children's understanding of the semantic compositional nature of bipartite stem verbs.

Finally in Chapter 8 I relate the findings of the previous three chapters to current debates in language acquisition. I present areas where this research provides new insights into current understanding of the acquisition of verbs and verbal morphology and also suggest some problematic issues for some current theories. This chapter evaluates the limitations of this study and provides suggestions and questions for future research, particularly in relation to the acquisition of Murrinhpatha verbal morphology, arising from this thesis.

4 Methodology

In order to best account for how children acquire language the field of first language acquisition needs to consider findings from a broad and typologically diverse range of languages and socio-cultural learning environments (Bowerman, 2011; Evans & Levinson, 2009; Lieven & Stoll, 2013a; Slobin, 1985; Stoll & Bickel, 2013a). For a crosslinguistic and crosscultural approach to be successful there is a need for findings to be comparable across studies and ultimately replicable. Ideally in order to examine the impact of different languages and learning environments on acquisition the same detailed stringent methodology would be used across studies so as to determine what about acquisition is universal and what is linguistically or culturally specific. This requires the development of 'best-practice' methodologies for acquisition research.

A common methodology utilised when studying a language which is yet to be considered from an acquisition perspective is the construction and analysis of longitudinal naturalistic corpora (Demuth, 1996a). This methodology has been used widely in the field to address a wide variety of questions including the acquisition of morphology (e.g. R. Brown, 1973). Recently Stoll and Lieven (2013a, p. 22) reported that there were longitudinal corpora

of 'naturalistic speech' for 34 different languages available through the CHILDES database. [41] The benefits of such an approach are that it provides an accurate representation of how children use language in specific contexts in day-to-day life and can be used to investigate many aspects of acquisition. This is particularly useful when little is known about the acquisition of a language as designing methods to address specific questions is difficult without a broader picture of acquisition of the specific language. The drawbacks of this approach include that the development of such corpora is very time-consuming and likely only represents a relatively small sample of what a child hears and produces.

Through the consideration of several studies it is clear that there are expectations about what constitutes a 'best-practice' longitudinal methodology (Kelly et al., 2015). These include expectations about the number of focus children in a study, the age of children, the regularity of data collection, the environment/s used for data collection and the size of the corpus. A useful overview of the various methodological decisions which must be made when constructing longitudinal corpora is given by Demuth (1996a). Findings from a diverse range of languages and contexts are welcomed by the field, however, research conducted in remote communities with languages not shared by the researcher pose a number of challenges for 'best-practice' research (Kelly et al., 2015; Kelly & Nordlinger, 2013). These challenges need to be addressed when designing methods in less traditional research contexts. This ultimately raises the question of whether what is 'best-practice' in one context will also constitute 'best-practice' in a different linguistic and cultural environment. In this chapter I present the methods used in this thesis. These methods are presented in light of 'best-practice' methodologies of the field, the social and linguistic context of Wadeye as well as my own background as a 'researcher'. Based on these influences I propose a modified approach to more traditional 'best-practice' methods, also detailed in Kelly et al. (2015), which were essential to the viability and success of the study.[42]

4.1 Brief Study Overview

This study was undertaken in the remote indigenous town of Wadeye (pop. ≈ 2700) (Taylor & Ivory, 2013) in Australia's Northern Territory. Wadeye lies at the end of a 200km long dirt

[41] http://childes.psy.cmu.edu/

[42] For other recent examples of the collection of child language data in Australian Indigenous contexts see the following (Disbray, 2008; Meakins, 2011; Moses, 2009; O'Shannessy, 2006).

road which becomes impassable during the height of the wet season (generally December to April). During these times the town is serviced by daily light plane flights and a barge freight service. Murrinhpatha is the main day-to-day language of the vast majority of residents and is acquired as a first language by the majority of indigenous children, for more details of the historical and sociolinguistic context see §1.1. While Murrinhpatha has been the focus of growing linguistic description it is still best categorised as 'underdescribed' as detailed in chapter 2. Adult residents in Wadeye have mixed levels of English competency. Although a number of people are literate in both English and Murrinhpatha, in general literacy levels are low and those with high literacy skills are in high demand from several organisations. Wadeye's indigenous population typically live in extended family groups in overcrowded housing. Temporary visitor accommodation in Wadeye is limited and what does exist is very expensive.

This thesis, which forms part of the Language Acquisition Murrinhpatha (LAMP)[43] project, focuses on the acquisition of Murrinhpatha by five focus children over a two-year period. The children were aged between 1;9 and 4;3 at the commencement of data collection. I undertook data collection and transcription with the assistance of several research assistants in Wadeye over five fieldtrips, of which the final fieldtrip was dedicated solely to transcription and clarification of past transcription and analysis. These field trips were typically 2 to 3 months in length and were spaced at semi-regular intervals. I aimed to record focus children on at least 2 occasions per field trip with children on average recorded on 12 occasions over the life of the project. I collected a total of 41 recordings over the course of this project of which 33 involved the focus children. All sessions were video and audio recorded. The methodology adopted in this thesis can be described as a staggered longitudinal study of semi-naturalistic speech. It is longitudinal in that the same focus children were recorded at intervals over an extended period so as to enable the analysis of language development in an individual. It is staggered in the respect that the focus children were from a broad age range at the beginning of data collection. It involves the recording of 'semi-naturalistic speech' to the extent that participants were recorded interacting in familiar contexts with little input from the researcher as to how to behave. There were however some

[43] http://languages-linguistics.unimelb.edu.au/research/projects-lamp

restrictions placed on recording environments (§4.5). The methods used and why these particular methods were used are now described in greater detail.

4.2 Relationships

It is important to remember that acquisition research, particularly in small remote communities, requires the involvement and co-operation of participants, their families and the broader community. This means that the methodology utilised must be respectful and sensitive to the environment in which it is being undertaken. Central to this is that researchers are also aware of their own identities and their relationship with the community and research participants. This type of research is not possible without the building and maintenance of positive relationships and the recognition of linguistic and cultural differences between 'outsiders' and 'community members'.

I am a young[44] Anglo-Australian male who has lived most of his life in Melbourne, Australia's second largest city in the country's south-east. Before beginning my data collection in Wadeye I had neither visited the Northern Territory nor an Indigenous community. Furthermore my contact with Indigenous Australians had been minimal. In order to prepare for fieldwork, before travelling to Wadeye, I had a number of useful discussions with several people, in particular Rachel Nordlinger, who had worked in similar environments and in Wadeye specifically. For my first fieldtrip I was initially accompanied by Joe Blythe, a linguist who had previously worked in Wadeye over a number of years. Joe helped in introducing me to many people and showing me around Wadeye. At this time we engaged a primary Murrinhpatha research assistant (RA) Carla[45], a grandmother, who had worked with several members of the LAMP research team over a number of years. Carla helped to facilitate discussions with various community stakeholders about the aims of the broader LAMP project and to gain 'community approval' from relevant representatives. Carla also facilitated the recruitment of focus children and their families, explained the project in Murrinhpatha and helped to gain informed consent from participants. She also helped to run recording sessions and assisted in transcription. Without the pre-existing connections

[44] I was 24 years-old when I commenced data collection in July 2012.
[45] Pseudonym

between researchers and various local Indigenous people and the support of the primary RA it is unlikely that this project would have been as successful.

Typically I conducted fieldwork in Wadeye without other non-local members of the research team. I worked with participant families and several local RAs in both data collection and transcription. The nature of this project meant that I was required to have working relationships with the mothers of the various focus children. These were young women of a similar age to me. It was culturally inappropriate for me to spend time alone with these women. Consequently initially all my contact with these women was through the primary RA who was a mother or mother-in-law of these women. Over the life of the project these women have become more comfortable in interacting with me, however, during transcription and recording sessions it was always important that there be another adult present as discussed in §4.5 and §4.6.

In addition to working with multiple adults at a time, I also fostered positive working relationships by spending time interacting with the participant families in a non-work environment. This included giving people lifts around town in the project vehicle, going on fishing trips and socialising in front of the shop. The more familiar and comfortable the families became with my presence, the easier work became. The development of these relationships is reflected by the make-up of the RA transcription team. During my first fieldtrip I did not do any transcription work with any of the mothers of focus children and by the end of the fourth trip I had done transcription with four.

The importance of fostering positive relationships with the participant families cannot be underestimated. Through these interactions people gained a greater understanding of the aims and nature of the project. It was often difficult to fully convey the aims of the project initially as it was not always clear to people why someone would be interested in investigating the speech of children. Discussions in the car and on fishing trips continued to build on understanding of the research throughout the life of the project. As these people developed a greater understanding they were able to disseminate this information through their own broader networks. I also learned a great deal about Wadeye and the participants through these relationships and was gifted with opportunities to facilitate my own acquisition of Murrinhpatha. Maintaining these relationships was and continues to be the most important methodological consideration to the health and success of this project.

In other studies in remote communities the building of close positive relationships has been achieved through the researcher living with one of the participant families (e.g. de León, 2007b). This was not possible in this context as there is limited housing in Wadeye and these houses are typically overcrowded (Taylor & Ivory, 2013). Furthermore houses are private family domains which are not generally accessed by non-family members. This meant such a housing arrangement in addition to being impractical would have also been culturally inappropriate. The private nature of these spaces also meant that they were not appropriate spaces for recording as discussed in §4.5.

4.3 Focus Children

A key consideration in the building of longitudinal corpora is the age and number of children to be included in a study. Demuth (1996a) notes that it is important to include a number of children to account for individual variation in development. It may also be necessary to initially include more children than required. This is particularly the case in Indigenous Australian contexts where families may move at various times of year for cultural and familial reasons. This has been an issue for other projects collecting child language data in remote Indigenous Australian contexts (e.g. Moses, 2009). With regard to the age of children, when considering the acquisition of morphology Demuth (1996a) suggests beginning with children before age 2 with rapid development likely between the ages of 2 and 3. However, when little is known about the acquisition of a particular structure a broader age range may need to be considered.

This study is focused on the language development of five focus children over a two-year period. This is a relatively standard sample size for longitudinal studies (Kelly et al., 2015). These children were aged between 1;9 and 4;3 at the beginning of data collection on the 10th of July 2012 as shown in Table 13. The decision for children to be recruited across this age range was made to ensure that the resulting corpus captured a broader picture of language development than if all children were the same age. The total age breadth contained in the final corpus ranges from 1;9 to 6;1. This age breadth was important since little was known about Murrinhpatha acquisition before the commencement of data collection. It also allowed for the recruitment of children who were all grandchildren of the primary RA which helped to facilitate data collection and transcription. Similar staggered longitudinal approaches have been adopted by other studies for similar reasons (Allen & Crago, 1996;

Rose & Brittain, 2011). The drawback of such an approach is that data at either end of the age scale is relatively sparse.

Table 13. Age of Focus Children at July 10th 2012

Focus child[46]	Age at July 10th 2012	Gender
Acacia	1;9	F
Emily	2;3	F
Nathan	3;2	M
Mavis	3;7	F
Molly	4;3	F

Initial recruitment of focus children and their families was facilitated by the primary RA Carla. This enabled data collection to begin relatively quickly. During the initial field trip 15 children aged from 1;9 to 8;4 participated in recording sessions. A larger number of children were recorded on the first trip for two reasons. Firstly it meant that after the first trip I was able to have some understanding of how bipartite stem verbs were being used across a variety of ages. Secondly it ensured that a larger pool of children were available to participate in future data collection as focus children, as it was anticipated that there may be a high attrition rate of participants throughout the project due to people moving away from Wadeye for various cultural and familial reasons. This in fact was not the case, with the vast majority of children recorded during the first field trip remaining predominantly in Wadeye for the majority of the data collection period from July 2012 to June 2014.

Six focus children were selected from the initial pool of fifteen on the basis of age as well as how well they and their families worked with the project during the initial field trip. One of these children, Adam aged 2;0 at the commencement of data collection, was eventually excluded from the study as his language development was delayed in comparison to other children of a similar age. Data collection was however continued for this child over the life of the project and I do briefly consider some data from Adam in chapter 7. The

[46] All participant names are pseudonyms.

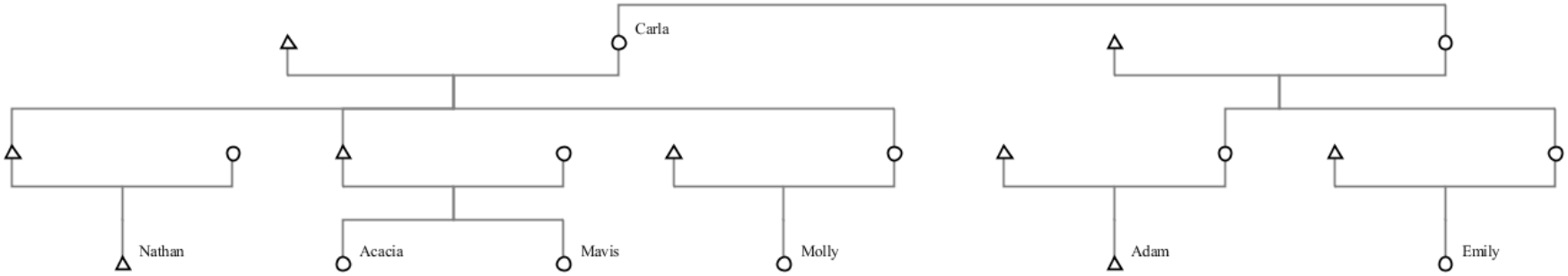
remaining five focus children provide a good representative spread across the age range being investigated.[47]

The five focus children were all grandchildren of the primary research assistant Carla. Figure 5 below shows a truncated family tree illustrating the kin relationships between the focus children and their relation to Carla.[48] This meant that all focus children knew each other and each other's families well allowing for them all to participate in 'natural' recordings with one another. The decision to choose these children also meant that RAs involved with transcription of recordings, typically mothers and grandmothers, were familiar with the idiosyncrasies of each child's speech. RAs were also aware of information concerning events and people that the children discussed. For example when one child referred to *kikmun* (beeswax) while making car noises this was easily identified as the name of a car well-known to this group of families.

Despite the close familial ties and the fact that extended family groups tend to live in similar parts of town not all the focus children lived in the same area. Three of the children resided predominantly in Nilinh, a small suburb of around twenty properties located a short walk from the Wadeye town separated by the airstrip, boarding school, bushland and a sports oval commonly referred to as chicken oval. One child lived predominantly in the area of town between the shop and chicken oval. The two remaining children lived predominantly in the part of town known as bottom camp and in Nilinh. It was not uncommon however for these children to visit and sleep at other relatives' houses throughout town. A potential drawback to the selection of these closely related focus children is that the language development documented is only of a small section of the larger town rather than providing a more representative sample. I believe that this decision is well justified. Working with a closely linked network of families has greatly aided the often arduous processes of recording and transcribing. It has enabled all participants to be involved in varying combinations during recordings (see §4.5) and it has also allowed this group to take some ownership and pride in the greater project.

[47] The ages of children were determined by consulting local church records.
[48] Many people have been omitted from this tree and it is by no means comprehensive for the generation levels shown.

Figure 5. Kin Relations of Focus Children



4.3.1. Otitis Media in Indigenous Australia

Another consideration in the recruitment of focus children was the health of their hearing given high rates of otitis media in populations of Aboriginal and Torres Strait Islander children especially those from remote communities (Australian Institute of Health and Welfare, 2011). Otitis media, also known as 'glue ear', is an infection of the middle ear common in early childhood. Concurrent with episodes of otitis media are periods of mild-to-moderate hearing loss which can be present for a few weeks to a few months (Williams & Jacobs, 2009). In children with recurrent otitis media this may impact their language development given that this will impact the way in which they perceive linguistic input.[49]

Given the potential impact of otitis media on language development it might be assumed that children with a history of infection be screened out of this study. This was not done as the rates are so high, that recruiting focus children with 'normal hearing' would have been difficult and this cohort would have not been representative of the wider population. In a survey of indigenous children aged between 6 to 30 months from four health regions in the Northern Territory it was found that only 20% were likely to have 'normal hearing' and to not require medical or audiological treatment (Morris et al., 2005). It is estimated that between the age of 2 and 20 Australian Indigenous populations will experience otitis media for an average of 32 months compared with 3 months for the non-indigenous population (Couzos, Metcalf, & Murray, 2001). This means that for children acquiring Murrinhpatha it is more typical for a child to have a history of otitis media than to have 'normal hearing'. Consequently focus children's history of ear infection was not considered in this study.

Recent research has considered the impact of hearing loss associated with otitis media on the perception of the phonologies of Australian languages (Butcher, Stoakes, Fletcher, & Tabain, 2013). These studies find that Australian Indigenous languages may be easier to perceive for people with hearing loss associated with otitis media than Standard Australian English. This is because Australian languages typically have 'long and thin' consonant inventories which typically lack a voicing contrast in the stop series and lack contrastive fricatives (Fletcher & Butcher, 2014). Voicing and fricative contrasts are difficult to perceive for people with otitis media. Consequently periods of hearing loss may have a greater impact

[49] Findings as to whether otitis media impacts Indigenous children's language development have been mixed (Williams & Jacobs, 2009). This may in part be due to the fact that these studies tend to assess children's development in Standard Australian English (SAE) which is often not the first language of these children.

on children's acquisition of Standard Australian English than on the acquisition of Australian Indigenous languages (Butcher et al., 2013). This raises the question of whether rates of otitis media were also high before colonisation and whether the sound systems of Australian languages have evolved in response to the rates of periods of hearing loss in their speaker populations (Butcher et al., 2013). Murrinhpatha, similar to other Australian languages, lacks a contrastive fricative series but unlike many Australian languages does have a voicing contrast in its stop series (§2.1). Periods of hearing loss may therefore have some impact on children's acquisition of Murrinhpatha with regard to the voicing contrast although this requires examination. It does however seem likely, that hearing loss will have a greater impact on children's ability to acquire Standard Australian English once at school compared with Murrinhpatha, particularly with regard to the contrastive fricative series of English.

4.4 Fieldtrips & Recording Schedule

Longitudinal studies vary in terms of the amount of data they collect, the time period over which they collect data and the regularity of individual recordings (Kelly et al., 2015). Where it is possible to train and employ local language users to record, transcribe and annotate data, large amounts of data can be collected. For example in documenting language development in Chintang, spoken by around 6,000 speakers in Eastern Nepal, four children were recorded for around four hours per month over an eighteen month period with the help of locally trained RAs (Stoll et al., 2012). This was not possible in this context for a number of reasons. Firstly, all transcription had to be conducted in the field by me and a local RA as described in §4.6. This meant my time in the field had to be balanced between both recording and transcription. Secondly, both the lack of appropriate accommodation and the remoteness of the town itself meant that my time spent in the community was limited. Thirdly, the task of employing and training a local research team would have been difficult, time-consuming and costly given the paucity of highly literate people able to commit to such a project and the high costs of labour compared to countries like Nepal.

Data collection for this study was undertaken across four fieldtrips to Wadeye over a two year period from July 2012 to June 2014. These trips ranged from two to three months in length and were spaced at semi-regular intervals. There was a significantly larger gap of 6 months between trips 1 and 2. This was done in order to avoid the height of the wet season

from December to April. Because recording was conducted largely outside (§4.5.2), data collection was not viable during these months and the noise from heavy monsoonal rains would have made transcription of recordings difficult. I conducted a final fieldtrip during July-September 2015 to undertake further transcription and to clarify previous transcription and analysis. During these trips I stayed by myself or with other researchers in private rental accommodation and in school housing for the final fieldtrip.[50] This schedule was also adopted so that the corpus would capture a larger period of development as opposed to collecting data during a single extended field trip. This was important given the lack of previous research concerning the acquisition of Murrinhpatha. This schedule also allowed me to spend time between field trips re-listening to recordings, refining transcriptions and beginning to morphologically analyse and code the collected data. This schedule is similar to O'Shannessy's (2006) collection of children's spontaneous speech in the remote Australian community of Lajamanu.

Table 14. Fieldtrip Schedule

Trip	Period	Tasks
1	July-September 2012	Recruitment, Data Collection, Transcription
2	April-June 2013	Data Collection, Transcription
3	October-December 2013	Data Collection, Transcription
4	April-June 2014	Data Collection, Transcription
5	July- September 2015	Transcription, Clarifications

Each focus child was recorded on at least two occasions during each data collection fieldtrip with the exception of Emily who was only recorded on one occasion during fieldtrip two. These recordings were typically between half an hour to an hour in duration as outlined in §4.5. On average children participated in 12 sessions each over the two year period. Recordings were made at the beginning and middle of field trips to allow for transcription work to be done with a RA whilst in the field (§4.6). In total 41 recordings were made over

[50] Accommodation was sourced through Thamarurr Development Corporation, the Victoria Daly Shire Council, the Kanamkek Yile-Ngala Museum and the Our Lady of the Sacred Heart Thamarrurr Catholic College.

the course of this project of which 33 involved interactions including the final five focus children. These 33 recordings resulted in 2064 minutes of recorded interaction of which approximately 732 minutes was eventually transcribed. More recordings could have been made during this time but this would have reduced the time available for transcription and resulted in less data being transcribed and available for analysis.

In terms of a recording schedule, studies typically space recordings at regular intervals such as weekly or monthly (Kelly et al., 2015). In this context however recordings were largely made spontaneously and a strict schedule was not adhered to.[51] I found that it was largely ineffective to pre-schedule recordings with most participants. When I attempted to pre-schedule recordings one or more of the participants would often be unavailable when it came time to record. Consequently the recording schedule had to be highly flexible. If I had tried to enforce a more rigid schedule this would have resulted in less data being collected and frustration for both me and the study participants. When making recordings and doing transcription I would begin the day by driving to the homes of participant families and giving them lifts to the shop. I would first visit the homes of people who I wanted to participate in either recording or transcription. When I needed to do recording I would ask if the relevant focus children and caregivers were available. If the necessary participants were available then we would make a recording that morning. In this context I believe it was essential to have a flexible approach to data collection as this better reflects and accommodates the day-to-day lives of the participants.

4.5 Recording Environments

When aiming to record 'naturalistic' interaction a number of decisions must be considered regarding the location of the interaction and the number and type of participants. These decisions need to take into account what types of scenarios and activities are 'natural' for the participants and are likely to generate 'typical' interactions. Furthermore, consideration needs to be taken regarding how an interaction will be recorded and to what extent the product of recording can be easily analysed. Many longitudinal corpora have examined the interactions of mother-child dyads in contexts which maximise the audibility of the child's speech such as

[51] It should be noted that O'Shannessy (2006) has had success in making weekly spontaneous recordings in a similar context.

playing at home or in recording labs at research institutions (Lieven & Stoll, 2013b). However such interactions are not typical of everyday life for many cultures and are therefore not 'naturalistic' (Demuth, 1996a; Kelly et al., 2015). Another approach has been to impose no restrictions on recordings apart from the focus child being alert as was done in the documentation of children's Chintang (Stoll et al., 2012). This type of approach will likely be much more difficult to effectively record and analyse.

In designing recording environments the following factors were taken into account. People in Wadeye tend to spend time in large extended family groups with a mixture of individuals across generations. The care of a particular child appears not to be the responsibility of a sole individual but is shared throughout the group. Children additionally spend a large amount of time interacting in their own peer group and this likely becomes more important as children grow older. People spend a large amount of their time outside, either in town around the shop, on the verandas of houses or out bush. The insides of homes are quite private areas not appropriate for researchers to access. Given these characteristics it was important that data collection was conducted with groups larger than caregiver-child dyads and that data collection not take place inside participants' homes.

Recording environments also needed to provide interactional data that could be easily transcribed. Furthermore, ideally recordings needed to contain a substantial amount of speech from the focus children themselves given this study's focus on production data. This meant that recording environments required quiet locations for recording and that participant numbers needed to be limited to some extent to reduce speaker overlap, which is difficult to transcribe, and to ensure the focus children had enough opportunity to speak. In recordings with many older more competent speakers the focus children tended to speak less. Each recording typically included more than one focus child to reduce the overall amount of recording and transcription.

Two recording environments were utilised during data collection, the *Mulurn-patha* and *bush-based* which are detailed momentarily. Taking the above considerations into account the environments aimed to:

- Limit participants to 3-8 people (including two focus children)
- Provide a quiet location for recording

- Provide a location in which the participants were relaxed and comfortable
- Be enjoyable for participants
- Encourage 'natural' spontaneous interaction amongst participants
- Provide an environment in which a researcher could also be present

In addition to these two environments Joe Blythe and I initially trialled recording interactions outside participants' homes as has been utilised in other similar studies (Lieven & Stoll, 2013a; O'Shannessy, 2006). This approach was quickly abandoned as it attracted many passers-by and resulted in many multi-party conversations which were both difficult to record and transcribe. Also, as mentioned above, such large group interactions typically resulted in less speech from the focus children.

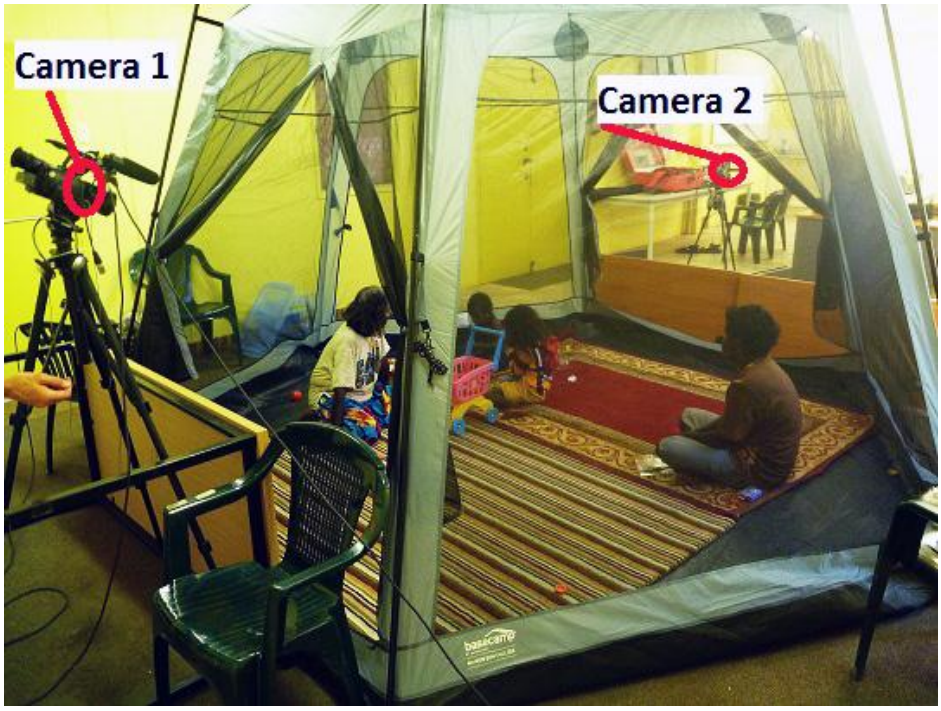
4.5.1. *Mulurn-patha*

The first environment trialled in early recordings was a 'portable baby lab' nicknamed the *Mulurn-patha* (lit. good shade).[52] This was a large tent that was set up in a room and lined with carpet to reduce noise. The tent was used to create a fun safe space for kids within a large space not well suited for recording. The two cameras were setup at each doorway and the entrances were barricaded with tables and chairs in order to prevent children from 'escaping'. This setup is pictured below.

These recordings involved two focus children and typically two to three caregivers. The caregivers were provided with a selection of toys that they and the children could play with. These included toys relating to scenarios with which the children were familiar such as visiting the doctor or shop as well as less context-restricting toys such as play-dough and building blocks. These sessions ranged from 20 to 50 minutes in length with most sessions lasting approximately 40 minutes. The use of similar toy stimuli has been used by Aboriginal Child Language Acquisition Project (ACLA) researchers collecting child language data in other remote Australian Indigenous contexts (Disbray, 2008; Meakins, 2011; Moses, 2009; O'Shannessy, 2006; Simpson & Wigglesworth, 2008).

[52] This witticism comes from the mind of Joe Blythe.

Figure 6. *Mulurn-patha* Recording Environment



Caregivers were initially not particularly talkative with the children when playing with the toys. When adults did speak often this involved prompting children to name different toys. This was not desirable for the purposes of this study as very few verbs, if any, were used by children. Furthermore these interactions did not seem to be particularly 'natural' for the participants. By comparison older siblings, when present, were great at generating interesting interactions with the smaller children. Although the data collected in this environment was not always particularly useful for addressing my research questions directly it proved invaluable in providing an introduction to the nature of the project for participants in a reasonably quiet, contained location within the town. It allowed new participants to become comfortable working with me and being recorded. In the early stages of data collection many participants preferred to stay in town for recording. This environment paved the way for the success of bush-based recording which formed the basis for the majority of data collection.

Ultimately the *Mulurn-patha* was not continued with both because it was a somewhat unnatural and unfamiliar context for participants and because it was time-consuming. Parents and caregivers do not typically spend time with children in one-on-one interactions playing

with toys. Participants tried to do what they thought was expected of them but this resulted in what seemed to be rather unusual and often stilted interactions. This highlights that what may be considered 'friendly' and 'familiar' in one culture can be altogether foreign in another. This approach was also time-consuming as the room in which the tent was erected was a shared space used by the local Night Patrol[53] and for some town meetings. This meant that the lab had to be constructed and deconstructed for each recording. This was a laborious task, especially considering that participants would not always attend scheduled recordings. This environment was also easily disturbed. It was located next to a workman's yard meaning that recordings were sometimes interrupted by the noise of machinery. Also the fact that the room was in town allowed other interested people, often large groups, to try and gain access to the recording by calling out to people inside the room and banging on the door.

4.5.2. Bush-Based

The recording environments used for the majority of data collection were a variety of nearby bush locations surrounding Wadeye. The bush-based recording environment was chosen for a number of reasons. Firstly families often visit the bush areas surrounding Wadeye on weekends and holidays to camp, fish, swim, collect bush foods or have a picnic. This meant that participants were familiar with the recording environment and data collection involved enjoyable activities which they commonly did together. Secondly this environment also restricted the number of people present at the recording as it was limited to those people who could fit in the project vehicle. The participants in these recordings minimally consisted of two focus children and two caregivers (typically grandmothers and mothers) although it was not uncommon for up to 4 adults and 4 children to be present at these recording sessions. It should be noted however that not everyone who came to a recording location participated in the recording. This restriction in participant numbers made both recording and transcription easier.

All sessions, including those in the *Mulurn-patha*, were recorded using two video cameras fixed to tripods. During trip one I used two Sony HDR-CX550V cameras. For trip two I used one Sony HDR-CX550V and one Sony HXR-NX30P. The Sony HXR-NX30P had greatly superior audio control with dual XLR inputs, phantom power and manual wheels

[53] Neighbourhood watch service

to adjust microphone levels. The HDR-CX550V only had a built in microphone and a 3.5mm stereo jack and audio level control was restricted to normal or low settings.[54] For trips three and four I used two Sony HXR-NX30P cameras. Multiple audio tracks were recorded for each session by each of the video cameras. The primary audio track was captured with two Sennheisser ew 112-p G3 wireless lavalier lapel microphone sets. The signal from these microphones was recorded in 16bit 48kHz stereo by the primary camera. This was the highest standard available on these devices. The wireless transmitters and lapel microphones were fitted in custom made adjustable backpacks designed and constructed by my sister Rose Forshaw. These backpacks were worn by the two focus children in each recording as pictured below. This is similar to a method reported by Demuth (1996a). One of the lapel microphones was recorded in the left channel and the other in the right channel of the stereo audio track. This was particularly useful in helping to identify exactly who was talking in an interaction. In particular it was easy to distinguish between the speech of the two focus children in a recording. There was however a substantial amount of bleed across the channels.[55]

The use of the backpacks allowed the children to move freely throughout the recording space without their speech becoming inaudible. The wireless microphones had a good working range of approximately fifty metres. This was particularly important in bush settings where children often explored and played in the surrounding environment. As a result recordings easily captured events as diverse as climbing in trees, collecting bush foods, fishing and exploring mangroves. These backpacks proved to be so popular with the focus children that on later fieldtrips 'placebo' backpacks without microphones were given to non-focus children who were also present in order to avoid arguments.

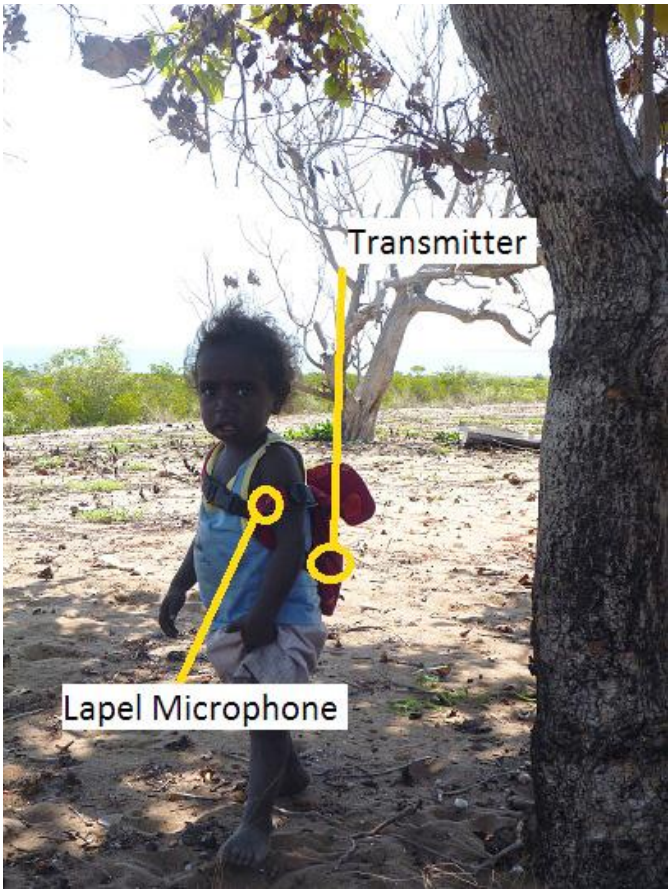
The surrounding speech of adults and other children was also captured through the backpack microphones. This proved to be adequate for the purposes of transcription in most situations. As a general rule if the speech was audible to the child it was also audible through their microphone. There were however several instances in which surrounding speech was

[54] I was able to record two wireless lavalier microphones using the HDR-CX550V by using a 3.5mm stereo to RCA adapter. I then converted each RCA input to 3.5mm stereo and then finally to 3.5mm female mono plugs. This somewhat convoluted string of adapters allowed for one microphone to be recorded on the left stereo track and the other on the right.

[55] When audio being recorded by a specific microphone is picked up by a different microphone this is referred to as bleed.

too quiet to be well understood for transcription. In these instances I referred to the secondary audio track recorded by the secondary camera.

Figure 7. Microphone Backpack[56]



The purpose of the secondary audio track was largely to provide a back-up of the primary audio in situations when the primary audio was compromised in some way. It was recorded in 16bit 48 kHz stereo by the second camera using either an in-built microphone or shotgun microphone. Two shotgun microphones were used throughout the project the Sony ECM-XM1 and Rode NT3. This secondary audio proved useful for a number of purposes including listening to surrounding speech not captured sufficiently by the backpack microphones and listening to focus children's speech if they went beyond the wireless range

[56] LAMP_20120911_WF_039

or removed their backpack. The secondary camera was also used as a 'roaming' camera. In situations when participants would explore the surrounding area I was able to follow the interaction and continue recording. The primary camera remained largely stationary during recordings.

On days of bush-based recordings I began by first collecting all the relevant participants from around Wadeye. I then encouraged participants to choose a location relatively close to town where they would like to do the recording the only requirements being that it needed 'good shade' and that traditional owners were happy for us to work in that location. Once in a location participants were provided with ingredients to make tea and damper.[57] If the recording was done by a river, participants were also able to fish. These sessions ranged from 20 minutes to 1 hour 20 minutes in duration. On average forty minutes of interaction was recorded although we typically remained at the location for a longer period of time. This additional time outside recording was highly valuable as it allowed me time to build relationships and learn from the participants about their language and culture as discussed previously (§4.2). Some examples of these settings are shown below.

During these sessions I often left the immediate recording space if the participants appeared to be inhibited by my presence, as was often the case in early recordings. Once I was out of sight participants typically relaxed into the recording environment. In later recordings I also often left the recording space. This was however due to the fact that the children in particular would want to speak to me. Interactions between me and the children during recordings were avoided as they resulted in less naturalistic data due to my low Murrinhpatha competence. The technique of removing myself from the recording space worked well although allowed less control of the cameras and audio levels. Sometimes this resulted in cameras pointing in the wrong direction as participants moved about. Additionally in some recordings children smudged camera lenses, played with the zoom or focus settings or on rare occasions turned cameras off. Caregivers however were aware that they may need to adjust the direction of a camera if recording participants changed location and that the children should not touch the cameras.

[57] Bread

Figure 8. Bush-based Recording Environments[58]





[58] In order of appearance: I: LAMP_20130528_WF_043.jpg, II: LAMP_20140611_001.jpg & III: LAMP_20131105_031.jpg.



Bush-based recording proved to be very successful in providing an environment which simultaneously made participants feel relaxed and in-control and enabled the making of relatively high quality recordings for transcription and analysis. Interactions in these recordings included telling stories about past trips to country, talking about country and the surrounding environment and also discussion around the gathering, preparation and consumption of food. It was also clearly an enjoyable experience for participants. It was often difficult to restrict the numbers of people coming on the excursion as they were quite popular. The main drawback to this approach was that it was easily impacted by weather. This meant that recording was not able to be done during the height of the wet season, on windy days or on particularly hot days. Recordings were mostly conducted in the morning when temperatures are cooler, there is typically less wind and participants are easier to find.

4.6 Transcription

Transcription of recordings is one of the most time-consuming aspects of creating a longitudinal corpus (Demuth, 1996a). Ideally researchers will have a good familiarity with or be a native speaker of the target language (e.g. Mateo Pedro, 2015) or if this is not the case have access to a team of literate native speaker RAs who can undertake independent

transcription and translation of recordings (Rose & Brittain, 2011; Stoll et al., 2012). Neither of these options were possible in this study. Firstly, before beginning data collection I had limited familiarity with Murrinhpatha, meaning that I could not undertake transcription and translation into English independently. Secondly, as discussed previously, due to the lack of available literate native speakers relying on a team of native speakers RAs was not possible.

Consequently all transcriptions and translations of recordings for this study were done through 'team transcription', which involved me working with the assistance of a team of Murrinhpatha speaker RAs. In total approximately 732 minutes of interaction were transcribed. The majority of RAs were related to the children, predominantly mothers and grandmothers. They varied in ability in terms of their English oral language competency and English and Murrinhpatha literacy. The mothers typically had low levels of literacy and only basic oral English. They were however very good at recognising what their children were saying or attempting to say. The grandmothers had comparatively higher levels of literacy and greater English proficiency than the mothers.[59] As a result RAs were used for varying purposes. Mothers helped to identify and transcribe early Murrinhpatha production, which often involved simpler language but was difficult to comprehend. The grandmothers helped with translating later stages of development when children were producing more complex utterances. I always had a variety of recordings ready for transcription so that I could be flexible in working with a variety of RAs. This was particularly important as, similar to recording, transcription sessions were often spontaneous, opportunistic and difficult to schedule. When working with the mothers there was usually an additional adult present. This was done as it was not culturally appropriate for me to spend time alone with women of a similar age. I also found that the presence of an additional Murrinhpatha speaker increased the accuracy and productivity of transcription. It allowed RAs to discuss utterances they weren't sure of and seemed to reduce the pressure of getting things 'right'.

The most difficult speech to transcribe was that of children under 3. Often mothers were unable to comprehend the speech of these children in recordings. RAs were frequently reassured that it was acceptable if they could not understand the speech of a child. This was important to ensure that consultants did not try to 'invent' what a child might be saying. Interestingly elder siblings (5-7 years old) of these younger children were much better at

[59] In general indigenous people over 40 in Wadeye have greater competence in English as discussed in §1.1.

comprehending toddler speech. On several occasions if an elder sibling was present during the transcription session they were able to reproduce the child's production in a form the RA could understand. I was able to use this technique opportunistically when older children were present during transcriptions sessions. However transcription sessions were generally more productive when these elder children were not present.

Transcription was done using ELAN multimedia annotation software (Sloetjes & Wittenberg, 2008).[60] ELAN allows for the linking of complex annotations to media and supports viewing of multiple video and audio tracks. The decision to use ELAN ahead of other annotation software such as CLAN[61] was made because of pre-existing Murrinhpatha materials compatible with ELAN.[62] The transcription process involved me and a native speaker RA listening to individual utterances. These were then re-spoken by the RA and entered by me into ELAN using the Murrinhpatha orthography (§2.1). Where children produced utterances that were not adult-like these were transcribed phonemically using the Murrinhpatha orthography and an accompanying transcription of the adult target utterance was also entered. When it was unclear what a participant was saying this was transcribed as 'xxx'. I worked together with RAs to produce appropriate English translations. Each of the transcription sessions were recorded using a Zoom H4-N. This allowed for rechecking and re-listening to adult descriptions and interpretations of child productions. This was also particularly useful when children produced non-standard forms as it meant tokens of the adult targets were also documented at this time.

This method of 'team transcription', common in language documentation contexts, tends to lead to a transcription bottleneck where there is much more recorded language than can be transcribed (Kelly et al., 2015). Consequently recordings were 'triaged' so as to get the most useful production data from the recordings as possible, similar to the approach of Allen & Crago (1996). Before beginning transcription I selected sections from recordings that appeared to contain interesting interactions with a dense amount of language production from the focus children. Before beginning work with a RA I completed as much transcription as I could by myself, although this was often very limited. These transcriptions were then either

[60] ELAN is developed by the Max Planck Institute for Psycholinguistics, Language Archive, Nijmegen. http://tla.mpi.nl/tools/tla-tools/elan/
[61] http://childes.psy.cmu.edu/
[62] This included a combined Toolbox databased described in chapter 2 (Blythe, Nordlinger, Street, Forshaw, & Mansfield, n.d.).

confirmed or disconfirmed and corrected by a RA. In order to facilitate transcription I also segmented utterances and attributed these to speakers in ELAN before transcription sessions. This meant I was able to play individual utterances to RAs. This process of 'triaging' and preparing recordings for transcription ensured that the maximum amount of data possible was transcribed.

4.6.1. Transcription Validity

When creating a corpus of language data it is important to ensure that transcription and translation are of a consistently high standard. This may be achieved through the re-transcribing of parts of the final transcription by another researcher (Demuth, 1996a). Demuth suggests this be done for 10% of the total data set. These transcriptions can then be checked for validity. Alternatively Stoll et al. (2012) describe a process where the first few transcriptions and translations of native speaker transcribers are double-checked by other native speaker transcribers and linguists to ensure that transcription and translation is being done to an adequate standard.

As a result of the variety of RAs who assisted with transcription as well as the nature of 'team transcription' neither of the approaches described above were appropriate. Consequently I implemented my own procedures to ensure the reliability of transcriptions. Initial transcription was undertaken by myself and a native speaker RA as described above. I then tagged all utterances by focus children which contained verbs as verb production is the focus of this study. I then re-listened to each of these utterances and checked the reliability of the initial transcription. I tagged transcriptions of utterances which I considered to be unreliable. These utterances were then re-transcribed by myself and a different native speaker RA and compared to the previous transcription. On the basis of this re-transcription process verbs were either included or excluded from the final verb database.

4.7 Data Coding and Analysis

After transcription of the various recordings had been completed these were tagged and coded for relevant features to allow for easy exploration of the corpus. Children's verb productions were also coded to allow for relevant counts and statistical analyses to be undertaken such as the calculation of Normalised Means Size of Paradigm (Xanthos & Gillis, 2010) examined in §6.1. This was done according to the following method.

All focus child utterances were tagged in ELAN transcripts according to whether or not they contained verbs. A verb was defined as any word which contained a classifier stem, including bipartite stem verbs, simple verbs and phrasal verbs (§2.2). All utterances containing verbs were then exported to an SPSS database (*IBM SPSS Statistics for Windows*, 2011) with relevant metadata. Each row in the database represented the production of a verb by a focus child. These verb productions were then manually coded according to their morphological structure including the presence and absence of morphs, the features encoded by classifier stems, the length of verb productions (syllables and morphs) and the nature of any non-standard productions. The coding categories used are outlined in Appendix II. This database was then exported and adapted for use in Minitab (*Minitab 17 Statistical Software*, 2010) in which all relevant counts and analyses reported in this thesis were undertaken unless otherwise indicated. This method resulted in a final corpus of 2036 verb tokens produced by focus children. The distribution of these productions is shown in the table below by focus child and field trip. The age of the child during each field trip is also shown as well as the number of minutes of transcribed interaction considered for each child.

Table 15. Verb Tokens and Age by Child and Fieldtrip

	Fieldtrips					
Focus child	**1**	**2**	**3**	**4**	**Total**	**Transcribed Interaction (min)**
Acacia	3 (1;9-1;10)	52 (2;6-2;7)	102 (3;0-3;2)	120 (3;6-3;7)	**277**	312
Emily	15 (2;4-2;6)	79 (3;1)	15 (3;7-3;9)	45 (4;1-4;3)	**154**	233
Nathan	92 (3;6-3;7)	143 (4;4)	82 (4;10-4;11)	113 (5;3-5;4)	**430**	186
Mavis	35 (3;7-3;9)	82 (4;5-4;6)	198 (4;11-5;1)	174 (5;4-5;6)	**489**	240
Molly	266 (4;3-4;5)	121 (5;0-5;2)	117 (5;7-5;8)	182 (6;0-6;1)	**686**	225
					2036	**732**[63]

[63] This is not the sum of the individual values in this column as individual recordings typically involved more than one focus child.

As expected the distribution of verb tokens across children and fieldtrips is not uniform. Fewer verb tokens were identified at earlier stages of language development and more were identified at later stages of development. This was the result of a number of factors. Firstly the younger focus children tended to produce less speech during recording sessions relative to older children. Secondly, the proportion of verbs to overall words tended to be lower at earlier stages of development. Variation in the numbers of verb tokens recorded, transcribed and coded for each child during each fieldtrip was also related to the number of recordings the child participated in as well as how much of these sessions were transcribed. For example, in comparing Acacia and Emily's verb use, Emily's lower number of verb tokens is associated with less interaction being transcribed. The values given above for number of minutes transcribed are only an approximation, especially for recordings at the earliest stages of development. This is due to the fact that shorter segments of interaction (less than 2 minutes) were typically transcribed in recordings with younger children due to longer periods of silence. By contrast recordings of older children generally allowed for the transcription of larger extended chunks of interaction meaning the values of transcribed interaction for older children are more accurate.

4.8 Summary

When collecting a longitudinal corpus of child language many decisions must be made about what the characteristics of this corpus will be. It is important that the field develop 'best-practice' methods for such studies and that researchers are aware of potential limitations of certain project designs. It is also important that the methods utilised are to some extent reflective of the sociolinguistic context of the study. This chapter has presented the methods used in this study. It has discussed the reasoning behind various decisions to structure the study in this way in light of typical practices in the field, the sociolinguistic context and the abilities of the research team. When these various factors are taken into account it is likely that the methods used will better represent 'best practice' in a given context.

5 Early Verbs

This chapter considers the characteristics of children's early bipartite stem verb productions. It focuses primarily on the verb use of Acacia and Emily before age 3 and considers verb use throughout the corpus where appropriate. Verb use at this age is relatively infrequent, meaning that only a relatively small set of data can be considered. For example during the first field trip only 3 verbs were identified for Acacia (1;9-10) and 15 verbs were identified for Emily (2;4-6). This sample does however provide a useful picture of the structure of early verbs and how they are used. The rate and context of use is presented throughout the second half of this chapter in §5.2.1 and §5.2.2. In §5.1 I describe the structure of children's bipartite stem verb productions in particular focusing on errors of omission. This analysis focuses on the production of various types of verbal prosodic structures. I initially consider the production of these structures as early verbs by Acacia and Emily and then follow the development of these structures throughout the corpus given that children often truncate early wordforms crosslinguistically (e.g. Demuth, 1996b). I then address the research question of whether phonological/prosodic (e.g. Demuth, 1996b; Peters, 1985; Slobin, 1985) and/or morphosyntactic (e.g. Courtney & Saville-Troike, 2002; Schütze & Wexler, 1996) factors drive the structure of children's verb productions. In the second half of this chapter §5.2 I

examine the semantic and pragmatic characteristics of early verbs focusing exclusively on the verb use of Acacia and Emily before age 3. It addresses the question of whether early verbs are semantically and pragmatically restricted as has been suggested by some researchers in the literature (e.g. Bloom, 1991; Clark, 1993; Huttenlocher et al., 1983) as outlined in §3.4.1 and §3.4.2. I also consider the potential impact of these characteristics on children's acquisition of verb morphology particularly in relation to the features encoded by classifier stems (§5.2.3). The chapter also provides a baseline of children's early verb use to be built on in the following two chapters.

5.1 Structure of Bipartite Stem Verbs

Children's early word productions often differ from those of adults, as discussed in §3.3. A key characteristic of these early word productions are errors of omission where children may omit syllables and segments of the target word (e.g. Demuth, 1996b). With regard to the 'shape' of children's early verbs, research has primarily focused on the acquisition of inflectional morphology given that it is commonly omitted crosslinguistically (e.g. Deen, 2009). Research in this area has sought to describe which parts of early verbs are preserved and which are omitted and then to explain the factors underlying these patterns. These questions have also been of considerable interest in the study of languages with complex verb morphology (Mithun, 1989; C. Pye et al., 2007). These languages provide interesting structures for investigation as verbs with potentially high morpheme to word ratios may be long complex structures. The length of these verbs make them more difficult for children to produce, meaning that they will likely require truncation in the early stages of language development. The omission of syllables and segments is characteristic of children's early verb productions in Murrinhpatha. The two examples below show the omission of a single syllable from bipartite stem verbs by children.[64]

[64] The first line of child examples provides a phonemic representation of the child's utterance. The 'AT' line, when present, provides the adult target form as given by a native speaker RA.

(63) Acacia 2;7

ˈ***nuku****warda*

AT: **ngu**ˈ**nu-ku-**warda

1SGS.FEET(7).FUT-throw-NOW

'I will throw it'

[Acacia throws an object after her utterance]

(LAMP_20130524_WF_01_V1 00:29:06)

(64) Mavis 3;9

thang*ˈkala*

AT: ˌ**thani-ng**ˈ**kala**

2SGS.BE(4).FUT-climb.up

'you climb up'

(LAMP_20120831_WF_01_V1 00:28:23)

Accounts of early verb productions tend to either focus on phonological/prosodic factors (e.g. Demuth, 1996a; Peters, 1985; C. Pye et al., 2007) or morphosyntactic factors (e.g. Rizzi, 1993; Wexler, 1994) as detailed in §3.3.1 and §3.3.2 although a number acknowledge the influence of various factors (e.g. Courtney & Saville-Troike, 2002). In the following analysis of early verb productions I find that an account based on phonological/prosodic factors best describes the early productions and development of Murrinhpatha bipartite stem verbs. Specifically I argue for a prosodic licensing model (e.g. Demuth, 1996b, 2001) outlined in §3.3.1.2, where children's productions are sensitive to the prosodic structures of the adult target language. I also argue that children's early verb productions are influenced by factors of perceptual salience (Peters, 1985; Slobin, 1985). In the following sections I first address why other accounts are either not well equipped or struggle to account for the Murrinhpatha data. I then present my analysis of the development of bipartite stem verb structures across the corpus in §5.1.3.

5.1.1. Bare Stems

In a number of morphologically complex languages children have been found to produce bare verb stem or root forms without any additional morphology. This has been observed for children acquiring Inuktitut (Crago & Allen, 1998), Navajo and Quechua (Courtney & Saville-Troike, 2002), Tzeltal and Tzotzil (C. Pye et al., 2007), Sesotho (Demuth, 1992b), Siswati (Kunene 1979) as well as Swahili (Deen, 2005). The production of bare verb stems is however not found in all morphologically complex languages and tends to only occur in languages in which there is also some regular perceptual property which enables the identification of the verb stem (Kelly et al., 2014). This may include factors of perceptual salience such as word position, stress and morphological transparency, see §3.3.1.1.

Based on findings from other languages it is predicted that children acquiring Murrinhpatha will produce bare lexical stems. Lexical stems will likely be salient to children as they always occur at the right edge of the verbal PWord, frequently occur at the right edge of the verbal complex, have a relatively fixed form and are often the locus of primary lexical stress. Children do indeed produce bare lexical stems as predicted. This is shown in (65) where the lexical stem *-watha*, realised as *-matha*, is produced without a preceding classifier stem.

(65) Emily 2;6

	nimi-ne	ˈ***matha***
AT:	nimi-de	na-ˈ**watha**
	other-again	2SGS.HANDS(8).FUT-make

‘you make it again’

(LAMP_20120910_WF_01_V1 00:30:26)

The production of bare lexical stems is however relatively infrequent in early verb productions. Bare lexical stems tend to be produced when the lexical stem is disyllabic and occurs word finally in the adult target form. This suggests that bare stem production is associated with structural characteristics of verbs as predicted by phonological and prosodic

accounts and not due to morphosyntactic factors. Further discussion of the production and analysis of bare lexical stems occurs at relevant points throughout §5.1.3.

5.1.2. ATOM & the Imperative Analogue Hypothesis

A prominent model accounting for children's early verb productions has been the Agreement Tense Omission Model (ATOM) (Schütze & Wexler, 1996; Wexler, 1998), detailed in §3.3.2.2. This model argues that children optionally omit agreement and tense marking during early stages of development which accounts for an optional infinitive stage in a number of languages (Schütze & Wexler, 1996). It has also been proposed that in languages that lack a root infinitive children may produce other structures which are analogous to root infinitives such as bare stems and imperatives (Salustri & Hyams, 2006). For example it is predicted that in null subject languages children will produce a large number of imperative verbs in early verb productions and this is due to the optional omission of agreement marking and tense (Salustri & Hyams, 2003).

Approaches which focus on the underspecification of specific grammatical features are well suited to the description of languages with agglutinative morphology, where many affixes with relatively clear form-function relationships attach to a single verb. For example Deen's (2005) account of four children acquiring Nairobi Swahili, a language with agglutinative verb morphology, is a notable example of the effectiveness of such approaches. Of the accounts considered he found that the ATOM (Schütze & Wexler, 1996) came the closest to accounting for the acquisition of inflectional morphology in Swahili although there was also likely an influence from factors of frequency. The ATOM however is problematic for languages such as Murrinhpatha with fusional morphology. For example in Murrinhpatha the classifier stem is a portmanteau morph which contributes to the encoding of subject person/number and TAM as well as verb semantics and argument structure (§2.2.4). The classifier stem may be omitted in early verb productions as shown previously in (65). It is difficult however to argue that the underspecification of a specific feature would lead to this type of production given that the classifier stem encodes many features. Furthermore given the effectiveness of a prosodic licensing model in accounting for truncated verb productions in Murrinhpatha, as argued below, appealing to underlying syntactic structures is not required.

It is however the case that children appear to use high rates of imperative verbs in early verb productions as predicted by the imperative analogue hypothesis (Salustri & Hyams, 2003). I argue however that this is likely due to the functions encoded by children's early verbs which include a large number of directives as well as factors of frequency and morphological complexity (§5.2.3).

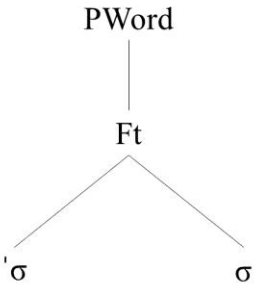
5.1.3. Prosodic Licensing Account

In the following analysis of the structure of early verbs I present children's verb productions in terms of the syllabic length of the adult target. This analysis is limited to the production of the verbal PWord, which begins with the classifier stem and concludes with the lexical stem. Stress is assigned based on pitch peaks where recordings allow, otherwise stress is attributed based on my own impressions where audio quality is not of a sufficient standard.

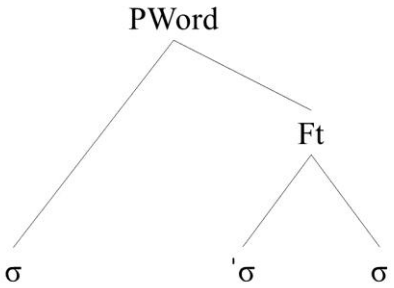
In this analysis I argue for a prosodic licensing model of early verb productions (e.g. Demuth, 1996b, 2001) as presented in §3.3.1.2. This approach argues that children's early productions are sensitive to the prosodic structures of the adult language and that crosslinguistic differences in early lexical productions can, in part, be attributed to differences in prosodic structures (Demuth, 1996b, 2001, 2006, Gerken, 1991, 1996). Initially children are argued to adhere to a minimal word constraint which requires that a PWord is equivalent to a foot (Demuth & Fee, 1995). As children develop they incorporate more structure into their lexical representations and exploit levels of the prosodic hierarchy above the PWord level.

PWords in Murrinhpatha have a bimoraic minimum. In verbal PWords greater than a syllable there is a penultimate pitch peak that heads a trochaic foot at the right edge of the PWord. An acoustic study (Mansfield, In Prep.a) has found no evidence of secondary stress preceding the head foot and thus I treat syllables preceding the head foot as being prosodified at the PWord level. The prosodic structures of various verbal PWords are given in §2.2.2 and repeated here for di-, tri- and tetrasyllabic verbal PWords.

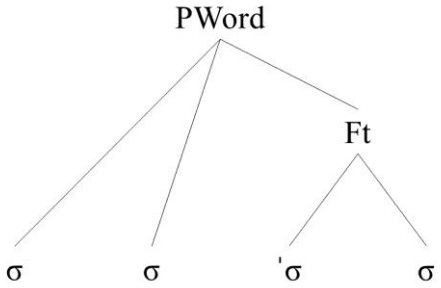
(66) a) Disyllabic verbal PWord



b) Trisyllabic verbal PWord



c) Tetrasyllabic verbal PWord



5.1.3.1 Monosyllabic Verbal PWord Targets (σ)

Monosyllabic verbal PWords with a bipartite stem structure are extremely rare in Murrinhpatha. I have only been able to identify a single verb of this type. This is the verb 'get' constructed of the lexical stem *-art* and the CSP GRAB(9), as shown in (67). This is a monosyllabic PWord when the classifier stem is not in the non-future. There are no examples in the corpus of omission errors which impact monosyllabic verbal PWords. These however would be particularly difficult to identify as the child would only be producing morphology

not contained within the PWord making the identification of such a verb unlikely.[65] There is a single example of an early monosyllabic verbal PWord in the corpus produced by Emily aged 2;4. This is produced as a single word utterance. The verbal PWord is bolded in examples for the remainder of the discussion of verb structure.

(67) Emily 2;4

mart[66]
ma-art
1SGS.GRAB(9).FUT-get
'I will get it'
[Emily reaches out and grabs a toy hammer]

(LAMP_20120711_WF_01_V1 00:12:32)

5.1.3.2 Disyllabic Verbal PWord Targets ('σ σ)

There are a number of productions of disyllabic verbal PWords in the early verbs of both Acacia and Emily. In each of these productions the verbal PWord is produced as a trochaic foot as with the adult target form. This can be seen in the following examples.

(68) Acacia 1;10

	mama	ˈ***debil***
AT:	mama	ˈ**ne-birl**
	Mo	**2SGS.HANDS:RR(10).FUT-turn.to.look**

'mum you look'

(LAMP_20120822_WF_01_V1 00:13:37)

[65] It might be possible to identify such an example in response to prompting by a more competent Murrinhpatha speaker.
[66] The adult target of this verb form would be *martnu* with an additional tense suffix *-nu* according to Nordlinger & Caudal (2012). However due to the fact that this was not described by a consultant as 'babytalk' and that Mansfield (2014a) notes that this suffix may be omitted in adult speech this is not treated as an error here.

(69) Acacia 1;10

ˈ***unga***
AT: ˈ**nangart**
na-nga-art
2SGS.HANDS(8).FUT-1SG.IO-get
‘you get it for me’

(LAMP_20120831_WF_01_V1 00:03:25)

(70) Acacia 2;7

ˈ***buy-bat-****nu*	*Mavis*
3SGS.LOWER:INTR(18).FUT-fall-FUT	name

‘Mavis is going to fall’

(LAMP_20130524_WF_01_V1 00:15:15)

(71) Acacia 3;2

ˈ***udhuth****nu*
AT: ˈ**ngi-dhuth-**nu
1SGS.SIT(1).FUT-swim-FUT
‘I will swim’

(LAMP_20131202_WF_01_V1 00:48:59)

(72) Emily 2;6

ˈ***kepa***
AT: ˈ**du-pak**
2SGS.LOWER(17).FUT-put
‘you put it down’

(LAMP_20120910_WF_01_V1 00:31:06)

As predicted by a prosodic licensing model these verbal PWords are not reduced in terms of their lexical metrical structure as the PWord constitutes a single trochaic foot and is a

minimal PWord (Demuth & Fee, 1995). This shows that both Emily and Acacia are able to produce verbal PWords of the type shown in (66a) at the initial stages of data collection, 2;6 and 1;10 respectively. Example (70) also shows the early use of the future inflectional suffix -*nu* at age 2;7. These verbs however are not all well-formed. In particular the initial syllable in Acacia's productions in (69) and (71) are 'filler syllables' (Peters, 2001). The final syllables of the verbal PWord in these examples however still closely resemble the adult target. This suggests that the end of the verbal PWord is particularly salient for Acacia as has been found for many other languages (e.g. Peters, 1985; Slobin, 1985).

It is of course possible that such forms would be truncated at an earlier stage of development when utterances are more likely to be monosyllabic. If this does occur there are two potential developmental pathways. Firstly the stressed syllable may be maintained as is found for early verbs in other morphologically complex languages such as Mohawk (Mithun, 1989). It is however possible that the final syllable of the verb core would be maintained instead, especially considering that the stressed syllable is realised as a filler syllable in both (69) & (71) and that filler syllables often fill the space in words where a syllable has previously been omitted (Peters, 2001). In order to investigate this point further dense production data would need to be collected from children before age 2 as by this age verbs of this type are not generally truncated.[67] This is however complicated by the fact that verb use is particularly infrequent at this age.

5.1.3.3 Trisyllabic Verbal PWord Targets (σ 'σ σ)

Trisyllabic verbal PWords in the adult language have penultimate stress where a trochaic foot is formed at the right edge of the verbal PWord and is preceded by an unstressed and unfooted syllable as represented in (66b). Verbs of this type are found relatively frequently in Acacia and Emily's early verbs as well as throughout the corpus. Children's early verbs include both well formed trisyllabic verbal PWords and trisyllabic verbal PWord targets which are truncated. Words with this structure are prone to truncation in a number of

[67] There is however one verb with a disyllabic core which could be considered an example of syllable omission in the corpus. This relates to the production of the highly frequent imperative construction of the verb 'turn to look' *nebirl*. This is produced by Emily as *nerl* at age 2;4 and by all other focus children throughout the corpus including by Molly at age 5;8. I however do not consider this to be an error of omission but instead treat it as acceptable variation. This is because this verb may also be reduced in this way in fast adult speech. This analysis as variation is further supported by the fact that language consultants do not identify such productions as 'babytalk'.

languages where the adult target is reduced to a single trochee (e.g. Gerken, 1996; Lleó & Demuth, 1999). This is also the case for early verbs in Murrinhpatha. In a number of verbs the initial syllable is either omitted or realised as a filler syllable, suggesting that it may have been omitted at an earlier stage of development.

The omission of the initial unstressed syllable is illustrated by the following production in (73), previously (65), by Emily at age 2;6. In this case omission of the initial syllable results in the production of a bare lexical stem where no other verb morphology is expressed. As discussed previously the production of bare lexical stems is fairly limited in the corpus. This is because they are typically only found for verb constructions with a disyllabic lexical stem where the adult target also expresses no additional suffix morphology.

(73) Emily 2;6

	ˈnimi-ne	***ˈmatha***
AT:	ˈnimi-de	**na-ˈwatha**
	other-again	**2SGS.HANDS(8).FUT-make**

‘you make it again’

(LAMP_20120910_WF_01_V1 00:30:26)

Another example of the production of a bare lexical stem is shown in (74). In this example Nathan, aged 3;7, uses a non-future verb form to ask if Molly saw an animal in the water. In this instance Nathan omits the initial syllable producing only the lexical stem. It is possible that greater numbers of bare lexical stems would be produced at a younger age however by 2 and a half years of age children tend to produce some additional suffix morphology such as tense inflection as in (75).

(74) Nathan 3;7

	ˈ***kardu***	
AT:	**dam**ˈ**kardu?**	
	dam-ngkardu	
	2SGS.SEE(13).NFUT-see	
	‘did you see it?’	

(LAMP_20120830_WF_01_V1 00:14:22)

(75) Acacia 2;7

	ˈ***lale****-nu*	*Mavis*
AT:	**ba-**ˈ**lele**-nu	Mavis
	3SGS.BASH(14).FUT-bite-FUT	name
	‘it will bite Mavis’	

(LAMP_20130502_WF_01_V1 00:27:14)

In considering the above three examples it does appear that morphological factors may impact early verb productions. In each of these examples it is the classifier stem which is omitted. This may be evidence that the lexical stem has been extracted as a stem according to the approach of Courtney & Saville-Troike (2002). Consequently further examples need to be considered to show that it is indeed prosodic and not morphological factors which are driving these errors of omission. The prosodic analysis is supported by examples such as that in (76). In this instance the verbal PWord consists of a disyllabic classifier stem *ngunu-* and a monosyllabic lexical stem *-ku*, meaning that the second syllable forms a trochaic foot with the lexical stem. Under a morphological account we might expect the classifier stem to be omitted however Acacia, aged 2;7, omits the initial unstressed syllable as predicted by a prosodic licensing model. The trochee at the right edge of the verbal PWord is well-formed despite the fact that it consists of more than just a lexical stem.

(76) Acacia 2;7

ˈ***nuku****warda*

AT: **ngu**ˈ**nu-ku-**warda

1SGS.FEET(7).FUT-throw-INTS

'I will throw it'

[Acacia throws an object after her utterance]

(LAMP_20130524_WF_01_V1 00:29:06)

There is however an alternative explanation of the above production that could allow for a morphological account. The above analysis assumes that the lexical stem used by Acacia has the same form as in the adult language *ngunu-*. It is possible however that at this age Acacia has a hypothesis that the lexical stem for the verb 'throw' is *-nuku* rather than *-ku*. The likelihood of this analysis would depend on the rate of inter-stem morphology used with this verb in input. If it was relatively infrequent this would support the possibility of this analysis.

Further potential support for a morphological account is found in truncated productions with monosyllabic lexical stems where the initial syllable of the remaining trochaic foot is realised as a filler syllable. Consider the following production by Acacia at 2;7 of the trisyllabic verbal PWord 'I will take it off' in (77). It consists of a disyllabic classifier stem *ngungu-* and a monosyllabic lexical stem *-pirt* similar to 'I will throw it'. In this case the verbal PWord is reduced to a single trochaic foot. In this case the trochee is not entirely well-formed. Instead the classifier stem element is realised as a filler syllable *i*.

(77) Acacia 2;7

ˈ***ipirt=nga?***

AT: **ngu**ˈ**ngu-pirt-**nu=nga

1SGS.REMOVE(32).FUT-take.off-FUT=DM

'I will take it off?'

[Acacia is fiddling with the buckle on the microphone backpack she is wearing]

(LAMP_20130524_WF_01_V1 00:20:33)

This production suggests that Acacia may have segmented and 'stored' the lexical stem *-pirt* and is producing it as an underspecified verb as suggested by morphosyntactic models such as ATOM (Schütze & Wexler, 1996). The preceding filler syllable is used to fulfil the requirement that the verb core be a trochaic foot. It is not well-formed as Acacia is aware that it is not part of the lexical stem.

I argue however that the production in (77) is due to a factor of perceptual salience rather than morphological factors. As was shown in the production of verbs with disyllabic cores the end of the prosodic word unit is salient for Acacia. In examples (69) and (71) the final syllable is either well-formed or resembles the target syllable whereas the initial syllable is realised as a filler. This is consistent with crosslinguistic findings that the ends of words are perceptually salient to children (e.g. Peters, 1985; Slobin, 1985). Therefore the end of the prosodic word unit in (77) is preserved because of its salient word position and not its morphological status.

If this account is correct we would also anticipate that the initial syllables of disyllabic lexical stems would be produced as filler syllables in some cases. There is some evidence that this is the case. In the following example Acacia aged 3;7 omits the initial syllable of a trisyllabic verbal PWord and produces the initial syllable of the disyllabic lexical stem *-yiparl* as a filler syllable. This example illustrates both that prosodic factors are driving the omission of the initial unstressed and unfooted syllables as well as the fact that the end of the verbal PWord is perceptually salient for children.

(78) Acacia 3;7

	ˈ***aparl****lu-nga*	*Tharran*
AT:	**ba**ˈ**yiparl**lu-nga	Tharran
	ba-yiparl-nu=nga	Tharran
	1SGS.BASH(14).FUT-hit-FUT=DM	name
	'I will hit Tharran'	

(LAMP_20140531_WF_01_V1 00:24:34)

Another example highlighting the salience of the end of the verbal PWord is seen in Emily's speech. In the following example (79) Emily's mother Tania is prompting her to speak to Acacia. She prompts Emily to produce the verb *thikaykay* 'you call out'.[68] Emily does not produce either of the first two syllables in an adult manner realising *thi* as *yu* and *kay* as *wa*. Only the final syllable of the verb is produced according to the preceding adult form modelled by Tania.

(79) Emily 3;1

1	*Tania:*	*Acacia*	***thi-ˈkaykay***	*thama*
		name	**2SGS.SIT(1).FUT-call.out(RDP)**	2SGS.SAY/DO(34).FUT
		'say Acacia you call out'		
2	*Emily:*	*Acacia*	***yuˈwakay***	
	AT:	Acacia	**thi-ˈkaykay**	
		name	**2SGS.SIT(1).FUT-call.out(RDP)**	
		'Acacia you call out'		

(LAMP_20130502_WF_01_V1 00:18:40)

Acacia and Emily do not truncate all early trisyllabic verbal PWords. Both children produce well-formed structures where the initial unstressed syllable is maintained. These well-formed verbs are produced at the same age as truncated verbs. For example in response to a prompt by her mother Tania, Emily produces a verb construction meaning 'you wash your face first' as shown in (80). In this instance the initial unstressed syllable *ne* is well-formed. Other well-formed examples of this type are given in (81), (82) and (83).

[68] This interactional routine of prompting is commonly used in Murrinhpatha child directed speech and could be used effectively to further investigate children's early word forms as it is something that children are familiar with and 'know' how to do.

(80) Emily 3;1

1 *Tania:* ***ne-ng*** ˈ***ka-purl****-warra=nga* *thama*

2SGS.HANDS:RR(10).FUT-face-wash-FIRST=DM 2SGS.SAY/DO(34).FUT

‘say wash your face first’

2 *Emily:* ***ne-ng*** ˈ***ka-purl****-warra*

2SGS.HANDS:RR(10).FUT-face-wash-FIRST

‘wash your face first’

(LAMP_20130502_WF_01_V1 00:17:23)

(81) Emily 3;1

ba ˈ***garduk****nu*

AT: **ba-**ˈ**gurduk-**nu

1SGS.SEE(13).FUT-drink-FUT

‘I will drink it’

(LAMP_20130502_WF_01_V1 00:21:47)

(82) Emily 3;1

tha ˈ***ni-wup***

2SGS.BE(4).FUT-sit.down

‘you sit down’

(LAMP_20130502_WF_01_V1 00:02:22)

(83) Acacia 2;7

Bill ***ma*** ˈ***nithu****-kanam*

AT: Bill **marn**ˈ**tithuk-**kanam

mam-rithuk=kanam

name **3SGS.HANDS(8).NFUT-be.a.nuisance**=3SGS.BE(4).NFUT

‘Bill she’s being a nuisance’

(LAMP_20130524_WF_01_V1 00:26:55)

The variation in the production of verbs of this structure highlights that the development of verbal prosodic structure is not divided into discrete stages. As observed in other languages, children produce a variety of different forms of a particular target prosodic structure at a single age (e.g. Deen, 2005; Swift & Allen, 2002). This variation can also occur when attempting to produce the same target utterance as highlighted in §3.3.3 (Deen, 2005, p. 20). Variation in the production of a single target is also found in the production of Murrinhpatha verbs. In the following example Acacia produces both well-formed instances of the verb 'you gather it for me' (lines 2 and 4) as well as omitting the unstressed initial syllable (lines 1 and 3).

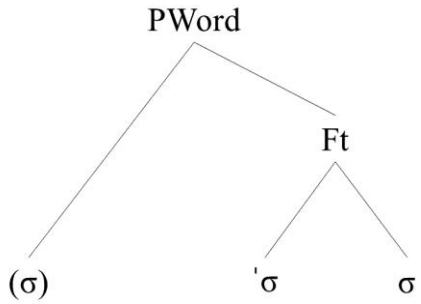
(84) Acacia 2;7

1		*Mavis*	*xxx*	*ˈ**ngakut**nu-nga*
	AT:			**na-**ˈ**nga-kut**nu=nga
		name	xxx	**2SGS.GRAB(9).FUT-1SG.IO-gather-**FUT=DM
		'Mavis you gather it for me'		
2		***na-** ˈ**nga-kut**-nu*		
		2SGS.GRAB(9).FUT-1SG.IO-gather-FUT		
		'you gather it for me'		
3		*ˈ**ngakut**nu*		
	AT:	**na-**ˈ**nga-kut-**nu		
		2SGS.GRAB(9).FUT-1SG.IO-gather-FUT		
		'you gather it for me'		
4		***na-** ˈ**nga-kut**-nu*		
		2SGS.GRAB(9).FUT-1SG.IO-gather-FUT		
		'you gather it for me'		

(LAMP_20130524_WF_01_V1 00:40:29)

This variation in the production of trisyllabic verbal PWords is reminiscent of what has been described for the acquisition of trisyllabic words in Spanish (Demuth, 2001). It is observed that children learning Spanish produce both well-formed and truncated trisyllabic word targets at the same age. This pattern of production is illustrated by the structure in (85) which shows a tendency to omit the initial unstressed unfooted syllables of such structures. This tendency is argued to be due to the minimal word constraint where a prosodic word should be no bigger or smaller than a foot (Demuth & Fee, 1995). As children are exposed to more trisyllabic words of this structure this constraint is overcome (Demuth, 2001). This is also the case for the acquisition of Murrinhpatha trisyllabic verbal PWords.

(85)



As discussed in §3.3.3 although accounts of early verb production typically accommodate for this type of variation they do not explain why a verb may be truncated in one context but not in another. Swift & Allen (2002) investigated what might predict variation in the production of verbal inflection in children acquiring Inuktitut. The factors they investigated were discourse/pragmatic, structural and emotional. They found that no one factor accounted for the observed variation in production but that many factors contributed to this phenomenon. This type of analysis is beyond the scope of this study but it does provide an interesting avenue for future research.

Another method to examine the development of verbal prosodic structures is to consider the development of a single frequent verb across the corpus in the speech of all

focus children. This allows us to gain a further insight into the progression of such a structure over time. The verb ‘to take off’ is the most frequent trisyllabic verbal PWord in the corpus. It is constructed of the CSP REMOVE(32), which is disyllabic in future indicative and imperative constructions, and the monosyllabic lexical stem *-pirt* ‘take off’. The verbal PWord is trisyllabic when no inter-stem morphology is present and the classifier stem encodes future tense. It is used on 10 occasions by 4 children between the ages of 2;7 and 5;8. These are arranged according to age in the table below.

Table 16. Production of ‘take off’ by Focus Children in Imperative & Future Indicative Constructions

Stage		Child Production		Adult Target	Age	Child
		Verbal PWord	Suffix			
I-A	a.	*‘ipirt*	*nga*	(nguˈngupirtnu-nga)	2;7	Acacia
	b.	*‘ipirt*		(ngunguˈwepirtnu)	2;8	Mavis*
	c.	*‘ipirt*	*nu*	(ngunguˈwepirtnu)	2;8	Mavis*
	d.	*‘ipirt*	*nukun*	(ngunguˈwepirtnu)	2;8	Mavis*
I-B	e.	*‘ngupirt*		(nguˈngupirt)	3;6	Acacia
	f.	*ngu’ngupirt*		(nguˈngupirt)	3;6	Acacia
	g.	*‘ngupirt*		(nguˈngupirt)	3;6	Acacia
II	h.	*ngu’ngupirt*		(nguˈngupirt)	4;4	Nathan
	i.	*thu’ngupirt*		(thuˈngupirt)	4;5	Mavis
	j.	*ngu’ngupirt*	*nu*	(nguˈngupirtnu)	4;11	Nathan
	k.	*thu’ngupirt*		(thuˈngupirt)	5;8	Molly

*These tokens are actually based on the production of a verb with a tetrasyllabic core but are included here as they are closely related verb forms whose truncated forms align with truncated forms of trisyllabic core verbs at this stage.

A clear developmental pathway can be observed for this particular verb which shows three non-discrete stages. During the first two stages I-A and I-B the trisyllabic verbal PWord tends to be reduced to a single trochaic foot. At stage I-A (2;7-2;8) the verbal PWord is disyllabic and consists of a well formed lexical stem and a preceding filler syllable *i*. The initial unfooted syllable of the target form is omitted. At stage I-B (3;6) there are well-formed verbs (f) as well as the continued production of truncated verb forms (e) and (g). These truncated verb forms however differ from those at stage I-A as both syllables produced in the verbal PWord are well-formed.[69] At stage II (4;4 and older) only well-formed trisyllabic PWords are observed.

The development of this verb is largely representative of the development of trisyllabic verbal PWords more generally. In early productions before age three the initial unstressed and unfooted syllable is prone to omission. The final syllable of the verb core is also more salient for children at this stage and is more likely to resemble the adult target than the preceding stressed syllable, which may be realised as a filler syllable. This is also supported by productions of disyllabic verbal PWords at this stage where the initial syllable displays greater variability. Children begin to produce a greater number of well-formed trisyllabic verbal PWords after age 3 although truncated verbs persist until at least 3;7 as shown in (74) and (78). After approximately 3;7 trisyllabic verbal PWords tend to no longer be truncated. This developmental pathway is effectively explained by a prosodic licensing model.

5.1.3.4 Tetrasyllabic Verbal PWord Targets (σ σ ˈσ σ)

Tetrasyllabic verbal PWords have a trochaic foot at their right edge. There is some conflicting evidence as to whether these structures have secondary lexical stress, see §2.2.2. In this study I treat adult targets as not having secondary stress following Mansfield (Mansfield, In Prep.a). This prosodic structure is shown in (66c). In contrast to trisyllabic verbal PWords, tetrasyllabic verbal PWords are scarce in Acacia and Emily's early productions. The earliest example of a well-formed verb of this type is produced by Acacia at age 2;7 in line 3 of (86). Her production is likely modelled on the production of the same word by her elder sister Mavis in line 1.

[69] It is however unclear whether this is actually the second syllable of the target verb or the initial syllable as these are identical in these target forms.

(86) Acacia 2;7, Mavis 4;6

1	*Mavis:*	*ya*	*ngarra*	***kana'lili?***
		ya	ngarra	**kanam-lili**
		HES	LOC	**3SGS.BE(4).NFUT-walk**
		‘hey where’s he walking’		
2	*Valerie:*	*ngarra*	*lektrik*	*xxx*
		LOC	electricity	xxx
		‘by the electricity (place)’		
3	*Acacia:*	***kana'lili***		
		kanam-lili		
		3SGS.BE(4).NFUT-walk		
		‘he’s walking’		

(LAMP_20130524_WF_01_V1 00:27:40)

Unsurprisingly, as with trisyllabic verbal PWords, tetrasyllabic verbal PWords are also truncated in children’s speech. There are two patterns of omission observed for verbs of this type both of which maintain the structure of the trochaic foot at the right edge of the verbal PWord. The first pattern of omission is for the first two syllables to be omitted resulting in a single trochaic foot. This was also the outcome when trisyllabic verbal PWords were truncated.

The following example of this omission pattern is taken from outside my own data collection and comes from an elicitation session being undertaken by Rachel Nordlinger investigating verbal body part incorporation. Mavis, one of the focus children of this study, was present during this elicitation session. Rachel is asking Mavis’s *maka* (FaMo) Carla[70] how to say ‘I will take the head off a toy doll’ for which Carla offers *ngungu'wepirtnu* in line 1. This production is then imitated by Mavis in line 4. This production is then described by Carla in lines 5-7. Mavis omits the initial syllable *ngu* of the adult target verb as well as the inflectional future tense suffix *-nu*. The second syllable of the adult target is realised as a

[70] This is the same Carla who is the primary RA for this study as discussed in §4.2.

filler syllable. Mavis's entire utterance is a single trochaic foot which corresponds to the trochaic foot at the right edge of the adult target verbal PWord.

(87) Mavis 2;8

1	*Carla:*	***ngungu-ˈwe-pirt-nu***
		1SGS.REMOVE(32).FUT-head-take.off-FUT
		'I will take its head off'
2	*Rachel:*	***ngungu-ˈwe-pirt-nu***
		1SGS.REMOVE(32).FUT-**head-take.off-**FUT
		'I will take its head off'
3	*Carla:*	*pelpith*
		head
		'head'
4	*Mavis:*	***ˈipirt***
	AT:	**ngungu-ˈwe-pirt-**nu
		1SGS.REMOVE(32).FUT-head-take.off-FUT
		'I will take its head off'
5	*Carla:*	*ˈipirtnu mam*
		ipirtnu 3SGS.SAY/DO(34).NFUT
		'she said "ipirtnu"'
6	*Carla*	*instead of ngungu ˈwepirt*
7	*Carla*	*but she was saying ˈipirtnu'*

(RN 20110805)

Another example of this pattern of omission is produced by Acacia in response to a prompt by Emily's mother Tania. The verb included in the prompt in line 1 *thanam ˈkaykay* is realised by Acacia as *nakay.* Acacia omits the initial two syllables and produces only a single trochaic

foot which resembles the foot at the right edge of the verbal PWord in the adult target. As was seen in early productions of both disyllabic and trisyllabic verbal PWords the final syllable of the PWord appears to be the most salient as it resembles the adult target whereas the preceding syllable produced by Acacia *na* differs from the adult target *kay*.[71]

(88) Acacia 2;7

1	*Tania:*	*thangku*	***ˌthanam-ˈkaykay***	*na-nge*
		what	**2SGS.BE(4).NFUT-call.out(RDP)**	2SGS.HANDS(8).FUT-3SG.F.IO
		‘say to her “why are you calling out?”’		
2	*Acacia:*	***ˈnakay***		
		ˌthanam-ˈkaykay		
		2SGS.BE(4).NFUT-call.out(RDP)		
		‘you are calling out’		

(LAMP_20130502_WF_01_V1 00:33:54)

This pattern of omission is consistent with the pattern of omission identified for trisyllabic verbal PWords. The few examples of this type identified for tetrasyllabic verbal PWords are also produced at a similar age of development to truncated trisyllabic verbal PWords before age 3;6.

The second pattern of omission impacting tetrasyllabic verbal PWords is for the PWord to be reduced to a trisyllabic PWord with the same lexical structure as adult trisyllabic verbal PWords with an initial unstressed unfooted syllable followed by a trochaic foot. Errors of omission of this type are identified in the corpus between age 3;6 and 4;5. This pattern of omission is neatly illustrated by Emily at age 3;7 when attempting to produce the verb *kewiˈnhipaknu/kewiˈnhipaknukun* ‘it will/might spill itself’. She truncates the verb so that it is a trisyllabic PWord with penultimate stress. This verb is then reformulated by Mavis aged 4;11. Mavis produces a tetrasyllabic PWord with the same lexical structure as the adult target

[71] It is also possible that Acacia is producing the 2nd and 3rd syllables of the adult target verb [nam kaj] as [na kaj]. However findings throughout the rest of the chapter suggest that this is unlikely to be the case.

form. Her production however is still not entirely adult-like in terms of the segments produced. The target form is then modelled for both Emily and Mavis by Emily's mother Tania who is also seeking clarification as to what the girls are talking about. This example provides a compact snapshot of the production of a specific verb across three age groups.

(89) Emily 3;7, Mavis 4;11

1	*Emily:*	***ka*ˈ*yipak****nu***	
	AT:	**ke-wi**ˈ**nhipak-**nu	
		3SGS.POKE:RR(21)-spill-FUT	
		'it will spill itself'	
2	*Mavis:*	***kawi*ˈ*yipak****nu***	
	AT:	**ke-wi'nhipak-**nu	
		3SGS.POKE:RR(21)-spill-FUT	
		'it will spill itself'	
3	*Tania:*	*ke-**wi**ˈ**nhipak**-nukun*	*ngarra?*
		3SGS.POKE:RR(21)-spill-FUTIRR	?what
		'what might spill itself?'	

(LAMP_20131105_WF_01_V1 00:16:14)

In the above production by Emily it is the initial syllable of the adult target form *ke-*, realised as *ka-*, which is maintained and not the second syllable *-wi*. Another omission error of this type is shown in (90) below produced by Mavis at 3;9.

(90) Mavis 3;9

	thang*ˈ*kala
AT:	**thani-ng**ˈ**kala**
	2SGS.BE(4).FUT-climb.up
	'you climb up'

(LAMP_20120831_WF_01_V1 00:28:23)

It is however not always the initial syllable of the adult target which is maintained. In other instances it is the second syllable of the adult target form which is maintained in the child's production. This is shown in (91) where Molly at age 4;5 is attempting to produce the tetrasyllabic verbal PWord 'I will climb up' *nganingˈkalanu*. Molly omits the initial syllable *nga-* and maintains the second syllable *-ni-* of the adult target in her production. This variation shows that it is the more abstract prosodic structure that children are sensitive to rather than the fully realised syllables of the adult target forms.

(91) Molly 4;5

	ngay-ka	***ningˈkala****nu*
AT:	ngay=ka	**ngani-ngˈkala-**nu
	1SG=FOC	**1SGS.BE(4).FUT-climb.up-**FUT

'I'll climb up'

(LAMP_20120830_WF_01_V1 00:10:31)

It is also possible that neither the initial nor the second syllable will be maintained when a verb of this type is reduced to a trisyllabic verbal PWord. In this case the initial unstressed syllable of the child's truncated verb production may also be produced as a filler syllable. This is shown in (92) where Nathan, aged 4;4, omits the initial syllables of the verb *ngunuˈnhiku* and produces a verb which begins with a filler syllable *a*.

(92) Nathan 4;4

1		*awu*	*riliwan*	*ma*
	AT:	awu	riliwan	matha
		no	true	INTS

'no it's true'

2		***a*ˈ*nhuku*-*ya***	*ngarra*	*kanarndurtdurt*
	AT:	**ngunu-**ˈ**nhi-ku**=ya	ngarra	kanarndurtdurt
		1SGS.FEET(7).FUT-2SG.DO-throw=DM	LOC	salt.water.crocodile
		‘I’ll throw you where the crocodile is’		

(LAMP_20130521_WF_01_V1 00:39:19)

Importantly this variation in production does not pose problems for a prosodic licensing model as the production of these verbs is constrained by a tendency to produce verbs according to the prosodic structure of trisyllabic verbal PWords. Each of the variations of this pattern of omission given in (90), (91) and (92) adhere to this constraint.

As with trisyllabic verbal PWords children also produce well-formed tetrasyllabic PWords at the same age as producing truncated forms of the same verb type. It has already been shown in (86) that children can produce verbs of this type as young as 2;7 when they are modelled in a previous utterance. Another example of a well-formed tetrasyllabic verbal PWord is given below produced by Nathan aged 3;7.

(93) Nathan 3;7

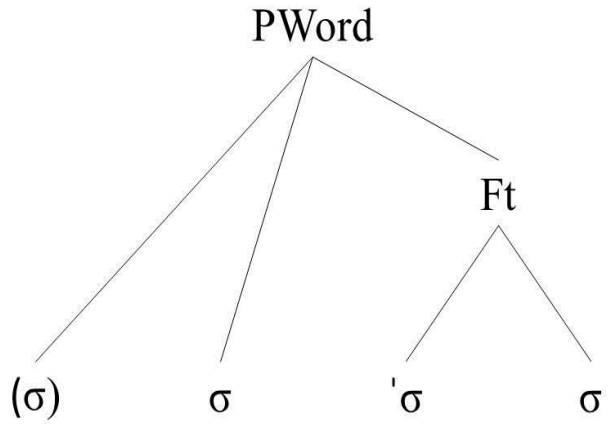
dam-nhi-*ˈ*riwak*=*kanam
3SGS.POKE(19).NFUT-1INCL.DO-follow=3SGS.BE(4).NFUT
‘he keeps following us two’

(LAMP_20120830_WF_01_V1 00:07:01)

Broader consideration of the data shows that children tend to produce both well-formed tetrasyllabic verbal PWords as well as producing forms where the initial syllable is omitted between 3;6 and 4;5. At this stage children’s productions are constrained by the structure

shown below, which shows that children allow tetrasyllabic verbal PWords but that the initial abstract syllable is prone to omission.[72]

(94)



As with the previous discussion of trisyllabic verbal PWords the corpus allows us to look at the production of a frequent tetrasyllabic verbal PWord across a broad age range. The most frequent verb of this type in the corpus is 'to climb up' which is constructed of the lexical stem *-ngkala* 'climb up' and CSP BE(4) which is disyllabic in all but its dual non-future and existential forms. The table below shows all the future indicative and imperative productions of this verb by focus children across the corpus.[73]

[72] Given the current proposed structure of tetrasyllabic verbal PWords it is unclear whether it is the initial or second syllable that is omitted.
[73] Tokens with inter-stem morphology have been omitted as these increase the length of the verbal PWord.

Table 17. Production of 'climb up' by Focus Children in Imperative & Future Indicative Constructions

Stage		Child Production			Adult Target	Age	Child
		Verbal PWord	?	Suffix			
I-A	a.	*ˈala**			(thaningˈkala)	-	-
I-B	b.	*ˈkala**			(thaningˈkala)	-	-
II-A	c.	*angˈala*			(nganingˈkalanu)	3;10**	Adam
II-B	d.	*pangˈkala*			(paningˈkala)	3;6	Acacia
	e.	*nganingˈkala*	*p*		(nganingˈkala)	3;6	Acacia
	f.	*kaningˈkala*		*gathu*	(kaningˈkalagathu)	3;7	Nathan
	g.	*thangˈkala*			(thaningˈkala)	3;9	Mavis
	h.	*paningˈkala*	*p*	*nu*	(paningˈkalanu)	4;5	Molly
	i.	*ningˈkala*		*nu*	(nganingˈkalanu)	4;5	Molly
	j.	*paningˈkala*	*p*	*nu-nga*	(paningˈkalanu-nga)	4;5	Molly
	k.	*paningˈkala*		*parra*	(paningˈkala-xxx)	4;5	Molly
III	l.	*kaningˈkala*	*p*	*nu*	(kaningˈkalanu)	5;3	Nathan
	m.	*paningˈkala*	*p*	*nu*	(paningˈkalanu)	5;4	Nathan
	n.	*kaningˈkala*	*p*	*nu*	(kaningˈkalanu)	6;1	Molly
	o.	*kaningˈkala*	*p*	*nu*	(kaningˈkalanu)	6;1	Molly

*These examples are constructed based on analysis relating to the production of other trisyllabic and tetrasyllabic verbal PWords before age 3.

**Adam's language production is typically behind the focus children and is excluded from the majority of data analysis (§4.3). This example is included here as it helps to demonstrate the observed stages of development with regard to the verb 'climb up'.

Two stages of development, II-B and III, are observed in the corpus for the verb 'to climb up', however based on broader findings in this chapter I hypothesise five potential stages of development. At stage I-A, typically before age 3, tetrasyllabic verbal PWords may be reduced to a single trochaic foot as was observed in (87) and (88) for other verbs of this type. This same pattern of reduction was also observed at a similar age for trisyllabic verbal PWords as shown previously in Table 16. At this stage it is the final syllable of the PWord that is most salient and is more likely to resemble the adult target form than the stressed syllable segment as shown in (a). This was observed for both disyllabic verbal PWords as shown previously in (68), (71) and (72) and for trisyllabic verbal PWords as shown in (77) and (78). At stage I-B the trochaic foot produced by the child resembles the foot at the right edge of the adult target PWord as shown in (b). This pattern of reduction was observed for trisyllabic verbal PWords as shown previously in 0, (75) & 0. At stage II-A and II-B children tend to produce tetrasyllabic verbal PWords as trisyllabic PWords. At stage II-A the initial syllable may be realised as a filler syllable. Adam, who was excluded from the study (§4.3), produces a form of 'to climb up' that illustrates this stage of development. In (c) he produces a relatively well-formed trochaic foot at the right edge of the verbal PWord preceded by a filler syllable *a*. This pattern of omission was also observed for other tetrasyllabic verbal PWord targets as in (92). At stage II-B, observed between 3;6 and 4;5, children produce both well-formed and truncated verb forms. In truncated forms the initial syllable is omitted. The segment which is produced as the initial unstressed syllable by the child may be either the first syllable of the adult target as in (d) and (g) or the second syllable of the adult target as in (i). The production of verbal PWords at this stage is represented by the structure in (94). At stage III, observed between 5;3 and 6;1, no more errors of omission impacting tetrasyllabic verbal PWords are produced as shown in (l) - (o).[74]

5.1.3.5 Developmental Stages of Verbal PWords

In analysing children's productions of bipartite stem di-, tri- and tetrasyllabic verbal PWords I have identified a number of commonalities in development. The production of these verbs is

[74] Another interesting observation regarding the production of the verb 'climb up' throughout the corpus is the production of a [p] consonant immediately following the verb core as shown in (f), (i), (k), (m), (n), (o) and (p). This was identified as an 'error' but it is unclear what may be the cause of this error. I am not aware of other similar errors in the corpus and investigation of this phenomenon is left for future research.

sensitive to the prosodic structure of the adult target language and, to a lesser extent, factors of perceptual salience. The development of these verbs in this corpus can be categorised in a number of stages. The development of each of these structures is summarised below.

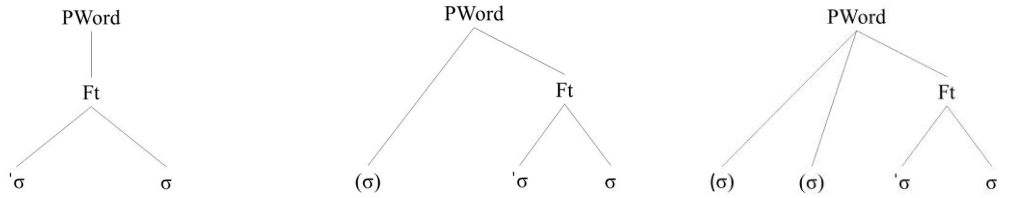
Initially, at stage I-A,[75] children's early verbs tend to be disyllabic verbal PWords. This means that tri- and tetrasyllabic verbal PWords will be reduced to a single trochaic foot. Also at this stage the syllable at the right edge of the PWord is more salient and consequently tends to more closely resemble the adult target syllable across children's productions. This stage was observed in children 2;8 and younger. At stage I-B children begin to produce more trisyllabic verbal PWords although many of these are still reduced to a single trochaic foot. This variation in production may even be observed for individual children producing a single lexical item in adjacent utterances, as in (84). Well-formed tetrasyllabic verbal PWords are still rare at this stage. Children tend to omit one or two of the initial syllables for verbs of this type. At stage I-B children still appear to prefer disyllabic verbal PWords although they begin to permit more trisyllabic PWords. Productions of this type are largely observed between 2;7 and 3;6. At stages II-A, B children tend to no longer truncate trisyllabic verbal PWords showing that this is now an acceptable prosodic verbal structure. Children do however continue to truncate tetrasyllabic PWords. The initial syllable of these verbs is prone to omission resulting in trisyllabic PWords. At stage II-A the initial syllable may be realised as a filler syllable. At stage II-B the phonemic form associated with either the first or second syllable may be preserved or omitted. Productions representative of this stage are observed between 3;6 and 4;5. After 4;5, at stage III, errors of omission impacting tetrasyllabic verbal PWords are not observed.[76]

[75] These stage numbers refer to the order of stages identified in this study. Stage I-A for example does not imply that this is the first stage of development in verb acquisition.

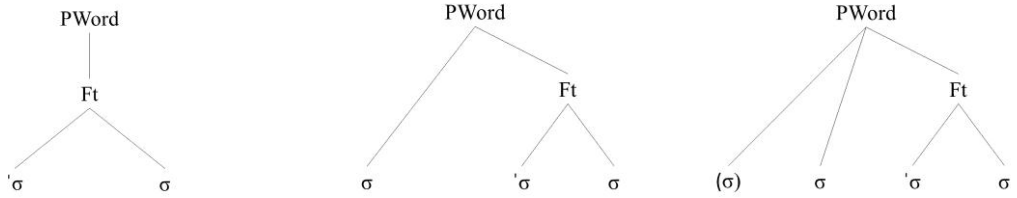
[76] Children learning Murrinhpatha must also learn to produce verbal PWords with cores greater than 4 syllables. There is however very limited data available in the corpus for verbs of this type so this is left for future research. It is likely however that these would also develop in the same way as the verb structures discussed here.

Figure 9. Developmental Stages of Verbal PWords

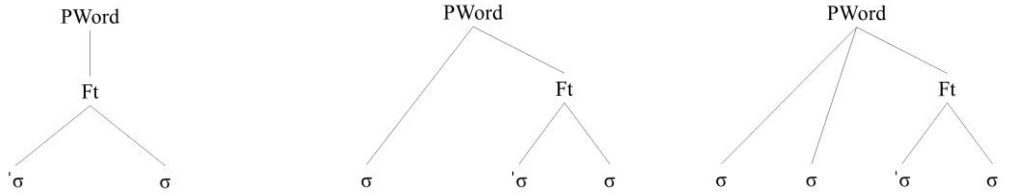
Stage I-A,B - Child <3;7



Stage II-A,B - Child ≈ 3;6-4;5



Stage III Child > 4;5



The developmental pathway described in this analysis shows children beginning at the right edge of the verbal PWord and then expanding leftwards through the gradual licensing of additional syllables accounted for by a prosodic licensing model (e.g. Demuth, 1996b, 2001). This leftward development from a right edge has also been described for a number of other languages with complex verb morphology such as Mohawk (Mithun, 1989) and several Mayan languages (C. Pye et al., 2007). This analysis has also found that children's early verb productions are sensitive to factors of perceptual salience (Peters, 1985; Slobin, 1985). Children are drawn to the right edge of the verbal PWord by the presence of lexical stress in a trochaic foot and the stable form of the lexical stem comparative to the classifier stem. Furthermore children find the final syllable of the verbal PWord particularly salient and

consequently this tends to most closely resemble the adult target form in early verb productions. These factors help explain why children begin at the right edge of the verb.

This pathway also has morphological implications for Murrinhpatha acquisition. It means that the lexical stem is produced earlier by children as it occurs at the right edge of the verbal PWord. This pattern of development also means that classifier stems are prone to omission. Lexical stems therefore tend to behave more like verb stems in other languages whereas classifier stems behave more like inflectional morphology. This has consequences for how children may begin to decompose bipartite stem verbs into their morphological parts. Children will treat the lexical stem as the 'true' verb stem and potentially associate verb semantics with this part of the verb. This hypothesis is supported by findings that children don't appear to attribute semantic information to classifier stems in their early bipartite stem verbs as explored in chapter 7.

5.2 Semantics & Pragmatics of Early Verbs

The previous sections have explored the structure of children's verbal PWords both as early verbs and throughout the corpus. I now focus on the semantic and pragmatic characteristics of children's early verb use before age 3. Several claims in the literature state that children's early verbs may be restricted either semantically or pragmatically (e.g. Bloom, 1991; Clark, 1993; Huttenlocher et al., 1983). These claims are based largely on studies of English acquiring children. I seek to address whether similar restrictions are also present in Murrinhpatha acquisition.

In terms of verb semantics, discussed previously in §3.4.1, it has been argued that children initially acquire and rely on 'general-purpose' verbs before later acquiring semantically heavier verbs (e.g. Clark, 1993). This claim has however been challenged by arguments that the early acquisition of such verbs is due to their high frequency and not their semantic generality (Theakston et al., 2004). Studies of languages other than English have found that general-purpose verbs do not predominate children's early verb use (e.g. P. Brown, 1998). I consider whether general-purpose verbs predominate children's early Murrinhpatha verb use. I also explore whether simple verbs are acquired before bipartite stem verbs given their general semantic nature.

The pragmatics of children's early verbs have remained relatively underexplored in the field. The few studies in this area (e.g. Huttenlocher et al., 1983; Naigles et al., 2009), which are based on English acquiring children, have found that children's early verbs are commonly used to refer to their own actions and to request action or attention from a hearer, see §3.4.2. This is consistent with broader findings that much of children's early speech is either self-directive or concerned with achieving change in the physical world with the assistance of others (Edwards & Goodwin, 1986) what I refer to as a self-interest bias. In terms of speech act categories (§3.4.2.2), which I use in exploring the Murrinhpatha data, early verbs are commonly used by children as commissives, to encode their own intention to act, as directives, to request action or attention from a hearer and to a lesser extent as representatives, typically to refer to actions of third persons. It has also been found that children tend to learn verbs better when they are used in contexts which precede the event being encoded (Tomasello, 1995). Based on these findings I consider whether children's verb use tends to occur before, during or after the events they encode.

In §3.4.2.4 I also explored whether the characteristics of early verb use may impact the acquisition of verbal morphology given that particular speech acts are associated with particular sentence types (e.g. König & Siemund, 2007). Specifically if children tend to produce a speech act of a certain type from a young age such as directives does this lead to the early acquisition of the associated sentence type imperative? In particular it has been observed that both directives and imperative constructions are prominent features of children's speech in a number of languages (e.g. Bavin, 1992; Huttenlocher et al., 1983; Küntay et al., 2014; Laalo, 2003; Naigles et al., 2009; Pfeiler, 2003; Salustri & Hyams, 2003) consequently I explore the extent to which this is the case in Murrinhpatha and whether such empirical facts are linked.

5.2.1. Verb Use Before 2;0

Acacia was recorded on three separate occasions during the first field trip when she was aged between 1;9 and 1;10. The first of these recordings was made in Wadeye inside the Mulurn-Patha (§4.5.1) with the two subsequent recordings made at the Wadeye Barge landing just outside of town involving fishing and picnicking. Each of these recordings also included Acacia's elder sister Mavis, as well as between one and three adult women, one of whom was

Acacia's mother Valerie. Acacia had begun speaking by this age however the recordings were largely dominated by the more socially and linguistically advanced Mavis who was aged between 3;7 and 3;9.

Only three verb tokens were identified in Acacia's speech across these recordings. These are given below in (95), (96) and (97). The first two tokens, produced within the same session, were of the verb 'turn to look' and were used as directives to request the attention of an adult. In (95) Acacia successfully directs her mother's attention towards a video camera or potentially to someone behind the camera.

(95) Acacia 1;10

	debil	*xxx*
AT:	**ne-birl**	
	2SGS.HANDS:RR(10).FUT-turn.to.look	xxx

'look xxx'

[Acacia points toward a video camera and Valerie's gaze follows her point]

(LAMP_20120822_WF_01_V1 00:08:29)

In (96) Acacia wants her mother to pay attention to a toy she is holding. Valerie does not respond to this request for attention. The imperative form of the verb 'turn to look' is produced 208 times by the focus children in this study making it the most frequent. It is also often used by caregivers and older children to gain the attention of younger children. It is therefore not surprising that it is the earliest verb identified given that children ten to acquire high frequency forms earlier (Ambridge et al., 2015).

(96) Acacia 1;10

	mama	***debil***
AT:		**ne-birl**
	Mo	**2SGS.HANDS:RR(10).FUT-turn.to.look**

'mum look'

[Acacia shows a toy to Valerie but this request for attention is ignored]

(LAMP_20120822_WF_01_V1 00:13:37)

The other verb identified in Acacia's speech at this stage was 'get'. In this instance Acacia uses this verb as a directive to request some orange from her sister Mavis. Mavis appears to reject this request although her speech is unintelligible as she is eating an orange and Acacia is then given some orange by her *maka*[77] (FaMo) Carla.

(97) Acacia 1;10

	unga
AT:	**nangart**
	na-nga-art
	2SGS.GRAB(9).FUT-1SG.IO-**get**
	'get it for me'

(LAMP_20120831_WF_01_V1 00:03:25)

As with 'turn to look' this is an imperative verb construction. Imperative verbs in Murrinhpatha are minimally constructed from a 2nd singular future classifier stem and a lexical stem for bipartite stem verbs making them morphologically relatively simple. It is difficult to make any substantial claims about the nature of Acacia's verb use at this stage due to the paucity of use. Interestingly, however, the verbs identified are used as directives to request action or attention from a hearer consistent with findings of early verb use in English (e.g. Naigles et al., 2009) and the relatively early acquisition of directives cross-linguistically (Küntay et al., 2014). These examples also suggest a link between the form and function of early verbs as these are all imperatives.

At this stage of development Acacia's language use does not typically employ verbs. This can be seen in situations where verb use might be anticipated in adult interaction. In the following example Carla, Acacia's *maka* (FaMo), tells Acacia to go and get oranges for the both of them, lines 1-6. The oranges are on a table which is too high for Acacia to reach. This means that Acacia must request the oranges from her mother Valerie who is standing next to

[77] This is potentially a child form of *mangka* although it is unclear whether this is a special kinterm used by and towards children, a shift in the production of the term in the language more generally or the reduction of a consonant cluster in children's early speech.

the table. Acacia makes this request in line 7 while also producing a 'GIMME'[78] gesture in the direction of her mother. This utterance is constructed of the object being requested 'orange' followed by the 1st singular pronoun *ngay* followed by the kin term *mama* 'mother'. What is 'missing' from this utterance is the verb 'get'. This is despite the fact that this verb was used by Acacia to ask for some orange from her sister earlier in the session and a different form of this verb is used by Carla in the preceding conversation. These verbs appear in bold in lines 3 and 6.

(98) Acacia 1;10

1	*Carla:*	*yawu*	*mi*	*orange*	*pangu*	*karrim*
		hey	CLF:VEG	orange	there	3SGS.STAND(3).EXIST
		'hey there are oranges there'				
2	*Carla:*	*mi*	*orange*			
		CLF:VEG	orange			
		'oranges'				
3	*Carla:*	*orange*	***nanhertdharra***			*orange*
		orange	**na-nhe-art-dharra**			orange
		orange	**2SGS.GRAB(9).FUT-1INCL.IO-get-moving**			orange
		'oranges you go get oranges for us'				
4	*Acacia:*	*wawit*				
	AT:	orange				
		orange				
		'oranges'				
5	*Carla:*	*yu*				
		'yes'				

[78] This term is adopted from (Kelly, 2006, p. 32) "GIMME: holding out an open palm as if to receive an object while gaze is on the object or a caregiver.

6 *Carla:* *orange* ***nanhertdharra***
orange **na-nhe-art-dharra**
orange **2SGS.GRAB(9).FUT-1INCL.IO-get-moving**

'you go get oranges for us'

7 *Acacia:* *xxx xxx*

xxx xxx

[Acacia walks toward oranges which are on a table. Her mother is standing next to the table]

8 *Acacia:* *wawit* *ngay-yu* *mama*
AT: orange ngay-yu mama
orange 1SG-DM Mo

'mum orange me'

[Acacia makes GIMME gesture towards her mother]

9 *Acacia:* *wayit* *ngawu* *two*
AT: orange ngay-yu two
orange 1SG-DM two

'two oranges me'

[Acacia continues holding GIMME gesture. Acacia's mother ignores this gesture. Acacia then climbs on a bench to gain access to the oranges on the table.]

(LAMP_20120831_WF_01_V1 00:34:46)

The key difference between the requests for oranges by Acacia in (97) and (98) is the discourse status of the oranges. In (97) the oranges are central to the interaction underway. In this context it is clear that Mavis's orange is what Acacia is requesting. Contrastively, in (98) Acacia must first make clear to her mother what it is she wants as there are many other items on the table as well as oranges. The need to identify the item being requested may lead to the lack of an appropriate verb being produced as the utterance becomes too long and complex for Acacia to produce, reminiscent of telegraphic speech (Bloom, 1970).

The scarcity of verbs in the corpus at early stages of development is perhaps contrary to what might be expected for a polysynthetic language. Especially when considering that polysynthetic verbs can constitute free-standing utterances without relying on context to encode information about the predicate and all its arguments (Evans & Sasse, 2002). Findings for other polysynthetic languages in this regard are mixed. It has been found for Tzotzil, a mildly polysynthetic Mayan language, that verbs are used more frequently than nouns by children (de León, 1999, 2007a). By contrast evidence of an early noun-bias has been observed for the polysynthetic languages Navajo (Gentner & Boroditsky, 2009) and Chintang (Stoll et al., 2012). Consequently whether or not a language is classified as polysynthetic is not determinate of whether verbs are acquired earlier or later in development. The lack of early verb use in Murrinhpatha is perhaps less surprising when considering findings that 32% of clauses in an adult-adult speech corpus consist just of NPs (Mujkic, 2013). I leave the analysis of factors influencing a lack of early verb use for future research as this requires careful investigation of the nature of Murrinhpatha child-directed speech including the frequency and morphological complexity of verb use and consideration of child-directed speech crosslinguistically.

Despite the identification of only 3 verb tokens at this stage we can state the following findings regarding Acacia's verb use at this age. Firstly there is evidence that verbs are used by children as young as 1;10 including the use of bipartite stem verbs, although verb use is infrequent. Secondly early verb use includes use as directives such as requests for action and attention from a hearer. These directives are realised as imperatives suggesting a link between the function of early verbs and their form.

5.2.2. Verb Use From 2;4 -2;7

In this section I examine the verb use of Emily and Acacia at similar ages between 2;4 and 2;6 and between 2;6 and 2;7 respectively. Emily's verb use is based on three recording sessions of which approximately 60 minutes has been transcribed. Acacia's verb use is drawn from four recording sessions of which approximately seventy minutes has been transcribed. [79]

[79] Providing precise figures of the amount of interaction transcribed is difficult as when recordings involved younger children, in particular children under 3, I did not transcribe lengthy stretches of interaction. Instead I focused on smaller, often quite short segments, in which the children were speaking and where potential verbs were identified as discussed in §4.7. Transcription was particularly sporadic in two of Emily's sessions LAMP_20120711_WF_01_V1 and LAMP_20120724_WF_01_V1.

During this period Acacia produced 28 spontaneous verb tokens (excluding repetitions) and Emily produced 7. This shows a substantial increase in verb use by Acacia compared to her use at 1;9-1;10. Spontaneous verb use is however infrequent in Emily's speech. The verbs used by each of these children (including simple verbs) are listed in the following table ordered alphabetically by lexical stem.

Table 18. Spontaneous Early Verb Use: Acacia (2;6-2;7) and Emily (2;4-2;6)

Verbs			Children	
Lexical Stem	**Classifier Stem**	**Verb Meaning**	**Emily**	**Acacia**
-	SIT(1)	'be (sitting)'		3
-	STAND(3)	'be (standing)'		2
-	BE(4)	'be'		2
-	GO(6)	'go'		3
-	HANDS(8)	'do'		3
-art	GRAB(9)	'get'	1	1
-bat	DOWN:INTR(18)	'fall'		1
-bat	SLASH(23)	'hit'		1
-birl	HANDS:RR(10)	'turn to look'	1	2
-gurduk	----(13)	'drink'		2
-ku	TRAVEL(7)	'throw'		1
-kut	TRAVEL(7)	'gather'		1
-lele	BASH(14)	'bite'		1
-lili	BE(4)	'walk'		1
-pak	DOWN(17)	'put down'	1	1
-pirt	----(32)	'take off'		1
-rithuk	HANDS(8)	'be a nuisance'		1
-watha	HANDS(8)	'make'	3	
-yit	HANDS(8)	'hold'	1	1
Total			7	28

Emily uses only general-purpose verbs including ‘do’, ‘give’ ‘put’ ‘make’ and ‘hold’ in her observed verb use. Acacia uses both general-purpose verbs as well as a number of verbs which encode more specific semantics such as ‘be a nuisance’ and ‘drink’. The observation that Emily’s spontaneous verb use, which is less frequent than Acacia’s, consists only of semantically general-purpose verbs suggests that children may initially produce ‘generic’ verbs before producing verbs which are semantically more specific or ‘heavier’ similar to claims regarding English acquiring children (e.g. Clark, 1993).

Additional support for this pattern of development is also observed in Acacia’s use of the simple verb ‘do’ as a directive. This verb is constructed of the 2nd singular future form of CSP HANDS(8) *na-* as well as a 1st singular indirect object marker *-nga*.[80] Acacia uses this verb in two distinct contexts where semantically more specific or heavier verbs would be more appropriate. The first instance of this type occurs when Acacia asks the researcher to draw a snake for her on the ground, given in (99). At this time I had been drawing with charcoal on a concrete slab with Acacia and her elder sister Mavis for a few minutes and had already drawn a snake like picture. In this instance the verb *nangawatha* ‘you make it for me’ would have been more appropriate. This is however also a semantically relatively generic verb.

(99) Acacia 2;7

1	*na-nga*	
	2SGS.HANDS(8).FUT-1SG.IO	
	‘do it for me’	
2	*pangkuy*	
	long	
	‘snake’	

(LAMP_20130524_WF_01_V1 00:07:58)

[80] It is unclear whether this is actually a form of CSP hands(8) or a special form of CSP say/do(34) used for 2nd singular subjects in combination with indirect object markers as hands(8) does not typically have this general ‘do’ meaning.

The other instance involves Acacia using *nanga* ‘you do it for me’ in place of *nangarara* ‘you peel it for me’, shown in (100). Acacia is attempting to peel an orange without success. As a result she asks her mother Valerie to ‘do’ the orange for her (line 1). Valerie responds by telling Acacia to ask ‘deaf one’ to ‘do it for her’. Valerie also uses a different form of the semantically generic verb ‘do’ in her response to Acacia rather than potentially modelling the use of ‘peel’.

(100) Acacia 2;7

1	*Acacia:*	*mama*	***nanga***	*mi*	*orange*
		Mo	**2SGS.HANDS(8).FUT-1SG.IO**	CLF:VEG	orange
		xxx	***nanga***		
		xxx	**2SGS.HANDS(8).FUT-1SG.IO**		
		‘mum do the orange for me, do it for me’			
2	*Valerie:*	*tebala*	*ma-mpa*	*dharra*	
		deaf.one	3SGS.HANDS(8).FUT-2SG.IO	MOVING	
		‘deaf one will do it for you, go’			
3	*Mavis:*	*Acacia*	*mi*	*xxx*	*Acacia*
		name	CLF:VEG	xxx	name
		‘Acacia food xxx Acacia’			
4	*Acacia:*	*tebala*			
		deaf.one			
		‘deaf one’			
		[Acacia walks towards ‘deaf one’]			

(LAMP_20130524_WF_01_V1 00:32:35)

Interestingly both of the verbs that would be more appropriate in the above contexts also contain the CSP HANDS(8). The verb ‘peel’ is constructed from HANDS(8) and the lexical stem *-rara* whereas ‘make’ is constructed from HANDS(8) and the lexical stem *-watha*. It is unclear

however whether the relationship between these verbs helps to drive the use of a more generic general-purpose verb in these contexts or whether this is coincidental.

This data suggests that children may initially rely on general-purpose verbs when acquiring Murrinhpatha before acquiring semantically more specific verbs. This is evidenced by the lack of semantically 'heavy' verbs in Emily's early verb use as well as by the use of general-purpose verbs in contexts where semantically heavier verbs would be more appropriate. Furthermore Acacia's use of simple verbs in place of bipartite stem verbs suggests these may account for a larger proportion of a child's early verb use compared with later in development. Bipartite stem verbs are however also utilised as soon as children begin using verbs in this study and many may also be general-purpose verbs. It is unclear whether these characteristics of early verb use are due to semantic generality as has been proposed by several researchers (e.g. Clark, 1978) or whether this is due to the input frequency of 'generic' verbs as argued by Theakston et al. (2004). Evaluating the role of input frequency in this area is left for future research.

Emily and Acacia's verb use is comprised largely of directives, which request action or attention from a hearer as well as commissives, which state the child's intent to act. These two functions are closely linked to particular types of verb constructions. Directives are predominantly realised as imperative verbs and occasionally as 2nd person singular future indicative verbs. These constructions are structurally very similar only differentiated by the presence or omission of the tense marker *-nu*.[81] Commissive utterances are mostly realised as 1st singular future indicative verbs.

Of Emily's 7 spontaneous verb tokens 5 of these are directives. Emily uses verbs to direct the attention of caregivers as shown in (101). In this instance Emily uses an imperative verb to attract the attention of Pauline, a young woman who she is playing with, to a toy hammer which she has just picked up.

[81] Mansfield (2014b) finds, for young men's speech, that the presence or absence of the tense marker *-nu* is not categorical in differentiating indicative and and imperative uses. This further highlights the structural similarity of these constructions.

(101) Emily 2;4

	nerl	
AT:	**ne-birl**	
	2SGS.HANDS:RR(10).FUT-turn.to.look	
	‘look’	
	[Emily shows the toy hammer she has picked to Pauline]	
		(LAMP_20120711_WF_01_V1 00:12:48)

Emily also uses verbs to request action from the hearer as in (102). Emily is playing with her two elder brothers and her mother Tania building small ‘houses’ out of twigs. Emily directs her mother to make the house. This same directive function was observed in Acacia’s speech in (99) and (100) previously.

(102) Emily 2;6

	nhinhi	***mathanu***
AT:		**na-watha-nu**
	2SG	**2SGS.HANDS(8).FUT-make-FUT**
	‘you will make it’	
		(LAMP_20120910_WF_01_V1 00:32:23)

In addition to using verbs as directives both Emily and Acacia use verbs as commissives to state their intent to act. This is consistent with findings for verb use in English which find that children often use verbs before they perform the encoded action (e.g. Huttenlocher et al., 1983). Verbs used in this way are typically 1st person singular future indicative verbs. As discussed above future indicative verbs are structurally similar to imperative verbs. In these instances however the classifier stem encodes a 1st person subject rather than 2nd person. An example of this type of use by Emily is given in (103). Emily states that she is going to get something and then she proceeds to reach out and grab an object.

(103) Emily 2;4

mart
ma-art
1SGS.GRAB(9).FUT-get
'I will get it'
[Emily reaches out and grabs a toy hammer]

(LAMP_20120711_WF_01_V1 00:12:32)

This same type of verb use is evidenced in Acacia's speech in (104) where she states that she will throw something immediately before throwing it.

(104) Acacia 2;7

nukuwarda
AT: **ngunu-ku-warda**
1SGS.FEET(7).FUT-throw-NOW
'I will throw it'
[Acacia throws an object]

(LAMP_20130524_WF_01_V1 00:29:06)

1st singular future indicative verbs are however not used exclusively to state the child's intention to act at this age. They may also be used to request permission to act from a more authoritative hearer (also a commissive), or they may be used as indirect directives to request action from a hearer. An example of a request for permission comes from child speech data outside the core data considered in this study collected by Lucy Davidson as part of the larger LAMP project. In this example Elsie who is 2;9 is trying to look at and no doubt handle a fish that has just recently been caught and placed on a table. Initially she begins to climb onto a bench to gain access to the table. Elsie is however swiftly removed by her *kawu* (MoMoZi)

Naomi and put back on the ground. She then asks if she can look as shown in (105). Naomi evades this request by directing Elsie away to play with other children.

(105) Elsie 2;9

xxx	***ba-ngkardu***	*mani?*
xxx	**1SGS.SEE(13).FUT-look**	be.able

'I will try look?'

(LAMP_20151007_LD_01 00:36:21)

The use of a 1st singular future indicative verb to request permission is also produced by Acacia. In the below example Acacia is fiddling with the buckle on her microphone backpack as she wants to take it off. She then uses the verb meaning 'take off' to ask the researcher if the backpack can be removed. The verb form however is truncated, according to the prosodic licensing model described previously (§5.1.3), so that it is unclear whether a 1st or 2nd person subject is intended. If a 2nd person subject is intended the adult target would be an imperative verb.

(106) Acacia 2;7

	ipirt-nga
AT:	**ngungu-pirt-nu=nga**
	1SGS.REMOVE(32).FUT-take.off-FUT=DM

'(I will) take it off?'

[Acacia is fiddling with the buckle on her microphone backpack]

(LAMP_20130524_WF_01_V1 00:20:33)

An example of a 1st singular future indicative verb being used as an indirect directive is found in Acacia's verb use. In this interaction, given in (107), there is a single bottle of juice being drunk by Mavis. Carla, Acacia, Mavis and Molly's grandmother, asks for the drink from

Mavis in line 1 and is then given it. Acacia asks to be given the drink now held by Carla in line 5 by using the verb meaning 'I will drink it'. Acacia also reaches out towards Carla making her intention to have the drink clear. Carla then hands the drink to Acacia who gleefully claims it as her own.

(107) Acacia 2;6, Mavis 4;5, Molly 5;0

1 *Carla:* *kura-gathu*
CLF:WATER-HITH
'give me the drink'
[Carla is speaking to Mavis who is holding a drink bottle]

2 *Carla:* *dangarduk*
dam-nga-gurduk
2SGS.SEE(13).NFUT-1SG.IO-drink
'you're drinking mine'
[Mavis hands the drink bottle to Carla]

3 *Molly:* *Mavis* *ba-mpa-rduk*
Mavis ba-mpa-gurduk
name 1SGS.SEE(13).FUT-2SG.IO-drink
'Mavis I will drink your drink'

4 *Mavis:* *yu*
yes

5 *Acacia:* ***badu*** ***baduk***[82]
AT: **barduk** **barduk**
ba-gurduk **ba-gurduk**
1SGS.SEE(13).FUT-drink **1SGS.SEE(13).FUT-drink**
'I'll drink it I'll drink it'
[Acacia reaches towards the drink bottle held by Carla]

[82] The target form is potentially *ba-mpa-gurduk* as produced by Molly in line 3.

6 *Molly:* *xxx* ***bamparduk*** *Acacia*
xxx **ba-mpa-gurduk** Acacia
xxx **3SGS.SEE(13).FUT-2SG.IO-drink** name
'xxx Acacia she'll drink from yours'

7 *Acacia:* *ngay xxx xxx xxx*
1sg xxx xxx xxx
'mine'

8 *Acacia:* *ngay-yu mana ngay-yu mana ngay-yu mana*
1SG-DM xxx 1SG-DM xxx 1SG-DM xxx

ngay-yu mana ngay-yu mana
1SG-DM xxx 1SG-DM xxx

'mine, mine, mine, mine, mine'

[Carla gives drink to Acacia]

9 *Molly:* *ngay-ka ha ha*
1SG-FOC HaHa
'mine ha ha'

(LAMP_20130423_WF_01_V1 00:09:54)

Although these 1st singular future indicative verbs are used in various ways they all have in common the child's desire to perform an impending action. In examples (103) and (104) there is no barrier to the child's action, in (105) and (106) the child is seeking permission indicating they may not be allowed to perform the action and finally in (107) the child first requires the action of another in order to perform their intended action.

As well as using verbs as directives and commissives Acacia uses verbs as representatives to describe the actions and location of other entities, particularly other people in the recording environment. Emily is not observed using verbs in this way. When describing the actions of another person these verbs either anticipate the actions of a person or describe an ongoing state of affairs. In (108) Acacia states that her elder sister Mavis, who is climbing on a fence, will fall. The verb construction is future indicative, similar to directive

and commissive verb forms already discussed, except that the verb encodes a 3rd person singular subject.

(108) Acacia 2;7

1	*Acacia:*	***buy-bat-nu***	*Mavis*
		3SGS.LOWER:INTR(18).FUT-fall-FUT	name
		'Mavis will fall'	
2	*Acacia:*	***buy-bat-nu=nga***	
		3SGS.LOWER:INTR(18).FUT-fall-FUT=DM	
		'she will fall'	
		[Acacia is pointing towards Mavis who is climbing a fence, while talking towards Bill]	

(LAMP_20130524_WF_01_V1 00:15:15)

The example in (109) is one of the few examples of an early verb being used to describe an ongoing state of affairs. Examples of this type are of particular interest as the difference in use is partnered with a difference in structure. Whereas all the verbs discussed thus far have had future classifier stems, the verb 'be a nuisance' in (109) has a non-future classifier stem as well as a serialised verb element which is used to encode an ongoing state of affairs in adult Murrinhpatha (Nordlinger & Caudal, 2012, p. 88).

(109) Acacia 2;7

	Bill	***manithu-kanam***
AT:		**marntithuk-kanam**
		mam-rithuk=kanam
	name	**3SGS.HANDS(8).NFUT-be.a.nuisance=3SGS.BE(4).NFUT**
	'Bill she's being a nuisance'	

(LAMP_20130524_WF_01_V1 00:26:55)

This usage potentially represents more advanced verb use by Acacia as it is not representative of her verb use more broadly at this age. Furthermore such forms are not found in Emily's speech at a similar age or in Acacia's earlier verb use at 1;9-1;10. The development of features encoded by classifier stems is considered in detail in §6.2. Interestingly the production of this verb by Acacia is preceded by the production of this same verb form by her elder sister Mavis (4;7) around twenty seconds earlier as shown in (110).

(110) Mavis 4;7

Bill	*kanhi*	***marntithuk-kanam***	***Acacia***
		mam-rithuk=kanam	
name	there	**3SGS.HANDS(8).NFUT-be.a.nuisance=3SGS.BE(4).NFUT**	name

'Bill there, Acacia is being a nuisance'

(LAMP_20130524_WF_01_V1 00:26:33)

Both girls are using this verb to call out to me in the distance both claiming that the other is being a nuisance. It is clear that Acacia understands the meaning of this verb form and how it is being used in this specific context. It is however unclear whether Acacia would be able to produce this verb spontaneously without prior modelling. Such examples highlight issues around what constitutes acquisition of a particular structure and what productions can be considered evidence of a child's knowledge in a naturalistic recording context. Often productions like Acacia's in (109) may be excluded from acquisition studies as its use is potentially reliant on the previous use rather than representing Acacia's verb knowledge. I however believe that such productions are worthy of attention in acquisition studies and potentially show children using the surrounding speech environment to learn to use more complex constructions.

Acacia also uses simple verbs, inflected for existential TAM, to refer to the existence/location of 3rd person entities within the recording space. The function of existential TAM is still not well understood in the adult language however Nordlinger & Caudal (2012, p. 101) note that it is "most commonly found in constructions that generally assert the

existence of an entity, place, state or event; and (are) only found in the third person." Acacia uses a small set of existential verbs to refer to the location of 3rd person entities. These are simple verbs which encode the stance/motion of the entity in adult speech (e.g. moving, sitting, standing). It is unclear whether Acacia uses these forms to encode stance/motion in an adult manner at this age. A typical use of an existential verb is given below. In this instance Tania asks Acacia about the location of an animal that they had previously been talking about. Acacia responds in line 2 using a simple existential verb *kem* to indicate the location of the animal. Her utterance is also accompanied by a point.

(111) Acacia 2;7

1	*Tania:*	*ngarra*	*ku-yu?*
		where	CLF:ANIM-DM
		'where's that animal?'	
2	*Acacia:*	***kem***	*panguthu*
			pangu-gathu
		3SGS.SIT(1).EXIST	there-HITH
		'it's over that way'	
		[Acacia points to her left]	
3	*Tania:*	*mm*	
		'mm'	

(LAMP_20130502_WF_01_V1 00:23:07)

In my interactions with young children around Wadeye these simple existential verbs, in particular *kem* 3SGS.SIT(1).EXIST, *karrim* 3SGS.STAND(3).EXIST, *kanam* 3SGS.BE(4).EXIST and *kurran* 3SGS.GO(6).EXIST, are all used relatively frequently to either discuss the location of other people or when pointing to particular entities. The early use of these verbs by children is due to both their usefulness in referring to entities in the surrounding context, often being used to facilitate 'joint attention' with another speaker, as well as the fact that they are frequently used, short, morphologically simple, monomorphemic words.

The early verb use of Emily and Acacia also provides evidence as to how children don't use early verbs. It is of course difficult to strongly claim what children don't do based on such a small sample of speech however there are a number of uses absent that are found in similar recording contexts at later stages of development. Perhaps the most notable absence is that neither Acacia nor Emily use verbs to refer to past events. All verbs were either used to refer to future events (directives and commissives) or to ongoing events, states of affairs and the location of entities (representatives). The relationship in time of the verbal utterance to the encoded event is shown below for Acacia's verb use.

Table 19. Verb Use in Relation to Event: Acacia 2;6 - 2;7

BEFORE EVENT	DURING EVENT	AFTER EVENT
'bite'	'be a nuisance'	
'drink'	'be (sitting)'	
'fall'	'be (standing)'	
'gather'	'be'	
'get'	'go'	
'hold'	'walk'	
'turn to look'		
'put down'		
'do'		
'take off'		
'throw'		

English acquiring children have been found to best acquire verbs when they precede the event they encode (Tomasello, 1995). I hypothesised in §3.4.2 that this may also lead children to predominantly use verbs in the same way. This has been suggested by some studies which find that children's early verbs often precede their own actions (Huttenlocher et al., 1983; Smiley & Huttenlocher, 1995). These findings appear to support this hypothesis that Murrinhpatha acquiring children tend to use verbs in contexts where the encoded event is yet

to occur. This mirrors findings in Murrinhpatha that children's early verbs are used regularly as directives and commissives which precede the intended or requested event.

Another notable absence was that verbs were not used to refer to dual, paucal or plural subjects, only singular subjects were identified. It is unclear whether this is due to the complexity of using such forms or whether this was due to a lack of opportunity to use these forms in the interactions being recorded.[83] It is clear however that as children begin to use verbs for a wider variety of uses this will inevitably result in the need to use verbs with more varied and complex morphology, something that appears to be largely unnecessary at the early stages of verb use.

5.2.3. Grammatical Development and Early Verbs

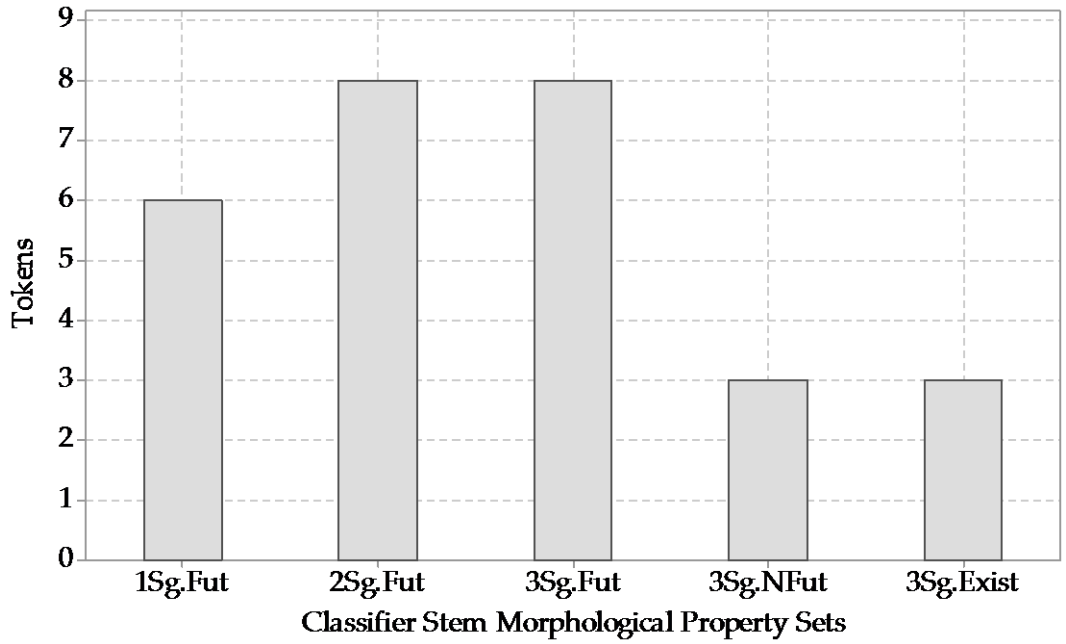
It has been observed for children acquiring English that verbs may be used for a small range of functions in particular as directives, to request action and attention from a hearer, and as commissives, to state a child's intention to act (Huttenlocher et al., 1983; Naigles et al., 2009). In §3.4.2.4 I suggested this may have an impact on acquisition given that some speech acts are associated with certain sentence types (König & Siemund, 2007; Levinson, 1983; Sadock & Zwicky, 1985). This may potentially result in the early acquisition of sentence types associated with early acquired speech acts.

It has been observed in this chapter that the early verbs of Acacia and Emily are only used for a small range of functions directives, commissives and to a lesser extent representatives. Each of these uses has tended to be encoded by a particular type of verb construction. Directives were largely imperative verbs, commissives were largely 1st singular future indicative verbs and representatives included a mixture of 3rd singular future indicative, 3rd singular non-future and 3rd singular existential verbs. This results in only a small portion of Murrinhpatha's rich verbal morphology being utilised. In particular this may impact the development of CSPs which encode subject person and number as well as TAM. A CSP can have over 40 morphological property sets however only a small number of these property sets are attested in Acacia and Emily's early verbs. The following graph represents the different classifier stem property sets used by Acacia between age 2;6 to 2;7. This data

[83] See Forshaw (2014) for a preliminary investigation of this question.

comes from two recordings sessions of which approximately 70 minutes was transcribed and coded (§4.7). During these recordings Acacia produced 28 standard[84] verb tokens. Across these 28 verb tokens only 5 different classifier stem morphological property sets were used. Interestingly these property sets also have in common that they encode singular subjects and the majority encode future tense. Therefore it appears that only a small core of morphological property sets are encoded by classifier stems in children's verb use at this age. These findings suggest a link between the development of classifier stem paradigms and the function of early verbs. The development of CSP cell diversity is explored further in chapter 6.

Figure 10. Classifier Stem Morphological Property Sets: Acacia 2;6-2;7



It has also been observed in a number of languages that imperative verbs are acquired early and may be used by children at increased rates compared to adult speech (e.g. Salustri & Hyams, 2003). Salustri & Hyams (2003, 2006) argue that this is due to the underspecification of agreement and tense, the same underlying factors used to account for an optional infinitive stage in some languages (Schütze & Wexler, 1996). My findings regarding Murrinhpatha

[84] Standard refers to adult-like verb productions.

verb acquisition however suggest that the early acquisition and potentially higher rate of imperative verb use early in development may be in part linked to the early use of directives. Interestingly in languages with an optional infinitive stage it has been noted that root infinitives have a similar directive function to imperative verb forms in other languages (Salustri & Hyams, 2006). Future research could be undertaken to explore whether the optional infinitive stage may be linked to the development of pragmatic function.

A number of other factors are also likely to contribute to the early acquisition of imperative verbs in particular. Firstly, as discussed in §3.4.2.4, imperative verb use is also relatively frequent in child-directed speech (Belletti & Guasti, 2015; Cameron-Faulkner et al., 2003). The greater frequency of these verbs therefore likely contributes to their acquisition (Ambridge et al., 2015). Furthermore imperative verbs in inflecting languages tend to be morphologically relatively simple (König & Siemund, 2007) which may also make them easier to acquire and produce.

5.3 Summary

This chapter has examined early bipartite stem verb use with a focus on verb use before age 3. §5.1 considered the development of verbs in terms of the prosodic structure of verbal PWords. It found that children initially produce the trochaic foot at the right edge of the verbal PWord and then gradually incorporate preceding syllables. This pathway of development was accounted for by a prosodic licensing model (e.g. Demuth, 1996b, 2001) with some influence from factors of perceptual salience (Peters, 1985; Slobin, 1985). §5.2 considered the semantic and pragmatic characteristics of early verb use. It found that children potentially initially rely on ‘general purpose’ verbs before acquiring more semantically specific verbs although this requires further investigation as suggested by some studies for English acquiring children (Clark, 1993). It also found that early verbs in Murrinhpatha were used for a small range of pragmatic functions as has been described for English (e.g. Huttenlocher et al., 1983; Naigles et al., 2009). In particular early verb use displayed a self-interest bias with directives used to request action or attention from a hearer or commissives used to state a child’s intention to act predominanting usage. Verbs also tended to be used prior to the events they encoded and were not used to refer to past events. I also identified a link between the use of verbs and the features encoded by the classifier stem suggesting that children initially use a small core of morphological property sets across CSPs in their verb

use. The following chapter examines how children acquire the complex morphological patterns of CSPs building on findings that children initially only use a small core of morphological property sets and that there is a link between the way in which verbs are used and the development of verbal morphology.

6 Acquisition of Classifier Stem Paradigms

There has been relatively little study into the development of complex morphological systems (Stoll, 2015). Much of the theoretical debate concerning the acquisition of inflectional morphology in particular has focused on the acquisition of the English past tense (e.g. McClelland & Patterson, 2002; Pinker, 2006; Pinker & Ullman, 2002), as well as the acquisition of languages with relatively isolating morphology, as discussed in §3.4 (e.g. Stoll, 2015). Accounts regarding the acquisition of morphology have been largely divided into two schools of thought often referred to as dual-route or single-route accounts (Dressler, 2012). Dual-route typically nativist accounts (e.g. Clahsen, 2006; Pinker & Prince, 1991; Pinker & Ullman, 2002), outlined in §3.4.1, propose a psychological distinction between regular and irregular inflection. These accounts focus on describing the acquisition of regular morphology through abstract rules. Single-route usage-based accounts (e.g. Bybee, 1995; Marchman, 1997), see §3.4.2, by contrast argue that morphological systems can be acquired through a single general learning mechanism resulting in the emergence of schemas based on associative networks of inflected wordforms.

A number of researchers have argued that languages with greater morphological complexity need to become central to the theoretical debate (Kelly et al., 2015, 2014; Krajewski et al., 2012; e.g. Laaha & Gillis, 2007; Mirković et al., 2011; Ragnarsdottir, Simonsen, & Plunkett, 1999; Stoll, 2015). In particular this is due to the fact that rule-based accounts are not capable of accounting for the acquisition of less regular morphological systems. It is often difficult to even generate regular inflectional rules for such systems (e.g. Krajewski et al., 2012; Mirković et al., 2011). Indeed the field's focus on rule-based acquisition is suggested to be a product of the overrepresentation of English in morphological acquisition research (Stoll & Bickel, 2013a).

Children acquiring complex morphological systems, which cannot easily be accounted for by rule-based approaches (Krajewski et al., 2012; Mirković et al., 2011) will need to rely on the formation of associative networks of whole wordforms, which result in the creation of general schemas which facilitate the acquisition of new wordforms (e.g. Bybee, 1995). This allows children to focus on the relationship between related wordforms and meaning rather than having to build meaning from the bottom up. A key distinction between dual- and single-route approaches is that dual-route rule-based models focus on children learning to construct meaning incrementally from morphemes whereas in usage-based approaches it is the contrast between whole wordforms that encodes differences in meaning.[85] Complex verbal paradigms common in polysynthetic languages (Stoll, 2015), pose a great problem for the language learner as their inflectional patterns are typically not regular enough to allow for a rule-based approach to morphological acquisition while also being so large and complex that it seems impossible for children to learn all forms of paradigms individually (Mithun, 2010).

This chapter considers how children are able to acquire such complex paradigms by focusing on the acquisition of classifier stem paradigms (CSPs) in Murrinhpatha across the corpus. Classifier stems are portmanteau morphs which encode three person categories (1st, 2nd and 3rd), three number categories (singular, dual and plural) as well as five TAM categories (non-future, past imperfective, future, past irrealis and existential) resulting in paradigms with over 40 morphological property sets (Blythe et al., 2007).[86] Throughout this

[85] This distinction is also found in approaches to morphological theory between incremental and realisation accounts, see Stump (2001 Ch. 1) for an introduction to this debate.

[86] The categories of number and TAM can be further modified by other verbal morphology increasing the complexity of the Murrinhpatha verb. I do not explore the acquisition of this part of the system in this thesis.

chapter I refer to morphological property sets of CSPs interchangeably as cells. There are approximately 38 CSPs. There is a great amount of homophony, suppletion and irregularity across and within CSPs (Nordlinger, 2015). Consequently the inflectional patterns of these paradigms cannot be easily accounted for by a set of regular rules (Walsh, 1976). There are however a number of intra- and inter-paradigmatic semi-regularities such as supra-inflection classes relating to the encoding of non-future TAM and singular subject person (see §2.2.4). CSPs vary greatly in their combinatorial potential, whereas some CSPs combine with a large number of lexical stems others combine with only a few, see §2.2.3. CSPs also contribute to verb semantics and argument structure, the acquisition of this particular part of the system is explored in chapter 7.

In building Murrinhpatha verbal paradigms I will argue that children first build item-based miniparadigms (Pinker, 1984) constructed of a small number of formally and semantically related rote-learned forms as shown in §5.2.3. Children then gradually begin to expand these paradigms based on both intra- and inter-paradigmatic patterns of form and meaning (§6.1 & §6.2). The application of these patterns can result in errors. These errors provide evidence that these patterns are both salient to children, as well as productive to some extent (§6.3). Although it is not clear exactly what drives the development of paradigms it is likely that function plays a role. As was observed in chapter 5, children's early verbs are predominantly directives and commissives. These functions are strongly linked to particular verbal structures which use certain classifier stem cells in their construction, often 1st and 2nd singular future. This results in children's initial mini-paradigms being constructed of largely future verb constructions with singular subjects.

As children get older and need to use verbs for a wider variety of functions they also begin to use a more diverse range of classifier stem cells. For example, if a child wishes to tell someone a story about a past event this will likely require the use of a past imperfective classifier stem. For example, the below utterance, which contains a past imperfective classifier stem, is used by Mavis to begin telling a story about a previous trip to the current recording location. Past imperfective classifier stems were not found in children's early verb use (Ch. 5).

(112) Mavis 4;11

ngay	*Naomi*	*nganaka*	***ngarde-ngime-dha***
1SG	name	you.know	**1DUS.BE(4).PIMP-PC.F-PST**

'me and Naomi you know, we were all here'

(LAMP_20131025_WF_01_V1 00:11:11)

In examining the acquisition of CSPs in the corpus I initially provide an overview of the 'raw' diversity of classifier stem cell use compared to an adult sample (§6.1). Diversity here refers to the range of classifier stem cells in a given sample. I then seek to quantify the development of this diversity using a measure of Normalised Mean Size of Paradigm (MSP) proposed by Xanthos & Gillis (2010) previously outlined in §3.4.4. This measure illustrates the development of classifier stem diversity throughout the corpus. The use of this measure for Murrinhpatha data does however present some problems. I consequently recalculate MSP based on a more 'matched' sample of the corpus considering the development of four CSPs across the corpus (§6.2). This method is able to better capture the development of classifier stem cell diversity with regard to this part of the verbal system. These measures relate to children's standard verb use.

I then seek to determine whether there are pathways in the development of classifier stem cell diversity represented by the value of MSP across the matched sample by examining the types of CSP cell categories used across five age brackets (§6.2.2). My findings suggest that the CSPs being investigated do show similar patterns in terms of the order of acquisition of CSP cell categories. The progression identified is supported in part by children's errors which suggest that particular parts of a verb paradigm tend to be acquired first (§6.3.1). Children then gradually add to these miniparadigms relying on intra- and inter-paradigmatic patterns of inflection in producing new forms. This is also supported by children's errors of commission (§6.3.2 & §6.3.3). These findings show that children are sensitive to semi-regularities across CSPs and that one of the keys to learning complex inflectional systems is to 'start small'[87]. I then consider whether the development of classifier stem cell diversity is associated initially with particular CSPs which may act as morphological pathbreakers as hypothesised in §3.4.1.1.

[87] I am grateful to one examiner for pointing out the similarity of this point to Elman's (1993) research regarding the importance of 'starting small' when acquiring complex systems.

6.1 Development of CSP Cell Diversity

It was observed in chapter 5 that children initially use only a small number of the over 40 morphological property sets encoded by CSPs. As children get older their CSP cell use will become more diverse. The question then is how we can best track and account for changes in classifier stem cell diversity. One option is to consider the types of morphological property sets attested at different stages of development by individual speakers. This is shown in the table below for Acacia between the age of 2;6-2;7 and Molly between the age of 6;0-6;1. These two child subsamples were chosen as they represent verb use at the youngest and oldest ends of the corpus, for which standard verb production data is available. The table also includes classifier stem cell use for the girls' grandmother Carla from a single recording session (LAMP_20131105_WF_01_V1).[88]

Table 20. Classifier Stem Cell Use

Classifier Stem Cell Category (Morphological Property Set)	**Acacia 2;6 - 2;7**	**Molly 6;0 - 6;1**	**Carla (Adult)**
1SGS.FUT	6	40	6
1SGS.NFUT	-	9	-
1INCLS.FUT	-	12	4
1INCLS.PIMP	-	-	1
2SGS.FUT	8	72	55
2SGS.NFUT	-	2	1
2DUS.PIMP	-	-	1
3SGS.FUT	8	10	2
3SGS.NFUT	3	24	6
3SGS.EXIST	3	39	10
3PLS.NFUT	-	-	1
Total Tokens	**28**	**208**	**87**
Total Categories Attested	**5**	**8**	**10**

[88] Although the data is not taken from the same session, which would be preferable, the verb use was recorded in similar contexts.

Firstly it is important to remember that making direct comparisons across the above samples is somewhat problematic due to the fluctuation in sample sizes. This is taken into account in measures used later in this chapter (§6.2). The purpose at this stage is to observe the diversity of classifier stem cell use in a real speech sample of an individual speaker at a certain stage of development. The most striking feature of the above table is that the majority of potential classifier stem cell categories are not attested either in the child or adult speech samples. This is likely because many classifier stem categories are utilised less frequently and are therefore less likely to occur in relatively small spontaneous speech samples (e.g. Tomasello & Stahl, 2004). Investigating the acquisition of these rarer categories would require the collection of 'dense' corpora or experimental methods and is not addressed in this thesis.[89]

Despite the lack of potential diversity displayed by the samples, it is apparent that a greater number of cell categories are used by the older child Molly as well as by Carla, who use 8 and 10 categories respectively in contrast to Acacia's 5. Interestingly the categories used by only Carla and by Molly and Carla suggest that the development of classifier stem cell diversity may have a discernible pattern. For example the categories used by only Molly and Carla include 1st inclusive subjects as well as non-future forms both of which are absent in Acacia's sample. The categories attested in only Carla's speech include categories with dual and plural subjects as well as past imperfective TAM. This suggests that certain categories encoded by classifier stems may be acquired later than others and that this progression may be predictable. However looking at the data in this way alone does not give an accurate picture of classifier stem cell diversity. This is because it does not show the extent to which individual CSPs are inflected for different categories. It only shows that these categories are attested across all CSP forms in a given sample.

In order to evaluate the diversity of classifier stem cells I adopt the measure of Normalised Mean Size of Paradigm (Xanthos et al., 2011; Xanthos & Gillis, 2010) outlined in §3.5.4. This measure is designed to quantify the inflectional diversity of a morphologically analysed speech sample. In its raw form MSP is defined by the following ratio where $|F|$ represents the number of wordforms (types) and $|L|$ represents the number of lemmas (types) contained in a particular sample.

[89] See Forshaw (2014) for preliminary experimental research in this area.

(113) *Mean Size of Paradigm*

$$\text{MSP} = \frac{|F|}{|L|}$$

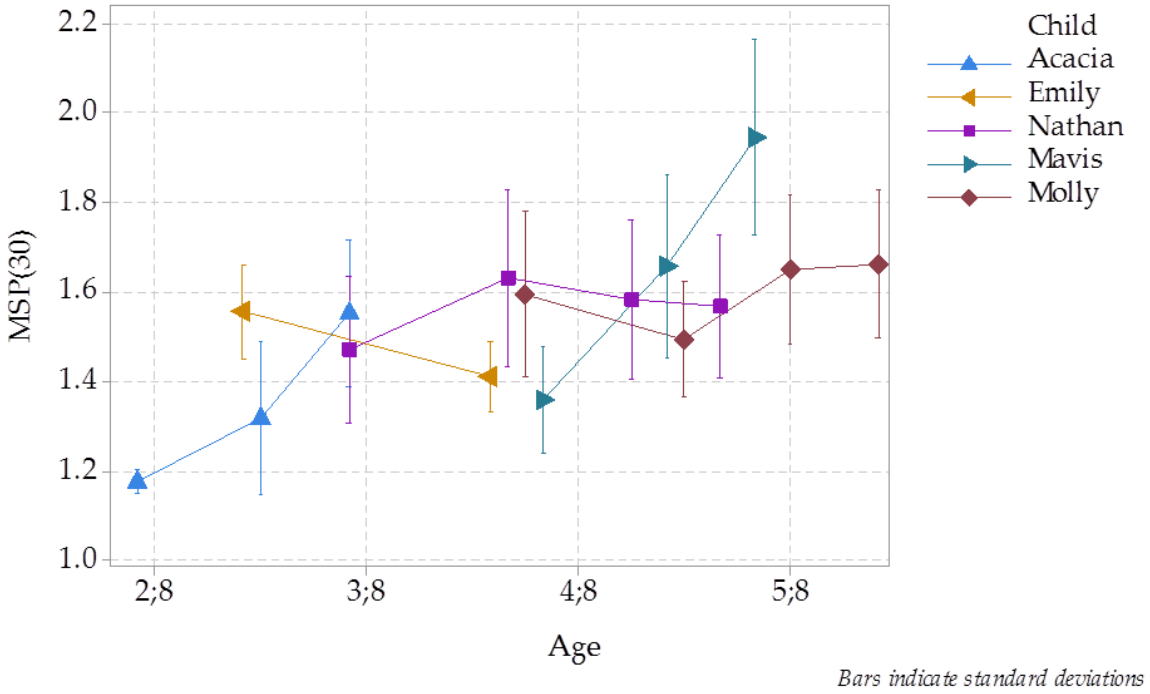
In this study a sample is all verbs recorded and coded for a focus child during an individual fieldtrip. This means samples can cover a period of up to 2 to 3 months and be drawn from 1 to 4 recording sessions. The age reported with measures of these samples is the child's age at the end of the fieldtrip. As we are only seeking to measure diversity with regard to classifier stem paradigms, |*L*| will represent the number of CSPs used in a given sample, which will range potentially from 1-38. |*F*| will represent the number of classifier stem morphological property sets used in a given sample. This measure is of course more reliable for larger samples. This is often problematic for longitudinal acquisition studies as small samples are often the norm. As a result I only calculate MSP for samples which have 30 or more members. This is an arbitrary cut-off point but was chosen in reference to the various samples across the corpus to ensure that the largest amount of data could be included in analysis without calculating relatively meaningless values for smaller samples.

The raw measure of MSP is impacted by sample size as with other type/token measures. Xanthos & Gillis (2010) address this by proposing a measure of 'Normalised MSP'. This measure uses a method of statistical 'bootstrapping' (Baayen, 2008) in which a number of subsamples are taken from a given sample *without replacement* for which MSP is to be calculated. MSP is calculated for each of these subsamples. The mean value of MSP for this group of subsamples is then reported. Criteria for determining the optimal size of the subsample *S* are not given by Xanthos & Gillis (2010) although they do provide some discussion of impacts to be considered when setting the value of *S*. Firstly *S* must be equal to or lower than the sample size of the smallest sample to be measured, in this case *S* must be equal to or less than 30 as this is the size of the smallest sample. If *S* is set to a larger number it will produce a value closer to the MSP of the entire sample. If *S* is set to a lower value it will provide a better estimate of the variance of the sample. There is consequently a trade off in setting the value of *S* in terms of capturing variance of a sample and the diversity of the entire sample.

Xanthos & Gillis (2010) propose that the number of subsamples (*B*) to be calculated for a given sample should be a function of the size of subsamples *S* and the size of a given sample *N* for which MSP is to be calculated. The number of subsamples to be constructed is calculated according to the formula $B = N/S$ rounded to the closest integer. This is so that on average each token is only sampled once in the whole set of subsamples. I initially trialled this approach but found that the values of MSP(*S*) were too unstable particularly for the smaller samples. Instead I calculated 100 subsamples for each given sample based partly on an approach to measuring inflectional diversity with statistical bootstrapping proposed by Malvern et al. (2004). I then calculated the mean size of paradigm for MSP(10), MSP(20) and MSP(30) in order to evaluate which measure captured any potential development of diversity across the corpus. MSP(10) showed no significant increase in the diversity of classifier stem use across the corpus compared with age, Pearson's $r = -0.182$ and $p = 0.500$. This shows that MSP(10) is likely not an effective measure of classifier stem diversity for samples in this corpus. This is because setting the value of *S* so low means that capturing the classifier stem cell diversity of the entire sample is deprioritised in favour of capturing the variance of the sample. When children do use a more diverse range of forms this is not captured by this measure.

By contrast there was a correlation between age and MSP for both MSP(20), $r = 0.515$ and $p = 0.041$, and MSP(30) $r = 0.687$ and $p = 0.003$. The figure below shows the values of MSP(30) for each child across the corpus. It shows an increase in classifier stem diversity with age as anticipated. This supports the above findings regarding the raw diversity of CSP use in individual speech samples that CSP use is more diverse in older children and most diverse in adult speech.

Figure 11. Mean Size of Paradigm (30)



Although overall there is a clear increase in the value of MSP(30) with age there is still considerable variation within the sample. This variation in diversity may be due to a variety of additional factors such as context, knowledge of inflection and the lexical diversity of the sample. Recently there have been a number of studies (Aguado-Orea, 2004; Aguado-Orea & Pine, 2015; Krajewski et al., 2012), as discussed in §3.5.4, investigating the acquisition of inflectional morphology that have attempted to mitigate these factors by comparing 'matched' child and adult speech samples. Although it is beyond the scope of this study to utilise such an approach it is possible to control the lexical diversity or more precisely the CSP diversity in the sample. The speech samples investigated across the corpus vary greatly in the diversity of CSPs used. For example between age 3;0 and 3;2 74 verb tokens are analysed from Acacia's speech. In these 74 tokens only 8 CSPs are attested. Similarly 73 verb tokens were analysed from Nathan's speech between age 4;10 and 4;11. However in this sample 17 CSPs were attested. The number of CSPs found in a sample will impact the value of MSP as this is the value $|L|$. It is therefore probable that samples with a greater diversity of CSPs will have a lower value of MSP than they would if this variation was controlled for. It is therefore advantageous to control for this variation when calculating MSP, particularly

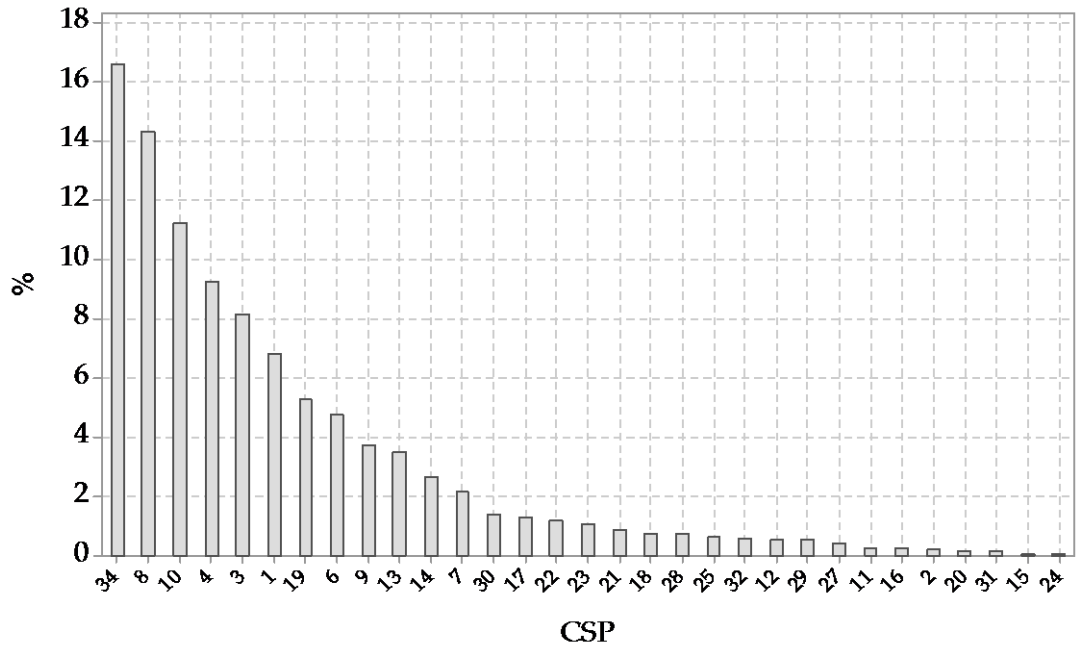
with small samples. I therefore consider a more 'matched' sample of children's classifier stem use by limiting analysis to a subset of four CSPs.

6.2 Development of CSP Cell Diversity in a Matched Sample

6.2.1. Selecting a Matched Sample

The four CSPs chosen for analysis were BE(4), HANDS(8), POKE(19) and SAY/DO(34). These particular paradigms were selected based on a number of criteria to ensure that enough data was available for analysis, that the selected CSPs showed diversity in terms of classifier stem cell use and that the sample investigated displayed varied characteristics representative of the broader system. Firstly with regard to the size of the matched sample it was important to select CSPs that were used frequently in the corpus. The following figure shows the rate of use of different CSPs in standard verb use by all children across the corpus.

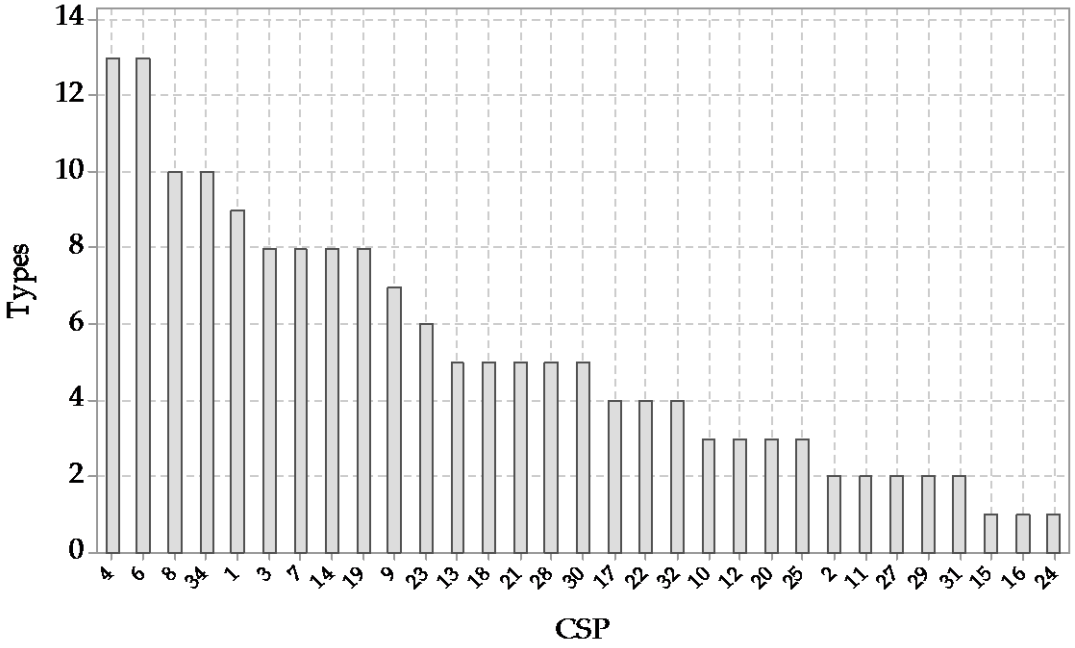
Figure 12. Classifier Stem Paradigm Use



The most frequently used CSPs were SAY/DO(34) and HANDS(8) which accounted for 16% and 14% of all classifier stem use respectively. BE(4) and POKE(19) were also used relatively frequently in the corpus, 9% and 5% respectively. CSP HANDS:RR(10) was also used frequently (11%), however this was largely due to the use of a single wordform *ne-birl* (2SGS.HANDS:RR(10).FUT-LOOK) 'you look'. It was therefore not an appropriate target for the investigation of building paradigms as it showed extremely limited classifier stem cell diversity.

Figure 13 below represents the raw diversity of classifier stem cell use per CSP for all children across the corpus by showing the number of different cells attested for each CSP. It is important that the CSPs selected for the matched sample showed relatively high diversity as it is the development of this which is being investigated. As can be seen CSPs vary greatly in terms of the raw diversity attested in the corpus. A relatively high number of cells are attested for each of the CSPs of the matched sample. 13 different morphological property sets are attested for BE(4), 10 for HANDS(8), 9 for SAY/DO(34) and 8 for POKE(19).

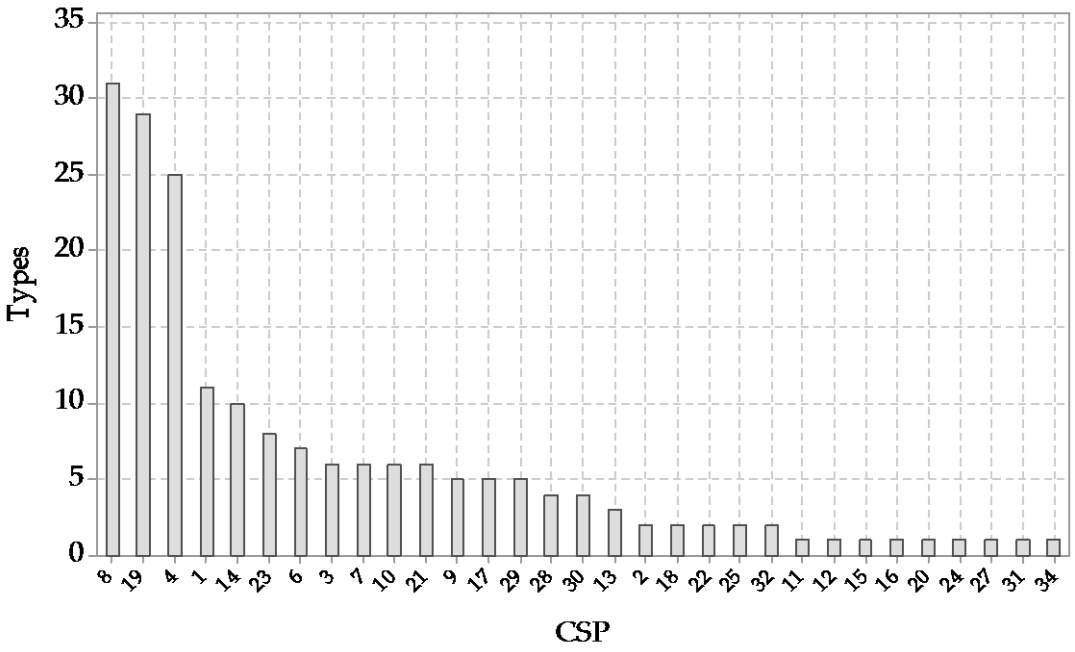
Figure 13. Classifier Stem Cells by CSP



I also aimed to select a matched sample which was somewhat representative of the broader system. Consequently I took a number of structural characteristics into account. CSPs vary in terms of their potential to occur in isolation as simple verbs and to combine with lexical stems. Of the selected CSPs SAY/DO(34) does not combine with lexical stems and can be used only as a simple verb. CSPs BE(4) and HANDS(8) can be used both as either simple verbs or in combination with lexical stems in bipartite stem verbs. CSP POKE(19) can only be used as a bound morph in bipartite stem verb contexts.

The selected CSPs also vary in terms of their membership in supra-inflection classes (§2.2.4). With regard to the encoding of singular subject person CSPs BE(4) and POKE(19) both belong to the NG.SBJ class, HANDS(8) belongs to the M.SBJ class and SAY/DO(34) is a mixture of the NG.SBJ and M.SBJ classes. The B.SBJ supra-inflection class is not represented in this subsample as its most frequent member, BASH(14), is used relatively infrequently relative to the CSPs in the matched sample. Unfortunately only one non-future supra-inflection class, M.NFUT is represented in the sample. This is due to the fact that CSPs which belong to other classes are less frequent, the most frequent being GO(6) which belongs to the N.NFUT class.

Figure 14. Classifier Stem Combinations by CSP



CSPs also vary in terms of the number of lexical stems with which they can combine. With the exception of SAY/DO(34), which does not combine with lexical stems, each of the selected CSPs combines with a relatively high number of lexical stems throughout the corpus as shown in Figure 14. This however was not a key consideration in the selection of the subsample.

6.2.2. Development of CSP Cell Diversity

The selected 'matched' sample of four classifier stem paradigms BE(4), HANDS(8), POKE(19) and SAY/DO(34) accounts for 45.19% (n = 767) of standard verb use across the entire child language corpus. The frequencies of each of these paradigms in terms of the matched sample are given below in Table 21.

Table 21. CSP Use in Matched Sample

CSP	Tokens	% of Matched Sample
BE(4)	157	20.46
HANDS(8)	242	31.55
POKE(19)	88	11.47
SAY/DO(34)	280	36.51
Total	767	100.00

SAY/DO(34) and HANDS(8) are the most frequently used followed by BE(4) and POKE(19). 16 different classifier stem cell categories are attested in the matched sample. These vary greatly in their frequency of use with half of these categories used on fewer than seven occasions and two categories, 1st singular future (24.64%) and 2nd singular future (31.94%), accounting for more than half of all classifier stem use. The frequency of use of each of these categories is given in Table 22.

Table 22. Classifier Stem Cell Use in Matched Sample

TAM	Number	Person	Classifier Stem Cell Category	Tokens	%
Future	Singular	1	1st Singular Future	189	24.64
		2	2nd Singular Future	245	31.94
		3	3rd Singular Future	33	4.30
	1st Inclusive		1st Inclusive Future	17	2.22
	Plural	2	2nd Plural Future	2	0.26
Non-Future	Singular	1	1st Singular Non-Future	59	7.69
		2	2nd Singular Non-Future	21	2.74
		3	3rd Singular Non-Future	128	16.69
	1st Inclusive		1st Inclusive Non-Future	3	0.39
	Dual	1	1st Dual Non-Future	1	0.13
		3	3rd Dual Non-Future	1	0.13
	Plural	3	3rd Plural Non-Future	6	0.78
Past Imperfective	Singular	1	1st Singular Past Imperfective	3	0.39
		3	3rd Singular Past Imperfective	2	0.26
	Dual	1	1st Dual Past Imperfective	4	0.52
Existential	Singular	3	3rd Singular Existential	53	6.91
Total				767	100.00

As with the previous section children's data was divided into various samples based on recordings undertaken during a particular fieldtrip. Restricting investigation to a limited set of CSPs reduced the number of tokens in each child's sample. The token counts of standard verb use for each child sample are given in the table below. The ages reported are the child's age at the end of the fieldtrip. Unsurprisingly there is great variation in the size of the various samples ranging from 0 standard verb tokens to 98. This variation is in part due to the lower

rate of verb use at earlier stages of development and differences in the amount of interaction transcribed for focus children for each fieldtrip (§4.7).

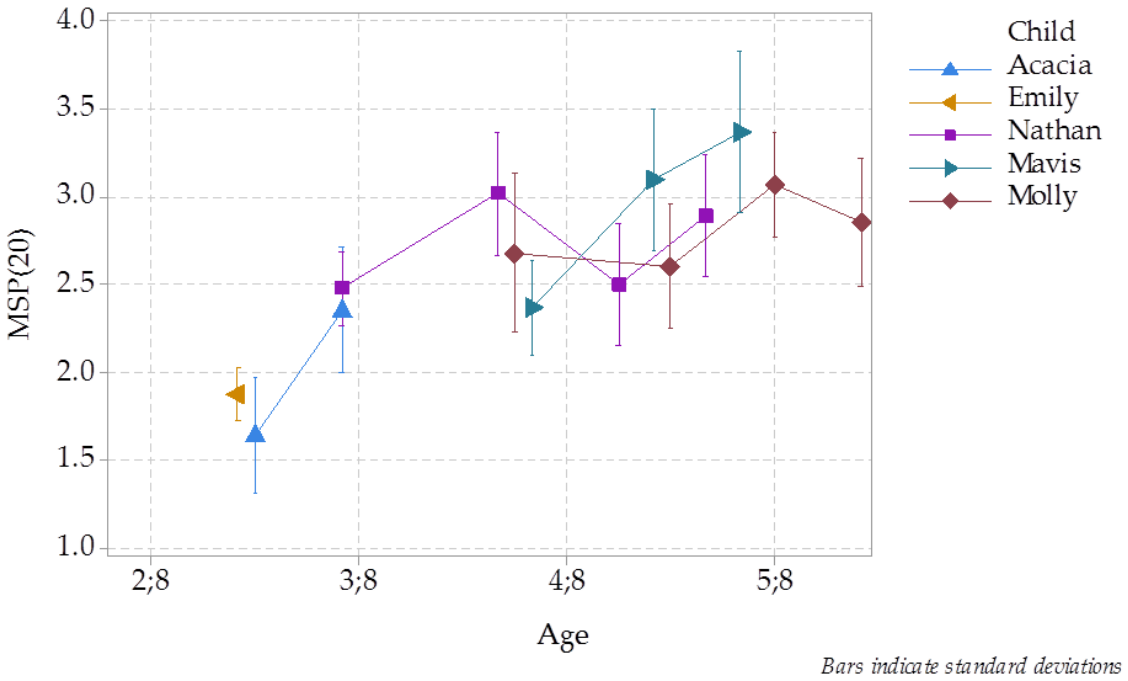
Table 23. Standard Verb Tokens by Child for 'Matched' Sample

	Fieldtrip (Age Y;M)								
	1		2		3		4		Total
Acacia	0	(1;10)	9	(2;7)	48	(3;2)	54	(3;7)	111
Emily	4	(2;6)	30	(3;1)	5	(3;5)	17	(4;3)	56
Nathan	22	(3;7)	49	(4;4)	44	(4;11)	42	(5;4)	157
Mavis	14	(3;9)	27	(4;7)	56	(5;1)	87	(5;6)	184
Molly	98	(4;5)	43	(5;2)	33	(5;8)	85	(6;1)	259

Based on these samples a measure of MSP(20) was calculated for all samples greater than 20. The decision not to calculate MSP(30) was made due to the reduction in sample sizes caused by the matched sample. This is offset by the reduction in the potential maximum value of $|L|$ from 38 to 4. This means that although there is a reduction in the value of S, diversity is still likely to be captured as there is also a reduction in the value of $|L|$. The results of MSP(20) are shown in Figure 15.

The results show clear development in the diversity of classifier stem cell use with age as MSP(20) correlates significantly with age, Pearson's $r = 0.799$ and $p = 0.001$. The trajectory of this rise in diversity appears to taper off after 3;7. The level of diversity found in the speech of Emily and Acacia at 3;1 and 3;2 is fairly limited with a value of MSP(20) less than two. A sharp rise in this value is observed by 3;7 and after this point the value of MSP(20) is consistently above or just below 2.5. After 3;7 diversity continues to grow with MSP(20) rising to around 3 by 5 years of age. There is however variability across individual samples, in particular the values of MSP(20) calculated for Nathan do not show a clear trajectory of diversity over time. A larger data sample would provide a more stable picture of the growth of classifier stem cell diversity. However, despite the variation in MSP(20) in Nathan's samples, the values do appear to be consistent with other children at a similar age.

Figure 15. MSP(20) for CSPs BE(4), HANDS(8), POKE(19) and SAY/DO(34)



Showing that diversity in classifier stem cell use develops with age with a metric such as MSP(20) is of course not the endpoint of investigation. It is important to consider whether the rise in diversity can be associated with patterns in children's verb use. We can then understand how children begin to construct complex verbal paradigms and whether this observed rise in diversity is due to encoding particular types of cell categories or whether development is more sporadic. In order to investigate potential pathways of development children's verb use is divided into five age brackets listed below.[90] The three middle age brackets are each a year in length.

(114)

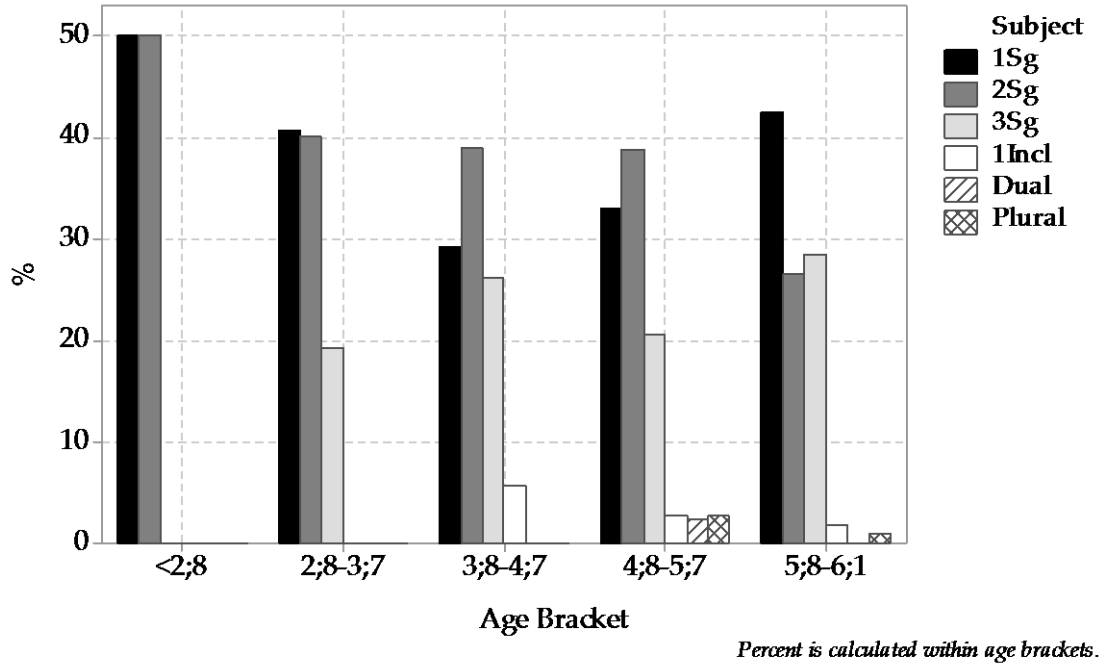
Age Brackets:	I	-	< 2;8
	II	-	2;8 - 3;7
	III	-	3;8 - 4;7
	IV	-	4;8 - 5;7
	V	-	> 5;7

[90] For ease of reference the beginning of each bracket is marked by a solid vertical line on graphs plotting MSP.

Considering children's verb use in this way suggests that the rise in classifier stem cell diversity observed in the matched sample represented by MSP(20) is associated with children beginning to encode specific additional categories. The rise in diversity is not due to children randomly producing verbs with more varied classifier stem cell categories instead this rise appears to follow a predictable progression. Potential pathways of development are observed with regard to the encoding of both subject and TAM categories.

Figure 16 shows the encoding of subject categories by classifier stems across the five age brackets. Dual and plural categories are not distinguished for person due to their low rate of use.[91] During the first age bracket before age 2;8 subjects are predominantly 1st and 2nd person singular as was observed in chapter 5. During the second age bracket (2;8-3;7) children begin to use 3rd singular forms as in (115). The use of 1st inclusive forms, shown in (116), is then found in the third age bracket (3;8-4;7). Finally the use of dual and plural forms, illustrated in (117) and (118) respectively, is observed in the final two age brackets (4;8-6;1), although their use is infrequent.

Figure 16. Classifier Stem Subject



[91] Existential verbs are not included as they can only be 3rd singular.

(115) 3rd singular - Acacia 3;7

	kayitunu	*Daisy-yu*
AT:	**ka-yiwik-nu**	Daisy-yu
	3SGS.POKE(19).FUT-drown-FUT	name-DM

'Daisy is going to drown'

(LAMP_20140531_WF_01_V1 00:10:00)

(116) 1st inclusive - Mavis 4;5

kay-ya	***pa-riwak***
let's.go-DM	**1INCLS.POKE(19).FUT-follow**

'Come on let's follow him'

(LAMP_20130423_WF_01_V1 00:12:40)

(117) Dual classifier stem cell - Mavis 5;4

ngarnamka-la-ngime

1DUS.BE(4).NFUT-climb-PC.F

'We all climbed in (to the car)'

(LAMP_20140413_WF_01_V1 00:43:13)

(118) Plural - Mavis 5;6

mere	*the*	***numa-bath***
NEG	ear	**2PLS.HANDS(8).FUT-take**

'You (pl.) don't know'

(LAMP_20140531_WF_01_V1 00:43:44)

This suggests that one way in which children gradually build verbal paradigms is by learning to encode a wider variety of subject categories. Initially verb use is restricted largely to 1st and 2nd singular[92] forms before growing to include 3rd singular and then 1st inclusive forms.

[92] With the exception of 3rd singular existential verbs which are excluded from the current discussion.

Dual and plural classifier stem cells only emerge at later stages of development.[93] This progression is shown in (119). These non-discrete stages represent general tendencies in children's use of classifier stem cell categories and provide a broad picture of one way in which children learn to construct large verbal paradigms.

(119) Development of CSP Subject Categories

1st & 2nd singular > 3rd singular > 1st inclusive > dual & plural

It is beyond the scope of this thesis to determine what factors may underpin this progression. Initially, however, the structure of children's early verbs has been shown to be associated with how verbs are used, see chapter 5. It is likely that function and discourse context will continue to play some role in determining the types of subjects encoded by classifier stems as children get older. Other factors such as frequency, markedness as well as children's ability to acquire concepts of plurality relating to verbs with multiple subjects should also be investigated in future studies.

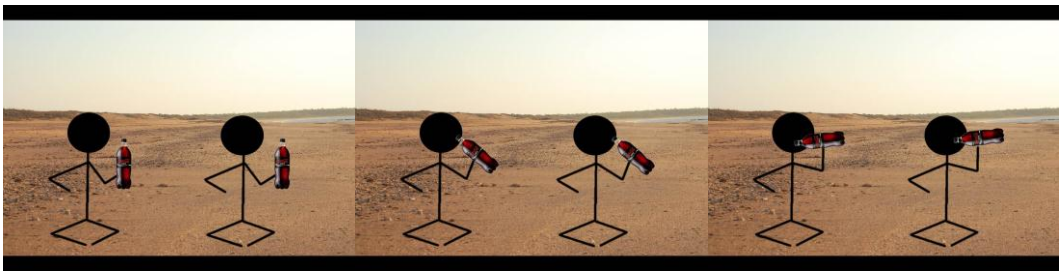
Concepts of plurality are especially important in Murrinhpatha as the lack of dual subject verb forms may be due to the complex concepts which they encode. For example dual classifier stems, when used without additional subject number morphology, encode dual sibling subjects, see §2.2.4. If dual subjects are not siblings the relevant verb will be constructed with a singular classifier stem form and additional number marking encoding whether the two people are both males or not. In discussions with some Murrinhpatha speakers I have been told that dual non-sibling forms tend to be used earlier by children than dual sibling forms although this remains to be empirically proven. Some evidence in support of this is found in preliminary experimental research (Forshaw, 2014), shown in (120). When asked to describe a picture 'flip-book'[94] sequence of two siblings (his paternal grandmother and her sister) drinking, Nathan, aged 4;11, used a verb encoding dual non-siblings (line 1).

[93] Note that this refers only to the form of the classifier stem. Given that subject number is also encoded by other morphs children may encod non-sibling dual subjects before this time. Furthermore the use of a dual classifier does not imply the encoding of a dual subject as in (117).

[94] Stimuli were presented on a computer monitor using Microsoft PowerPoint. The pictures were presented quickly one at a time in sequence to create the illusion of movement much like a children's flip-book.

However, when the research assistant Carla clarified who was in the picture (line 2) and then asked 'what they were doing' using a dual sibling verb (line 4) Nathan adapted his own response (line 5). This suggests that although Nathan is able to use such forms he may not be aware that the people he is seeing are 'siblings' despite their close familial relationship. He therefore uses a verb which encodes a less specific subject category. Alternatively he may be in the process of acquiring the sibling/non-sibling distinction and not yet be aware of the sibling concepts which these forms encode. The acquisition of this type of knowledge will play some role in the acquisition and use of classifier stem paradigms.

(120) Nathan 4;11



1	*Nathan:*	*kura*	*tarak*	***bam-ngintha-gurduk***
		CLF:WATER	carbonated.drink	**3SGS.LOOK(13).NFUT-DU.F-drink**
		'the two non-siblings drink soft drink'		
2	*Carla:*	*nangkal?*		
		who		
		'who?'		
3	*Nathan:*	*Carla*	*Laura*	
		name	name	
		'Carla and Laura'		
4	*Carla:*	*yu*	*ngarra*	***pamamka=parnam***
		yes	what	**3DUS.SAY/DO(34).NFUT=3PLS.BE(4).NFUT**
		'yeah, what are the two siblings doing?'		

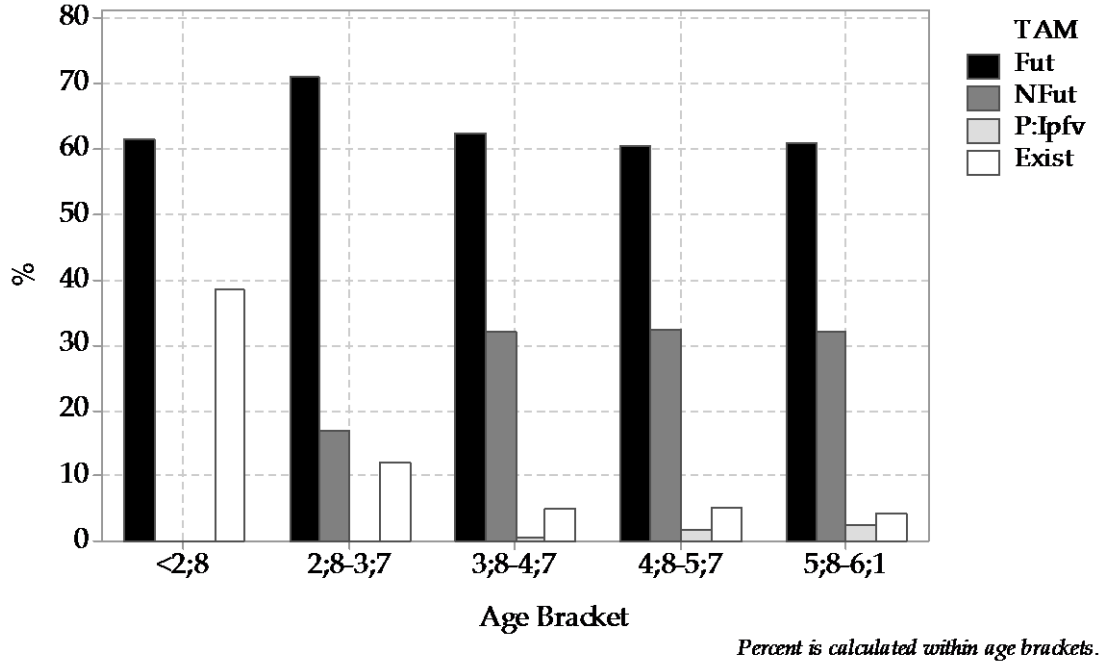
5	*Nathan:*	***pubamka-gurduk***	*kura*	*tarak*
		3DUS.SEE(13).NFUT-drink	CLF:WATER	carbonated.drink

'the two siblings drink soft drink'

(LAMP_20131216_WF_03_V1 00:15:16)

A discernible pathway is also observed in relation to the encoding of TAM categories by CSPs. The encoding of different TAM categories across the five age brackets is shown in Figure 17. Initially children are only observed using future and existential classifier stem forms as was shown in chapter 5. During the second age bracket (2;8-3;7) children begin to use non-future forms. Past imperfective forms are only observed in the final three age brackets (4;8-6;1) and are used infrequently.[95] Examples of non-future and past imperfective constructions are shown in (121) and (122) respectively.

Figure 17. Classifier Stem TAM



[95] No past irrealis classifier stems were attested in the corpus. This is likely due to their formal similarity with past imperfective forms. Consequently what have been described by others (e.g. Nordlinger & Caudal, 2012) as two categories are likely coded here as a single category.

(121) Non-future - Nathan 3;7

dam-nhi-riwak=kanam

3SGS.POKE(19).NFUT-1INCL.DO-follow=3SGS.BE(4).NFUT

'He's following us'

(LAMP_20120830_WF_01_V1 00:07:01)

(122) Past imperfective - Nathan 4;4

mi	*yilulul*	*ngay-yu*
CLF:VEG	liquid.excreta	1SG-DM

ngardi-thek-dha	*xxx*	*mi*	*yilulul-lu*
1SGS.BE(4).PIMP-excrete-PST	xxx	CLF:VEG	liquid.excreta

'I've already been to the toilet'

(LAMP_20130521_WF_01_V1 00:50:02)

The data suggests a developmental pathway with regard to the encoding of TAM by CSPs, as shown in (123). This provides an additional dimension by which children gradually 'build-up' verbal paradigms from an initial core. As with subject encoding it is likely that function plays some role in the development of TAM categories, such as when children begin to talk about past events likely requiring the use of past imperfective classifiers stems.

(123) Development of CSP TAM categories

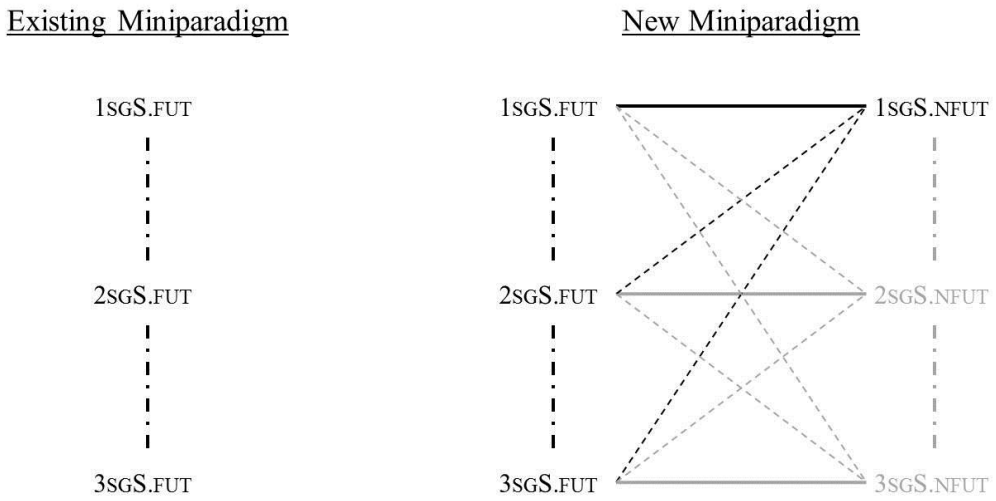
Future, Existential > Non-Future > Past Imperfective

These observed pathways of development can be related to the values of MSP(20) discussed previously, see Figure 15. Initially the value of MSP(20), in the matched sample, is small as classifier stems encode only very few categories. The sharp rise in the value of MSP(20) by 3;7 (the end of age bracket 2) is due to the use of forms encoding non-future and 3rd singular categories both of which are used relatively frequently for the remainder of the corpus. The

more gradual increase in MSP(20) after this point is due to the use of forms that encode a number of different categories, 1st inclusive, dual and plural classifier stem cells as well as past imperfective TAM. The increase in MSP(20) associated with the use of these categories is not as great as they are only used relatively infrequently and consequently contribute less to the overall diversity of classifier stem cell use as represented by MSP(20).

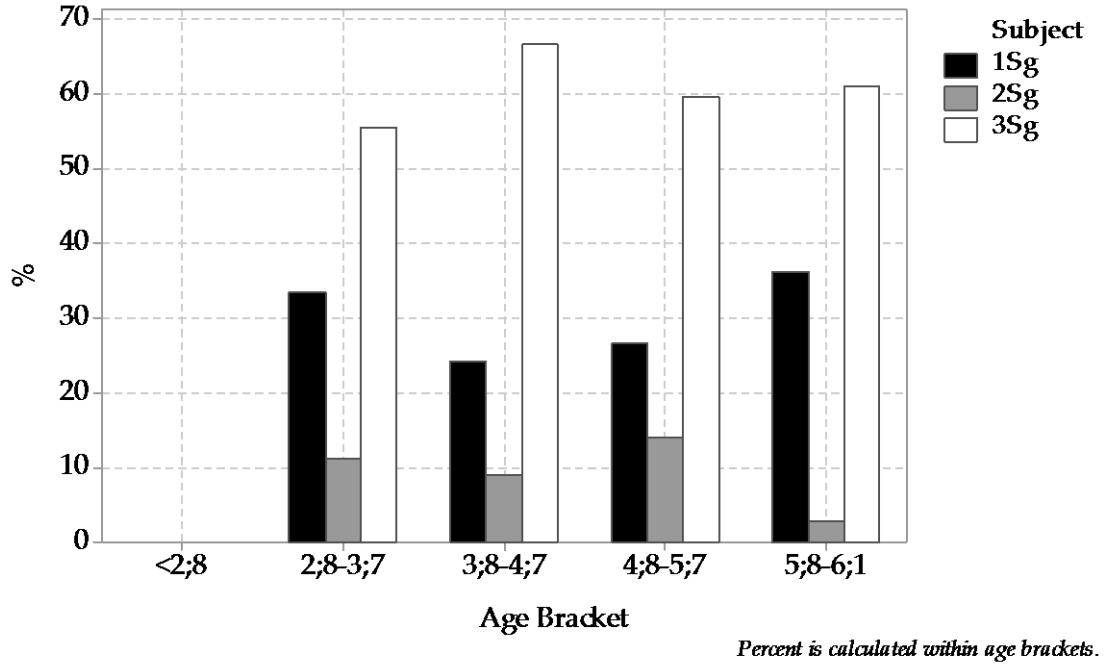
These findings provide a broad picture of the development of four frequent CSPs in a sample of child speech controlled for CSP diversity. Children begin by using a small number of rote-learned inflected wordforms. These wordforms tend to encode similar classifier stem cell categories. This is in part due to how children use early verbs as discussed in chapter 5. These few rote-learned verbs form miniparadigms (Pinker, 1984), based on semantic and phonological similarities, which provide the initial core of verbal paradigms. Children then gradually begin to expand these paradigms. This is achieved by adding additional dimensions to existing miniparadigms that are applied across the categories that have already been acquired. New dimensions are hypothesised by children based on the relationship of form and function between associated forms. Put more concretely, a child may initially construct a miniparadigm for a given lemma/CSP. This consists of three related forms which encode 1st, 2nd and 3rd singular subjects all of which encode future events. The child then begins to also use an associated 1st singular non-future wordform to describe events they have just completed. I hypothesise that this form shares properties with all forms of the existing miniparadigm but most strongly with the 1st singular future form based on phonological and semantic similarities. The difference in the strength of the links between associated forms leads to an additional paradigmatic dimension being created. Based on knowledge of the existing miniparadigm this leads to the realisation of the existence of corresponding non-future forms associated with 2nd singular and 3rd singular future forms. This is represented below with the strength of lines offering an impression of the strength of relationships between wordforms.[96]

[96] It is unclear based on this sample the extent to which early diversity may be either lexically or CSP specific, this is left for future research.



That children begin to build classifier stem paradigms in this manner is supported by the fact that new paradigmatic dimensions are not restricted to certain categories. Let us consider the emergence of non-future CSPs in this matched sample more closely. The below figure shows the distribution of non-future forms across the most commonly used subject categories 1st, 2nd and 3rd singular. The use of the non-future TAM category across frequent subject categories appears to be relatively stable. For each age bracket the 3rd singular non-future category is the most frequently used, followed by 1st and 2nd singular categories. If the addition of new forms did not lead to a new paradigmatic dimension we might anticipate that the use of non-future might be more restricted in terms of its combination with various subject categories. It is of course also possible that due to the size of the age brackets used for analysis any stage of restricted use might be hidden. Furthermore the use of non-future may be restricted in other ways such as the CSPs with which it is attested as explored in §6.4. The development of this dimension would benefit from future investigation with a denser corpus.

Figure 18. Distribution of Non-Future Across Frequent Subject Categories



It is important to remember that the growth of paradigms and addition of new dimensions as shown in (119) and (123) previously do not represent discrete stages. These are general tendencies in development attested in the CSPs in the matched sample. As will be shown momentarily the use of new dimensions in verbal paradigms occurs in a piecemeal fashion across CSPs with a dimension being used for one verbal paradigm yet to be acquired for another.

6.3 Errors of Commission and the Development of Diversity

Further evidence that children's verbal paradigms develop from initial cores in a somewhat predictable way is found in children's errors of commission. These errors show children's restricted knowledge of adult-like verbal paradigms as well as indicating that children use knowledge of early miniparadigms to infer the forms of new inflected wordforms (§6.3.1). Errors also show that children are sensitive to inflectional patterns of CSPs (§6.3.2 & 6.3.3). The errors of commission reported here are drawn from the entire corpus and not just from examples related to the production of CSPs in the matched sample. This was necessary as

errors of commission are relatively rare in the corpus which is common crosslinguistically (Deen, 2009).

6.3.1. Future Precedes Non-Future

There are a number of errors across the corpus that support the finding that future forms tend to be acquired before non-future forms for at least some verbs. Firstly, children are found to use future verb forms in contexts where non-future verbs are required. This suggests that at this point in time the child may not yet have acquired the non-future forms of a verbal paradigm. As a result the child uses a verb form which they already know, which is associated with the event being encoded. The following three examples show the use of future verb forms in contexts were the use of a non-future verb is required. Each of the relevant verbs appears in bold. In (124) Emily aged 3;1 closes the lid of a drinks cooler which Acacia has been attempting to close. After closing the cooler successfully, Emily says 'I *will close* it' rather than 'I *closed* it' using the future classifier stem form instead of the non-future form.

(124) Emily 3;1

	ngay-wa	***ngadhap***
		1SGS.POKE(19).FUT-close
AT:		**nganthap**
	ngay=wa	**ngam-dhap**
	1SG=FOC	**1SGS.POKE(19).NFUT-close**

'I will close it'

(LAMP_20130502_WF_01_V1 00:29:37)

A similar type of error is produced by Nathan at 3;6 in (125). In this instance Eleanor is trying to get Molly to put on her microphone backpack. She directs Molly to put it on in line 1 using the imperative verb construction *duyrdi*. Nathan then states that 'he will put it on' despite the fact that he is already wearing his backpack. Eleanor interprets Nathan's statement as intending to point out that he is already wearing his backpack and is behaving well. The

intended verb production meaning ‘I am wearing it’ requires a non-future classifier stem. Eleanor responds to Nathan’s statement by pointing out to Molly that Nathan is behaving by wearing his backpack.

(125) Nathan 3;6

1	*Eleanor:*	*kirra*	*kirra*	
		wunkerrere	wunkerrere	
		quickly	quickly	
		duyrdi		*duyrdi*
		duy-rdi		duy-rdi
		2SGS.LOWER:INTR(18).FUT-put.on		2SGS.LOWER:INTR(18).FUT-put.on
		‘quickly quickly put it (microphone backpack) on put it on’		
		[Eleanor is telling Molly to put on her microphone backpack properly]		
2	*Nathan:*	*ngay-matha nga-wa*	***buyrdinu***	
			1SGS.LOWER:INTR(18).FUT-put.on-FUT	
	AT:		**banurdi-ngem**	
			ban-rdi=ngem	
		1SG-INTS INTJ-EMPH	**1SGS.LOWER:INTR(18).NFUT-put.on-1SGS.SIT(1).NFUT**	
		‘Hey, I am wearing it’		
3	*Eleanor:*	*kardu*	*patha*	*kanamatha*
		kardu	patha	kanhi-damatha
		CLF:HUMAN	good	this-just
		‘this person is being good’		
		[Eleanor points to Nathan as she says this]		

(LAMP_20120716_WF_01_V1 00:18:35)

Finally in (126) Nathan produces a similar error aged 4;4. In this instance the recording participants are at the Wadeye barge landing. I have gone for a short walk and am approximately 200 metres from the recording location. Nathan picks up a plastic bag and

walks towards the river to throw it in. As he walks to the river he tells his elder sister Felicity to tell 'Bill' that the rubbish 'will blow into the water'. It is probable however that Nathan is directing his sister to tell 'Bill' that the rubbish 'has blown away' so as not to get in trouble, on my return, for having thrown it away himself. Felicity, who is talking with Molly at the time, does not respond to Nathan's request but later asks what he is doing to which he replies that he is going to throw the rubbish into the river. This example differs slightly form those presented in (124) and (125). In the previous examples the child produced well-formed verbs using future classifier stems in non-future contexts. In this example however the classifier stem element is not clearly future or non-future. Instead it appears to be a mixture of the 3rd singular future *purdi-* and the 3rd singular non-future *wurdan*.

(126) Nathan 4;4

	aa	*na-na*	*Phil*	*nga=wa*	
	INTJ	2SGS.HANDS(8).FUT-3SG.M.IO	name	INTJ=EMPH	
	****wurdi-parl-warda***		*mi*	*kanhi*	*rubbish*
AT:	**wurdan-parl-warda**				
	3SGS.TURN(29).NFUT-be.blown-TEMP		CLF:VEG	this	rubbish

'hey you say to Bill, that this rubbish was blown away'
[Nathan walks away to throw a plastic bag in the river]

(LAMP_20130521_WF_01_V1 00:35:26)

Each of these errors are produced by children at ages, 3;1, 3;6 and 4;4, when other non-future verb forms are commonly used in the corpus. In the matched sample non-future forms began to be used during the second age bracket between 2;8 and 3;7. Their use increased in age bracket three between 3;8 and 4;7. Their rate of use remained stable during age brackets four and five. This is consistent with findings crosslinguistically that morphological development progresses in a piecemeal fashion rather than a certain feature being acquired and then widely applied broadly across all wordforms of the relevant type. This is a point often highlighted by usage-based approaches (e.g. Krajewski et al., 2012) as discussed in §3.5.2. I return to this point in §6.5. Importantly these errors suggest that future verb forms precede non-future verb

forms as errors are only attested in this direction. I have found no evidence for example of non-future verb forms being used in contexts which require future verb forms.

Further evidence that paradigms develop according to the model described here is found in children's errors of commission based on intra-paradigmatic knowledge of already acquired wordforms. The examples presented here suggest that children construct non-future verb forms in particular, based in part on their knowledge of future verb forms. This is consistent with findings that future verb forms tend to precede non-future forms in the matched sample. In the following example (127) Molly aged 4;5 produces the verb *pim-ngime* instead of the target *thim-ngime* producing a non-standard initial consonant.

(127) Molly 4;5

	ya	*mange*	*pirdithme*	*ya*
	INTJ	???	long.time	INTJ
	pim-ngime			***pim-ngime***
AT:	**thim-ngime**			**thim-ngi**me
	1INCLS.SIT(1).NFUT-PC.NSIB			**1INCLS.SIT(1).NFUT-PC.NSIB**

'we've been here for too long'

(LAMP_20120830_WF_01_V1 00:30:50)

The source of this error is likely the related future form of the classifier stem SIT(1) *pi-*. This can be understood by considering the structure of this paradigm more generally, a partial CSP is shown below in Table 24.

Table 24. CSP SIT(1)

	FUT	**NFUT**
1SG	*ngi*	*ngem*
2SG	*thi*	*thim*
3SG	*pi*	*dim*
1INCL	*pi*	*thim* *(*pim)*

CSP SIT(1) belongs to the supra-inflection class M.NFUT which is an inflectional pattern relating to non-future forms. Non-future forms have a final *-m* and in many cases this is all that differentiates non-future and future forms. The formal similarity of future and non-future forms is found in SIT(1) to some extent, particularly in the 1st and 2nd singular with non-future classifier stem forms distinguished from future forms by a final *-m* and a change in vowel in the first singular. Importantly the initial consonant, which is closely associated with subject person in many paradigms (Green, 2003), is identical in both 1st and 2nd singular forms. It is likely that the pattern detected amongst these related forms will be influenced more strongly by 1st and 2nd singular forms as these categories have a higher token frequency in children's speech. Consequently the preservation of the initial consonant from the 1st inclusive future classifier stem is the likely source of this error.

Further support for this analysis would be the use of the future form of SIT(1) in a similar context at a similar or earlier age. No such productions are attested in Molly's speech. Molly does however use standard 1st inclusive future forms of other CSPs at the same age that belong to the same supra-inflection class NG.SBJ as shown in (128) below.

(128) Molly 4;5

kay-ya	***paningkala-xxx-nu***
kay=ya	**pani-ngkala-xxx-nu**
let's.go=DM	**1INCLS.BE(4).FUT-climb.onto-xxx-FUT**

'come on, let's climb up'

(LAMP_20120830_WF_01_V1 00:13:11)

Errors of this type that can be explained via intra-paradigmatic associations are rare in the corpus, as is typical of morphological errors of commission crosslinguistically (e.g. Deen, 2009). They show however that children are sensitive to semi-regular patterns intra-paradigmatic patterns of inflection in acquiring CSPs. Other errors of commission may result from the overgeneralisation of inter-paradigmatic inflectional patterns, such as those associated with supra inflection classes. I explore these errors now.

6.3.2. Closely Related CSPs

There is a great amount of syncretism found across CSPs in Murrinhpatha (Nordlinger, 2015). This syncretism is at its most extreme in pairs of closely related CSPs which are only distinguished in the non-future, see §2.2.4. The partial paradigms below show two pairs of closely related CSPs HANDS(8) and GRAB(9) as well as SEE(13) and BASH(14).[97] The development of closely related CSPs provides a great opportunity to consider the impact of inter-paradigmatic inflectional patterns because these paradigms only differ in terms of their non-future supra-inflection class membership.

Table 25. CSPs HANDS(8) and GRAB(9)

HANDS(8)

	FUT	NFUT	P:IPFV
1SG	ma	mam	me
2SG	na	nam	ne
3SG	ma	mam	me
1INCL	puma	thumam	thume

GRAB(9)

	FUT	NFUT	P:IPFV
1SG	ma	mangan	me
2SG	na	nangan	ne
3SG	ma	mangan	me
1INCL	puma	thumangan	thume

Table 26. CSPs LOOK(13) & BASH(14)

SEE(13)

	FUT	NFUT	P:IPFV
1SG	ba	bam	be
2SG	da	dam	de
3SG	ba	bam	be
1INCL	puba	thubam	thube

BASH(14)

	FUT	NFUT	P:IPFV
1SG	ba	bangam	be
2SG	da	dangam	de
3SG	ba	bangam	be
1INCL	puba	thubangam	thube

[97] These are partial paradigms which do not include dual and plural dimensions and are restricted to three TAM categories, future, non-future and past imperfective. Full CSPs are given in Appendix II.

It has been shown that children initially use predominantly future verbs in Murrinhpatha. This means that, based on children's production at this stage there is no formal distinction between CSPs HANDS(8) and GRAB(9) as shown by the pair of examples in (129) and (130).

(129) HANDS(8)

na-watha
2SGS.HANDS(8).FUT-make
'you make it'

(constructed)

(130) GRAB(9)

na-kut
2SGS.GRAB(9).FUT-collect
'you collect it'

(constructed)

Equally there is no formal distinction between CSPs LOOK(13) and BASH(14) as shown by the pair of examples in (131) and (132). This means that there are likely strong links between wordforms containing related CSPs at the early stages of development.

(131) SEE(13)

ba-ngkardu-nu
1SGS.SEE(13).FUT-look-FUT
'I will look'

(constructed)

(132) BASH(14)

ba-rdurt-nu
1SGS.BASH(14).FUT-find-FUT
'I will find it'

(constructed)

The influence of the strong relationships between closely related paradigms is observed in children's acquisition of non-future forms. Children are found to use the non-future forms of HANDS(8) in target verb constructions formed with GRAB(9) as in (133) and (134).

(133) Mavis 4;11

	yawu	*mup*	*ku*	*karrath*	
	INTJ	stop	CLF:ANIM	devil	
	mam-nhi-tha=kanam				*mam*
	3SGS.HANDS(8).NFUT-				
AT:	**mangan-nhi-tha=kanam**				
	3SGS.GRAB(9).NFUT-2SG.DO-chase=3SGS.BE(4).NFUt				3SGS.SAY/DO(34).NFUT

'she said, "wait the devil is chasing you"'

(LAMP_20131025_WF_01_V1 00:16:49)

(134) Molly 5;0,

	ngawu	*nayp*	*ngay*	***mangimart***	*Lauren*
				mam-ngi-ma-art	
				3SGS.HANDS(8).NFUT-	
AT:				**mangangimart**	
				mangan-ngi-ma-art	
	INTJ	knife	1SG	**3SGS.GRAB(9).NFUT-1SG.DO-APPL-take**	name

'hey he took my knife from me Lauren'

(LAMP_20130527_WF_01_V1 00:37:01)

Similarly the non-future forms of SEE(13) may be used in place of BASH(14) as in (135) and (136).

(135) Mavis 4;11

	maka	*mi*	*wan*	***bam-nga-rdurt***
				3SGS.SEE(13).NFUT-
AT:				**bangam-nga-rdurt**
	Fa:Mo	CLF:VEG	one	**3SGS.BASH(14).NFUT-1SG.IO-find**

'grandma he found one (yam) for me'

(LAMP_20131105_WF_01_V1 01:27:45)

(136) Mavis 4;11

	mi	*ngala*	***bam-nga-rdurt***	*ngay-yu*
			3SGS.SEE(13).NFUT-	
AT:			**bangam-nga-rdurt**	
	CLF:VEG	big	**3SGS.BASH(14).NFUT-1SG.IO-find**	1SG-DM

'he found a big yam for me'

(LAMP_20131105_WF_01_V1 01:29:38)

These errors of commission are only observed in these directions. It might be anticipated, based on findings from usage based accounts of the acquisition of inflectional morphology (e.g. Behrens, 2009; Bybee, 1985, 1995), that type frequency of CSPs, in terms of the number of lexical stems they combine with, would play a role in which pattern is overgeneralised. This however is not the case with regard to individual paradigms. Although HANDS(8) has a much higher type frequency compared with GRAB(9) in children's speech, this is not the case for CSPs SEE(13) and BASH(14) where BASH(14) is used with a greater number of lexical stems, see Figure 14 previously. It is also possible that the token frequency of the relevant CSPs would explain this error. CSP HANDS(8) is indeed used much more frequently by children than GRAB(9), however SEE(13) and BASH(14) are used at relatively similar rates, as shown in Figure 12 previously, suggesting this is also not the common source of the error.

Type frequency does however explain the nature of the above errors if we consider the supra-inflection classes of the related paradigms. Both HANDS(8) and SEE(13) belong to the supra-inflection class M.NFUT whereas GRAB(9) belongs to NGAN.NFUT and BASH(14) belongs to NGAM.NFUT (see §2.2.4). These classes have greatly different type frequencies in

terms of the number of CSP members in each class. Based on the CSPs given in Blythe et al. (2007), the M.NFUT class is found with some variation, in 20 of the 38 CSPs. By contrast the NGAN.NFUT and NGAM.NFUT classes have just 3 and 6 clear members respectively.[98] Consequently in both pairs of related CSPs it is the supra-inflection class with a much higher type frequency that is overgeneralised.

Interestingly overgeneralisations of the M.NFUT supra-inflection are not readily observed in paradigms that do not have a closely related CSP from this supra-inflection class. This suggests that it is the combined factors of the type frequency of the supra-inflection class as well as the close formal relationship of CSPs which brings about these errors of commission. An important part of this explanation is that children appear to learn future forms of verbs first and that these related CSPs are not distinguished formally for this TAM category. These findings suggest that children are encoding differences in meaning through alternations in whole wordforms rather than attaching meaning to individual inflectional elements such as a classifier stem final *-m* encoding non-future. The fact that this error of commission is observed in closely related CSPs is neatly explained by Bybee's Network Model (1995) which argues that a pattern of inflection is more likely to be overgeneralised if the target wordforms are phonologically similar. I return to this point in §6.5.

An intriguing alternative explanation is that these errors are the result of the overgeneralisation of these CSPs on semantic grounds similar to errors of commission in systems with structural similarities such as Persian light verb phrases (Family, 2009). Such errors would provide evidence that children associate meaning with individual CSPs distinct from lexical stems. I return to discussion of this hypothesis in §7.3 but maintain that the source of these errors is related to the type frequency of the non-future supra-inflection classes as well as the formal similarity of the related CSPs.

6.3.3. Singular Subject Person Supra-Inflection Classes

The investigation of the development of closely related paradigms highlights the impact that supra-inflection classes can have on children's acquisition of CSPs. Knowledge of these patterns allows children to further build verbal paradigms based on analogy with other CSPs.

[98] It is possible that these each have one or two additional members as some CSPs potentially fall into multiple classes based on the currently available data.

Evidence of this is found in children's errors of commission which overgeneralise supra-inflection classes as described in the previous section for non-future classes. Children are also sensitive to and utilise the patterns of supra-inflection classes relating to the encoding of singular subject person as evidenced by errors of commission.

In §2.2.4 I outlined three supra-inflection classes relating to the encoding of singular subjects in CSPs, NG.SBJ, M.SBJ and B.SBJ. This was based largely on observations by Green (2003) that the initial element of classifier stems often encodes subject person. For example in the NG.SBJ class 1st singular is associated with an initial *ng-* where as in the M.SBJ class 1st and 3rd singular are associated with an initial *m-*. Partial examples of CSPs belonging to each of the three classes are given below.[99] As with non-future classes these supra-inflection classes differ greatly in terms of their type frequency. Based on the CSPs of Blythe et al. (2007) 26 CSPs belong to the NG.SBJ class, 5 belong to M.SBJ and 6 belong to B.SBJ. CSP SAY/DO(34) is a mixture of classes NG.SBJ and M.SBJ

Table 27. Singular Subject Person Supra-inflection Classes

NG.SBJ - POKE(19)

	FUT	**NFUT**	**P:IPFV**
1SG	nga	ngam	ngani
2SG	tha	tham	thani
3SG	ka	dam	dani

M.SBJ - HANDS(8)

	FUT	**NFUT**	**P:IPFV**
1SG	ma	mam	me
2SG	na	nam	ne
3SG	ma	mam	me

B.SBJ - LOOK(13)

	FUT	**NFUT**	**P:IPFV**
1SG	ba	bam	be
2SG	da	dam	de
3SG	ba	bam	be

[99] Note that although each of these CSPs belong to different supra-inflection classes relating to singular subject encoding they all belong to the same supra-inflection class with regard to the relationship of future and non-future forms M.NFUT.

As with the non-future it is the supra-inflection class with the highest type frequency, NG.SBJ, which tends to be overgeneralised. Errors of this type are relatively infrequent in the focus children's speech but are attested in 1st, 2nd and 3rd singular classifier stem contexts. Example (137) shows the overgeneralisation of 1st person NG.SBJ marking to a verb which belongs to the B.SBJ class by Mavis at age 4;11.

Overgeneralisation of NG.SBJ -1st singular

(137) Mavis 4;11

	ya	*mange*	*ngay*	***ngu-pak-nu***
AT:				**bu-pak-nu**
	INTJ	by.myself		**1SGS.LOWER(17).FUT-put.down-FUT**

'hey I will put it down myself'

[Mavis is putting the yam in the fire. Her grandmother tries to do it for her.]

(LAMP_20131105_WF_01_V1 01:27:45)

Example (138) also shows the overgeneralisation of NG.SBJ marking by Acacia at age 3;2. In this instance however the target verb belongs to the M.SBJ inflection class and it is the 2nd person pattern which is overgeneralised. Interestingly the forms produced by Mavis and Acacia in these examples are actually well-formed verbs but with meanings different to those intended. The verb produced by Mavis means 'to paint up' where as the verb used by Acacia means 'to insult'. I explore this observation in detail in §7.3.

Overgeneralisation of NG.SBJ - 2nd singular

(138) Acacia 3;2

	tharnuthuk-thanam *xxx*
AT:	**narntithuk-thanam**
	nam-rithuk=thanam
	2SGS.HANDS(8).NFUT-be.a.nuisance=2SGS.BE(4).NFUT

'you're being a nuisance'

(LAMP_20131202_WF_01_V1 00:45:54)

Examples of the overgeneralisation of NG.SBJ inflectional patterns relating to 3rd singular forms are somewhat different as they occur within the inflection class. This occurs as the encoding of 3rd singular subjects often varies across TAM categories as shown in the partial CSP of POKE(19) above. In this CSP the future form has an initial *k-* whereas the non-future and past imperfective forms have an initial *d-*. In example (139) Acacia overgeneralises the initial *k-*, which is often associated with 3rd singular future forms as well as existential verb forms belonging to this class, to a non-future environment. In (140) Acacia overgeneralises this same pattern to a past imperfective environment. These examples show that Acacia associates an initial *k-* with third person subjects. This is likely due to the predominance of future and existential forms in early verbs (see Ch. 5), which in this class tend to have an initial *k-*. The source of these particular errors of commission therefore is likely due both to the ways in which verbal paradigms are constructed from an initial core and the impact of inter-paradigmatic supra-inflection classes. Notably the overgeneralisation of this pattern of inflection associated with 3rd singular subjects is not attested as impacting verbs belonging to either the M.SBJ or B.SBJ classes, although this possibility cannot be ruled out.

Overgeneralisation of NG.SBJ - 3rd singular

(139) Acacia 2;7

1	*Tania:*	*wurdawal*	*thama*
		wurdam-wal	thama
		3SGS.TURN:INTR(30).NFUT-jump.down	2SGS.SAY/DO(34).FUT
		‘say he got off (out from the car)’	
2	*Acacia:*	***kurdawal***	
	AT:	**wurdawal**	
		wurdam-wal	
		3SGS.TURN:INTR(30).NFUT-jump.down	
		‘he got off’	

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(140) Acacia 3;7

aa	***kurrini-dha***
	wurrini-dha
INTJ	**3SGS.GO(6).PIMP-PST**

'oh, it went'

[Acacia says this just after an orange rolls away from her.]

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The salience of patterns associated with supra-inflection classes, in particular the NG.SBJ class, is also observed in children's acquisition of 'impersonal' (Walsh, 1987) or 'experiencer object' verbs (Evans, 2004). These are verbs in which the experiencer is encoded as a grammatical object and the grammatical subject, which in Murrinhpatha is fixed as 3rd singular, denotes the stimulus for the experienced state. An example of this construction type is given in (141) for the verb 'be thirsty'. The 1st person experiencer is encoded as a direct object.

(141)

dem-ngi-ralal=ngurran

3SGS.POKE:RR(21).NFUT-1SG.DO-be.thirsty=1SGS.GO(6).NFUT

'I'm thirsty'

(Nordlinger, 2010: 25)

If we consider the production of this verb by Mavis at age 4;6, it appears that she attempts to encode the experiencer as a grammatical subject in the classifier stem. Instead of producing a grammatical 3rd singular subject classifier stem form Mavis utilises the 1st singular subject form from the same CSP POKE:RR(21). This shows that Mavis at this stage associates an initial *ng-* with 1st singular subjects and that this association is salient when learning to construct verb forms. Furthermore, it also shows that Mavis is yet to master the use of

impersonal verb constructions and seeks to encode herself as an experiencer as a grammatical subject.

(142) Mavis 4;6

1		*martnu*	*(kura)*	*patha-wa*
		ma-art-nu	kura	patha=wa
		1SGS.GRAB(9).FUT-get-FUT	CLF:WATER	good=EMPH
		‘I will get some water’		
2		***ngerntalal***		*ngay-yu*
		ngem-ralal		
		1SGS.POKE:RR(21).NFUT-		
	AT:	**dem-ngi-ralal**		
		3SGS.POKE:RR(21).NFUT-1SG.DO-be.thirsty		1SG-DM
		‘I’m thirsty’		

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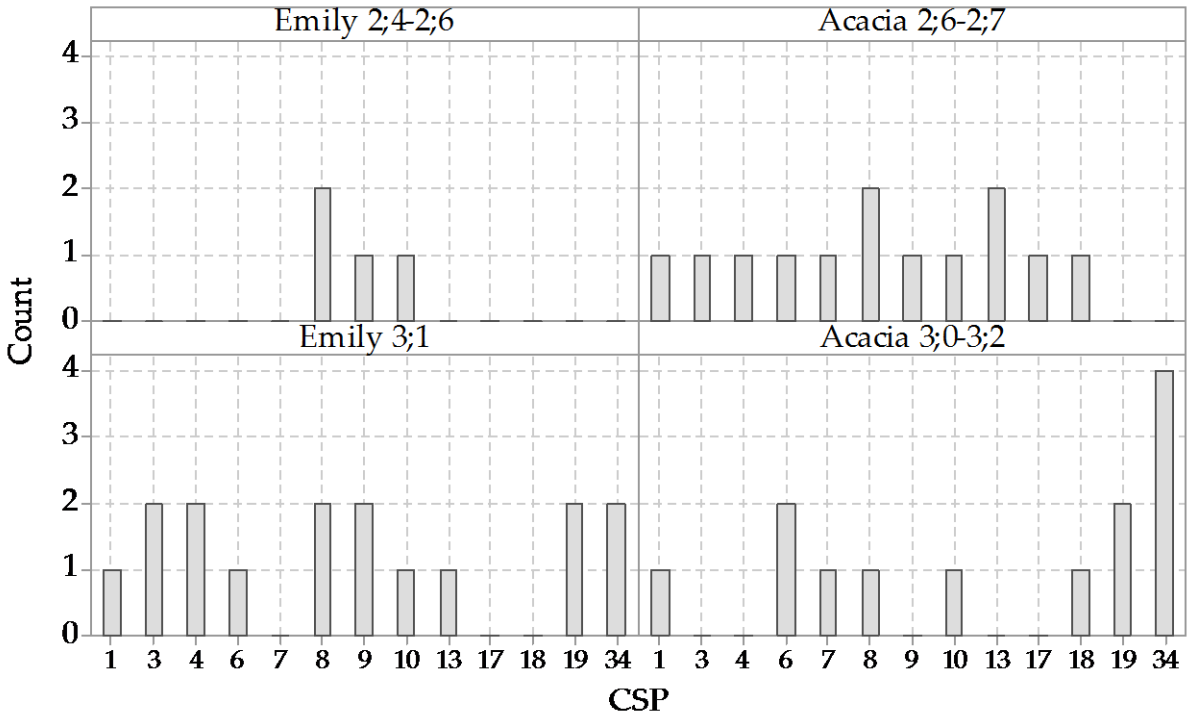
6.4 Pathbreaking CSPs

This chapter has shown that children’s verbal paradigms begin from small initial cores and that children gradually expand these paradigms through the addition of new paradigmatic dimensions. These dimensions show a general pathway of development in terms of which features are used earlier and which are used later in development by children. It has also been shown that this development occurs in a piecemeal fashion with the encoding of features such as non-future by some verbs but not others in obligatory contexts. This raises the question of whether the emergent use of new dimensions is initially associated with certain CSPs. For example are particular features such as non-future first used predominantly with a specific CSP before being used more widely? In this scenario the CSP could act as a morphological pathbreaker allowing children to acquire inflectional patterns and salient features for an individual CSP before extending these to other CSPs. This is somewhat similar to the general-purpose verbs argued to act as syntactic pathbreakers in languages such as English

and Hebrew (Ninio, 1999b), see §3.4.1.1. If morphological pathbreakers exist for the acquisition of CSPs we would expect to find greater CSP cell diversity for particular CSPs at earlier stages of development than is observed for other CSPs at the same stage.

To consider this proposition we can first consider children's early verbs. The figure below shows the number of morphological property sets per CSP attested in children's speech during an individual fieldtrip. This is shown for Emily between age 2;4-2;6 and at age 3;1 and for Acacia between age 2;6-2;7 and between age 3;0-3;2. Based on these figures there appears to be no evidence to suggest that certain CSPs have greater cell diversity in comparison to other CSPs. What these figures do show is that many CSPs are not attested in children's early verbs. This finding is however not likely to be developmental as children's use of CSPs in terms of their rate of use has been shown to reflect their use in adult speech (Forshaw et al., in press).

Figure 19. Number of Morphological Property Sets by CSP



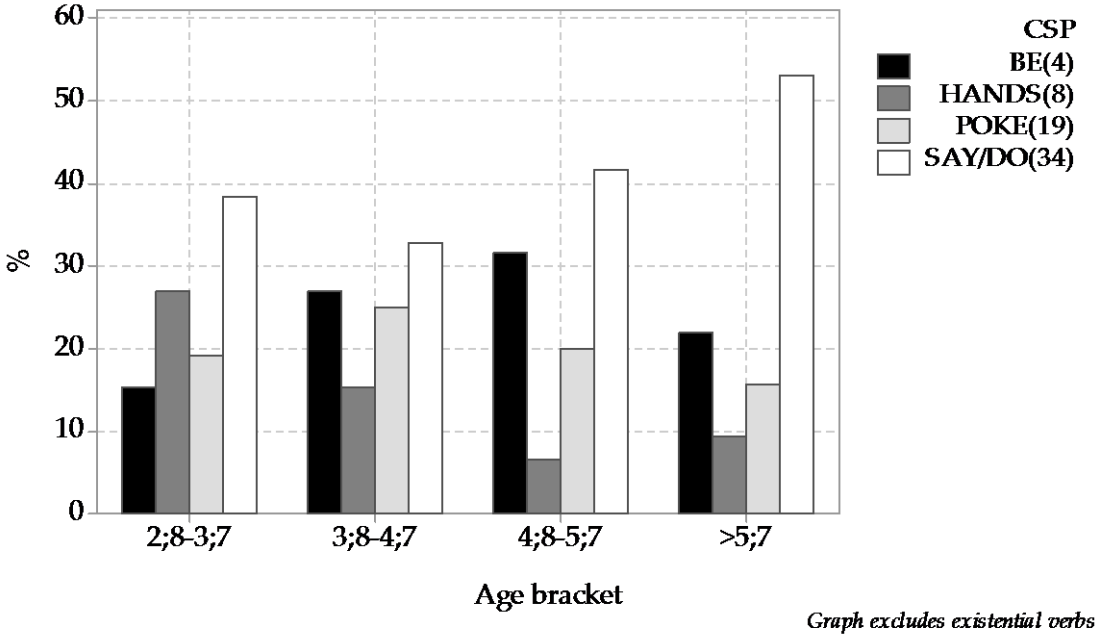
Alternatively it is possible to consider the use of individual features known to emerge during the stages of development captured in this corpus such as non-future and 3rd singular. If certain CSPs are morphological pathbreakers these features may initially be associated with particular CSPs. In considering the corpus in this way it is important that the features and CSPs included in analysis are relatively frequent as the inclusion of rarer features and CSPs are likely to provide a skewed picture of the development of diversity. Since potential pathbreakers will be frequent they will also likely show greater CSP cell diversity as they will have a greater opportunity to illustrate such diversity. Therefore frequency of individual CSPs must be controlled to some extent. I do this by restricting investigation to the matched sample (§6.2.1) used to investigate the development of CSP cell diversity. As this matched sample is restricted to four frequent CSPs, BE(4), HANDS(8), POKE (19) and SAY/DO(34) it is of course possible that all are morphological pathbreakers.[100] I consider the emergence of 3rd singular and non-future CSP forms in the matched sample. These features in particular are considered as they both emerge during the second age bracket (2;8-3;7) considered in previous discussion and then continue to be used relatively frequently throughout the corpus.

The two figures below show the use of 3rd singular[101] and non-future classifier stems across four CSPs over four age brackets. In both cases 3rd singular and non-future forms are used across all four CSPs in the first age bracket in which they are attested 2;8-3;7. They are used with greater frequency with CSPs HANDS(8) and SAY/DO(34). There is however insufficient evidence to suggest that these CSPs act as morphological pathbreakers in terms of the building of CSPs. It seems more likely that the higher frequency of use for these features with these CSPs is due to the overall frequency of individual CSP use. During the age bracket 2;8-3;7 CSPs HANDS(8) and SAY/DO(34) are used much more frequently than the other two CSPs. They account for 42% and 33% of all CSP use in this age bracket respectively. This likely results in the higher percentage of 3rd person and non-future forms with these CSPs.

[100] Future research could investigate the CSP diversity of frequent and infrequent CSPs using measures of entropy used to examine the development of morphology (e.g. Stoll & Bickel, 2013b), but this lies beyond the scope of this thesis.

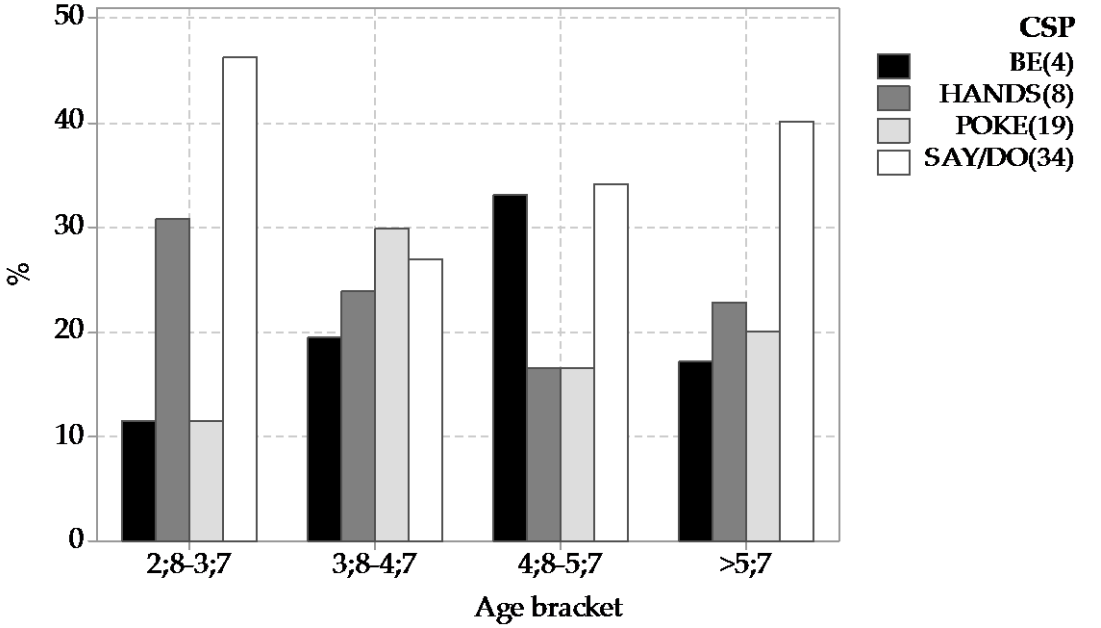
[101] Verbs with existential TAM are excluded from this graph as they can only be 3rd person forms.

Figure 20. Distribution of 3rd Person Forms by CSP



Graph excludes existential verbs
Percent is calculated within levels of age bracket

Figure 21. Distribution of Non-Future Forms by CSP



Percent is calculated within levels of age bracket

Similar to the exploration of the syntactic pathbreakers hypothesis the corpus considered here raises some issues for evaluating a morphological pathbreakers hypothesis. Firstly ideally the samples being compared would be denser as a pathbreaking period may not last for an extended period. The sparseness of the samples in this corpus mean identifying morphological pathbreakers may often be missed. This means that although evidence of CSPs as morphological pathbreakers is not found in this corpus consideration of a denser sample may show otherwise.

6.5 Summary & Preliminary Discussion

This chapter has considered the development of the inflectional patterns of CSPs across the corpus. It has shown that children initially 'start small' using only a small number of CSP cells associated with certain functions as also explored in §5.2.3. Children then gradually expand these paradigms to encode new feature dimensions potentially driven by the new diverse ways children use verbs such as to refer to past events. Children are sensitive to semi-regular intra- and inter-paradigmatic inflectional patterns as evidenced by children's errors. However overgeneralisations are largely limited to contexts where there are also other formal similarities between the target wordforms and the source of the error as shown most clearly by the development of closely related CSPs (§6.3.2).

The findings in this chapter are relatively consistent with several accounts of the acquisition of morphology, including Protomorphology (Dressler & Karpf, 1995), Pinker's (1984) nativist model and Bybee's (1995) network model, in terms of the initial stages of morphological development. These approaches argue that children's early inflected wordforms are rote learned and do not indicate knowledge of underlying morphological structure. Children then gradually uncover morphological patterns across these rote-learned forms. The crosslinguistic typological approach of Protomorphology (Bittner et al., 2003a), see §3.5.3, has found that children tend to become aware of morphological structure earlier in languages with rich morphological systems (Laaha & Gillis, 2007). Earlier morphological awareness is also promoted in languages with regular morphological systems such as in Turkish (Aksu-Koç & Ketrez, 2003). This awareness, referred to as the protomorphological

stage, is typically indicated by the production of errors of commission and the emergence of true miniparadigms, the use of three inflected forms for a given lemma.[102]

Given the rich morphology of Murrinhpatha CSPs we might anticipate that children become aware of morphological structure quite early. However this does not seem to be the case. This is likely due in part to the fusional nature of CSPs and the degree of irregularity within and across paradigms. Although an analysis of a denser corpus is required to determine the onset of the protomorphological stage, it appears that this may only emerge between 2;6 - 3;0 years of age. This is based on the fact that the errors of commission analysed in this chapter occurred mostly after age three with many after age four. Furthermore the value of MSP(30) is less than 1.2 at 2;7 and rises to between 1.4 and 1.6 by 3;8, see Figure 11. In the matched sample the value of MSP(20) was less than 2 at ages 3;1 to 3;2, see Figure 15. These measures suggest the late emergence of true miniparadigms (Bittner et al., 2003b) and the onset of the protomorphological stage with regard to CSPs. By contrast the beginning of the protomorphological stage is observed earlier in languages such as Turkish (1;6) (Aksu-Koç & Ketrez, 2003), German (1;11) (Bittner, 2003) and Yucatec (2;1) (Pfeiler, 2003).[103] Also the use of verbs in Murrinhpatha has already been noted to be relatively infrequent in early development, see chapter 5, therefore it is understandable that little CSP cell diversity is observed in the early stages of development. By contrast in Yucatec, an agglutinative language, after age 2;0 verb tokens represent around 50% of utterances (Pfeiler, 2003, p. 383). Despite the inflectional richness of Murrinhpatha CSPs the lack of early verb use partnered with the complexity of the system may result in the later recognition of the morphological patterns of CSPs by children. I return to this point in §8.3.

As with other complex inflectional systems Murrinhpatha CSPs raise problems for nativist rule-based approaches as simply generating the rules to account for such a system is problematic. There was however evidence of children overgeneralising inflectional patterns suggesting that children associate certain classifier stem segments with certain meanings. For example an initial *ng-* is associated with 1st singular subjects. These associations however did not appear to result in the acquisition of abstract rules central to rule-based accounts (e.g.

[102] See §3.5.3 for a more detailed definition of 'true miniparadigms' and the protomorphological stage.
[103] The later emergence of the protomorphological stage in Murrinhpatha may also be due to the small size of the corpus as logically a larger corpus will provide more opportunities for inflectional contrasts to be observed. However the use of MSP(20) and MSP(30) controls for this factor to some extent.

Pinker, 2006; Pinker & Prince, 1991). Instead overgeneralisations often relied on further similarity of whole wordforms suggesting that it is the alternations and contrasts between whole wordforms that are salient for children as opposed to storing individual segments with associated meanings to then be combined 'on-line'.

These findings better support a usage-based network account of morphological acquisition (e.g. Bybee, 1995). Such an approach focuses on the associations between networks of wordforms. The strength of the links between wordforms is based on semantic and phonological similarities, similar to Pinker's (1984, Ch. 5) organisation of miniparadigms. Children are sensitive to patterns across these networks that then lead to the creation of schemas. The strength of schemas is associated with the type frequency of inflectional patterns meaning that patterns with high type frequency are more likely to be overgeneralised. This was shown to be the case for various patterns in §6.3.2 and §6.3.3. Importantly a usage-based account also explains why errors of commission are found more regularly in contexts where the non-standard form shares similarities with other standard forms and patterns in its associated networks. Links between whole wordforms do not disassociate inflectional morphology meaning that the whole wordform impacts the patterns which children are sensitive to in producing certain structures. If a network of wordforms for a verb shares strong links with another network these networks are more likely to influence each other in some way. I return to this discussion in §8.3. The importance of associations between whole wordforms rather than the disassociation of individual segments is also important in understanding the acquisition of bipartite stem combinations which I now explore in the following chapter.

7 Acquisition of Bipartite Stem Verbs

The majority of verbs in Murrinhpatha have a bipartite stem structure constructed of a classifier stem and a lexical stem (§2.2.3). Together these encode the verbal semantics and argument structure of bipartite stem verbs and co-vary to encode different verbs (e.g. Nordlinger & Caudal, 2012). Therefore, as well as having to learn the complex classifier paradigms as discussed in Chapter 6, the Murrinhpatha-acquiring child also needs to learn how these combine with lexical stems to form bipartite stem verbs. The task for the child is made particularly difficult by the fact that the overwhelming majority of CSPs and lexical stems are bound forms and so are never heard in isolation.

There has been no detailed study in the literature of how such a verbal system is acquired. The structure of this system raises a number of questions regarding its acquisition. Firstly is it the case that children initially treat a certain stem element as the 'true' stem? It was observed in §5.1.3 that children may omit classifier stems, or parts thereof, in bipartite stem verbal PWords greater than a foot but that lexical stems tend to be preserved. Lexical stems are more salient to children given that they are often associated with primary lexical stress, always occur at the end of the verbal PWord, frequently occur at the end of the verbal

complex and have a relatively fixed phonological form. This may initially disguise the bipartite stem structure of verbs with children likely to treat the lexical stem as a 'true' stem and the key semantic kernel of the verb.

After these earlier stages of development, as children begin to acquire more verbs, they will need to be able to co-vary classifier and lexical stem combinations to encode different verb meanings. This can potentially be achieved in two ways. Firstly children could acquire bipartite stems as fixed combinations of classifier and lexical stems. The different meanings of verbs with shared stem elements would emerge through contrasts of whole bipartite stem combinations. The second option is that children learn to associate meaning with individual stem elements and learn to construct the meaning of bipartite stem verbs compositionally. Evidence of the acquisition of underlying compositional principles would be individual stem elements being overgeneralised on semantic grounds. It is also possible that children utilise both options for different parts of the same system with the more regular parts of the system potentially allowing for the semantic disassociation of individual stem elements.

Despite the lack of acquisition research concerning bipartite stem verbs there are a number of relevant studies which investigate the acquisition of constructions with structural similarities including Persian light verb phrases (Family, 2009), Georgian preverbs (Imedadze & Tuite, 1992), German complex verbs (Behrens, 1998) and noun-noun compounding in several languages (e.g. Berman, 2011). These constructions are similar to Murrinhpatha bipartite stem verbs in that they are constructed of two elements which both contribute to the core semantics of the final word or phrase. In each of these systems combinations range from those which are semantically compositional to those which are semantically opaque. These studies argue that children acquire the underlying compositional principles of these systems. Evidence of this are children's productions of novel combinations either on grounds of frequency or semantics (Clark, 1981; Family, 2009; Imedadze & Tuite, 1992), see §3.6 for examples. These studies find that children are more likely to overgeneralise individual elements which are flexible (occur in a wide variety of combinations), frequent and morphosemantically transparent (Berman, 2011; Family, 2009). Furthermore, these types of errors are more likely to occur if the system as a whole is relatively productive and semantically transparent (Berman, 2011).

In terms of these factors Murrinhpatha bipartite stem verbs and individual classifier and lexical stems vary widely. Bipartite stem combinations vary greatly in terms of their semantic transparency and can be understood as existing on a continuum, as described in §2.2.3. At one end of the continuum combinations are semantically compositional. In such constructions the meaning of bipartite stem verbs is predictable based on the meanings of the individual stem elements. An example of a transparent bipartite stem verb is shown in (143) where the CSP HANDS(8) can be understood to contribute the meaning 'do with hands' and the lexical stem *-kurrk* contributes the meaning 'scratch'.

(143)

mam-kurrk
1SGS.HANDS(8).NFUT-scratch

'I scratched something (using my hands).'

(Nordlinger & Caudal, 2012, p. 80)

At the other end of the continuum bipartite stem combinations are semantically opaque. In these cases it is often difficult to attribute meaning to the individual stem elements as in (144).[104] For discussion of this construction regarding semantic transparency see §2.2.3. In such cases even when it is possible to attribute meaning to one of the stem elements the resultant meaning of the bipartite stem verb is not compositional or predictable.

(144)

ba-ngkardu	*mani*
1SGS.SEE(13).FUT-look	be.able

'I'll have a look.'

(Street, 2012, p. 38)

[104] The stem glosses here are arbitrary labels based on the meaning of the whole verb and do not represent semantic analysis of the individual elements. Where it is possible to identify a semantic core for a classifier or lexical stem the gloss attempts to illustrate this meaning.

Classifier and lexical stems also vary in terms of their flexibility and frequency. While some stems occur in a variety of combinations others occur in relatively few combinations. For example the CSP POKE(19) has been attested in combination with 160 lexical stems whereas BREAK(11) is attested with just 11 (Blythe et al., n.d.). Stems which are both flexible, frequent and relatively transparent are more likely to be isolated as individual stem elements with associated semantics and consequently more likely to be overgeneralised. These stems also provide the best evidence of the bipartite nature of the verbal system to the child.

In this chapter I explore children's bipartite stem verb use. I examine the extent to which children utilise contrastive stem combinations to encode changes in verbal meaning. In particular I consider contrastive use of CSPs with individual lexical stems §7.2. This is done through the examination of children's use of particular lexical stems with different CSPs throughout the corpus as outlined in §7.1. This analysis shows that despite the importance of bipartite stem verbs in Murrinhpatha grammatical structure there is little use of contrastive CSPs in the corpus. The contrastive CSP uses identified range from verbs which are semantically opaque (§7.2.1) to those which are relatively transparent (§7.2.2). Contrastive CSP use in semantically transparent verb sets shows that children are able to use CSPs in an adult-like manner to encode different verbal meanings. The most widespread use of transparent contrastive CSPs is found with reflexive/reciprocal CSP alternations that occur with a wide variety of lexical stems (§7.2.2.3). Children's errors suggest that meaning emerges through associative links of whole bipartite stem combinations, as semantically and phonologically related verbs with different CSPs are used in place of one another and CSP alternation patterns are not overgeneralised.

I then further consider children's errors of commission in terms of the production of non-standard combinations of classifier and lexical stems (§7.3). In particular I consider whether children produce novel combinations or overgeneralise CSPs based on semantic or frequency grounds. These types of errors, which have been identified in similar construction types in other languages (Behrens, 1998; Family, 2009; Imedadze & Tuite, 1992) are the best evidence that children are aware of the compositional semantic principles that underlie Murrinhpatha bipartite stem verbs and that children associate meaning with independent stem elements.

7.1 Analysing Contrastive CSP Use

In analysing contrastive bipartite stem use I focus predominantly on the contrastive use of CSPs. This is because CSPs are typically used in a wider variety of combinations than lexical stems and therefore are more likely to be used contrastively in the corpus. Furthermore if a child does overgeneralise a stem based on semantics or frequency it is more likely to be the classifier stem due to their typically more general semantics and greater general flexibility. In analysing how children use CSPs contrastively to encode alternations in verb semantics and argument structure it is important to consider the use of CSPs in a variety of verb contexts. In order to examine the contrastive uses of CSPs I focus initially on the use of CSPs with particular lexical stems in individual focus children's speech. In these combination sets, groups of bipartite stem verbs with a shared lexical stem, it is the CSP which is essential to differentiating the meaning of verbs, if the meaning of the lexical stem is shared across the bipartite stem verbs. These groups of examples provide evidence that a child is utilising the CSP contrastively to encode a different verb. I also consider the use of particular contrastive CSPs in other bipartite stem contexts where relevant (§7.2.2.3).

In considering the child data I adopt a broad definition of what constitutes contrastive CSP use as given below.

> *A classifier stem paradigm (CSP) is considered to be used contrastively with a given lexical stem at the point in the corpus (reported as a child's age) that a child has produced at least two classifier stem forms from more than one CSP in combination with the same lexical stem.*

7.2 Contrastive CSPs

Across the corpus 19 of the 159 lexical stems attested were used by individual focus children with more than one CSP. Of these 19 lexical stems 4, *-bat, -bath, -ku* and *-wurl*, were used with more than one CSP by more than one focus child. The tables below show the CSPs used by each of the children in combination with these 4 lexical stems. They also show the age when this combination was first attested as well as the age at which contrastive CSP use was

identified for this combination set according to the above definition. These show that identification of contrastive use is identified across a wide age range (2;7-5;8) and that children are able to use CSPs to differentiate verb meaning in combination with a variety of bipartite stem verbs.

Table 28. CSP Combinations with *-bat*

CSP	Free Translation	Acacia	Emily	Nathan	Mavis	Molly
FEET(7)	'throw at'	-	-	3;7	-	-
LOWER:RR(18)	'fall'	2;7	-	3;7	-	4;5
SLASH(23)	'hit'	2;7	-	-	4;9	-
CSP Contrast		2;7	-	3;7	-	-

Table 29. CSP Combinations with *-bath*

CSP	Free Translation	Acacia	Emily	Nathan	Mavis	Molly
HANDS(8)	'take'	-	4;3	4;4	-	4;3
the + HANDS(8)	'know' (lit. take ear)	-	-	4;10	4;11	-
WATCH(28)	'watch'	-	-	3;7*	4;11	4;5
CSP Contrast		-	-	4;4	4;11	4;5

*Truncated classifier stem

Table 30. CSP Combinations with *-ku*

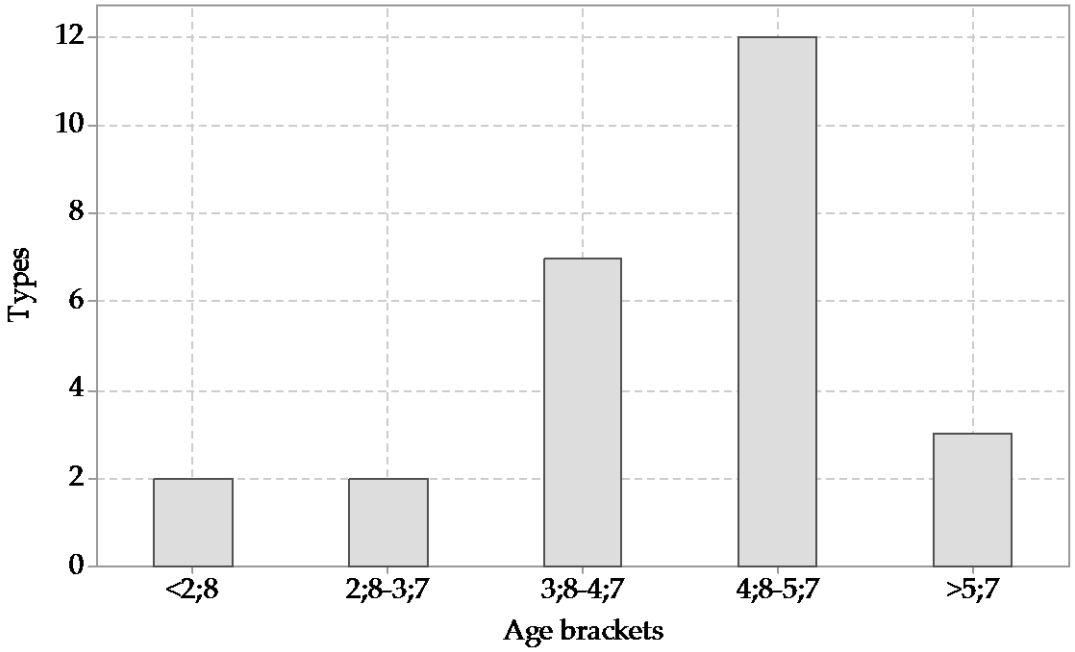
CSP	Free Translation	Acacia	Emily	Nathan	Mavis	Molly
SIT(1)	'go quickly'	3;6	-	4;4	3;9	4;3
STAND(3)	'go quickly'	-	-	-	5;4	5;8
BE(4)	'fish with a line'	-	-	4;4	-	6;1
FEET(7)	'throw'	2;7	-	4;4	5;4	4;3
CSP Contrast		3;6	-	4;4	-	4;3

Table 31. CSP Combinations with *-wurl*

CSP	Free Translation	Acacia	Emily	Nathan	Mavis	Molly
HEAP(25)	'get water'	-	-	4;10	4;11	4;3
TURN:RR(30)	'return'	-	-	4;10	5;6	5;8
CSP Contrast		-	-	4;10	5;6	5;8

A broader view of bipartite stem verb use shows that, although the numbers are small, contrastive CSP use increases with age. The figure below illustrates the stage at which individual contrastive CSP uses were first identified for children. These have been categorised according to the age brackets used in chapter 6. The vast majority of contrastive CSP uses are identified in the corpus after age 3;7. Only 4 contrastive combination sets are identified before this age with the earliest contrastive CSP use with an individual lexical stem identified at age 2;7 in Acacia's speech, see Table 28.[105]

Figure 22. First Contrastive CSP Use Across Five Age Brackets



Given that the majority of verbs in Murrinhpatha are bipartite stem verbs and that children must learn to co-vary stem elements in acquiring the system, it is somewhat surprising that so few examples of contrastive CSP use are identified in the corpus and that these tend to emerge at later stages of development. Bipartite stem verbs are a prevalent part of the Murrinhpatha verbal repertoire and consequently we might anticipate the principles of this

[105] The low number of new contrastive uses after 5;7 months is likely due to the small amount of data in this age bracket in the corpus.

system to be acquired early. These findings do show however, that children are able to use CSPs contrastively to encode different verbal meanings to some extent.

There are a number of factors that may contribute to the low levels of contrastive CSP use identified in the corpus. Firstly, this may in part be due to the complexity of the system. Since parts of the bipartite system are not particularly transparent or regular it may take a long time to acquire contrastive combinations and to acquire the underlying semantic compositional principles which underlie the more regular parts of the system. That is the overall characteristics of the system may disguise the bipartite stem structure of many verbs. I return to this point in discussing children's bipartite stem combination errors in §7.3. The late emergence of contrastive CSP use is also in part due to the nature of the definition of contrastive CSP use itself. Since contrastive use is identified as the stage in the corpus at which a lexical stem is used by a child with two distinct CSPs, as more verb tokens are used by a child the likelihood of identifying contrastive use is increased. The production of a verb later in the corpus and therefore later in development, is more likely to result in contrastive use as it has many more verb productions with which it can be contrasted, compared with those produced earlier in the corpus.

I now discuss several contrastive CSP uses identified in the corpus in greater detail. I explore the extent to which these provide evidence of children's abilities to produce different but related verbs through the use of different CSPs. I also consider the relationship between several bipartite stem combinations and children's acquisition of particular CSP alternations (§7.2.2.1-3). As with the broader bipartite stem verb system the contrastive combinations identified range from those which are semantically transparent to those which are relatively opaque. I first discuss CSP contrasts relating to bipartite stem combinations which are relatively semantically opaque (§7.2.1) before considering those which are more transparent (§7.2.2).

7.2.1. Semantically Opaque Contrastive CSPs

For a number of the contrastive CSP combination sets identified it appears unlikely that the different combinations actually contain the same lexical stem. Instead in these cases the lexical stems are likely distinct but homophonous. Thus such examples do not provide evidence of children using CSPs to encode different verbal meanings as the lexical stems are

already distinct. Consider the following two examples produced by Molly which contain verbs with the lexical stem *-wurl*. Relevant verbs in examples appear in bold throughout this chapter. In (145) *-wurl* is used in combination with the CSP FORM(25) to mean 'get water' where as in (146) it is used in combination with TURN:RR(30) to mean 'return'.

(145) Molly 4;3

mama-wu	***thi-nga-wurl***		
Mo-DM	**2SGS.FORM(25).FUT-1SG.IO-get.water**		
kura	*therrikan*	*kanhi-re*	*nga*
CLF:WATER	jerry.can	this-INST	TAG

'mum get water for me from the jerry can with this'

(LAMP_20120717_WF_01_V1 00:48:41)

(146) Molly 5;8

pana-dhangu	***thurdi-wurl***
there-SOURCE	**2SGS.TURN:INTR(30).FUT-return**

'go back there where you came from'

(LAMP_20131201_WF_01_V1 00:15:24)

It is difficult to determine what the shared meaning of these lexical stems might be. Consequently this set of examples does not appear to be evidence that Molly is using CSPs to encode alternations in verbal semantics or argument structure. According to Street (2012, p. 78) *-wurl* also combines with CSPs TURN(29) and GO(6) to mean 'return an object' and 'swim just below the surface' respectively. Even with knowledge of these additional combinations it seems unlikely that children would be able to identify a semantic link between the lexical stems in (145) & (146), or that children would break the bipartite stem combinations into

individual stem elements.[106] Instead the verbs in (145) & (146) are likely learned as fixed stem combinations.

In such combination sets, where the lexical stem appears to be semantically different in the different verbs, it is still possible that the meaning of the CSP may be somewhat semantically transparent. For example the CSP which I have glossed as FORM(25) is used in a number of combinations to mean things like 'scoop', 'form a totem site', 'weave' and 'squash together' where a new entity is created by bringing other elements together (Blythe et al., n.d.). Despite these potential links, in this instance they are likely too few and too obtuse for children to be sensitive to them. Also if the lexical stem is distinct this reduces the need for the CSP to contribute greatly to verbal semantics, as the verbs are already differentiated to a greater extent than if the lexical stems were related. This results in the bipartite stem nature of verbs being less apparent.

Another example of contrastive CSP use which is relatively semantically opaque is found in the speech of Nathan. The verbs in the examples below both contain the lexical stem *-rdi*. In (147) it is combined with the CSP LOWER:INTR(18) to mean 'put something on'. In this case it refers to putting on a small backpack. In (148) it is used with BE(4) to mean go inside.

(147) Nathan 3;6

	ngay-matha nga-wa	***buyrdinu***[107]
AT:		**banurdi-ngem**
		ban-rdi=ngem
	1SG-INTS INTJ-EMPH	**1SGS.LOWER:INTR(18).NFUT-put.on-1SGS.SIT(1).NFUT**
	'Hey, I am wearing it'	

(LAMP_20120716_WF_01_V1 00:18:36)

[106] Children would however likely have a strong semantic and phonological association between *-wurl* and its combinations with TURN(29) and TURN:INTR(30). In this instance the contrast in CSP does encode different meanings of verbs with a shared lexical stem. The acquisition of this type of CSP alternation is discussed in detail in §7.2.2.3.

[107] Nathan produces an inappropriate classifier stem in this context with regard to the encoding of TAM. The nature of this error is discussed in §6.3.1.

(148) Nathan 4;10

ngay	*yawu*	*mangi*	*ekspert*	***nganardigathu***
				nganam-rdi-gathu
1SG	hey	like	expert	**1SGS.BE(4).NFUT-enter-TOWARD**

'I'm an expert, I went into it'

(LAMP_20131201_WF_01_V1 00:32:13)

Although it may be possible to decipher a semantic link between the lexical stems in these constructions it is unlikely that it is transparent enough to be salient to children. Instead these verbs are also likely learned as fixed stem combinations where the semantic contribution of the individual stem elements is relatively unclear. Furthermore the contrast between these CSPs is also not transparent or productive as the alternation between the CSPs BE(4) and LOWER:INTR(18) is not found in our database with any other lexical stems (Blythe et al., n.d.). For CSP alternations to be meaningful and useful in acquiring the bipartite stem verb system they likely need to be found across a variety of lexical stems.

7.2.2. Semantically Transparent Contrastive CSPs

In contrast to the previous examples there are contrastive CSP uses where the lexical stem has greater semantic consistency across combinations and the CSP is used in an adult like manner to encode a different verb. It is these types of examples which provide evidence that children are able to use CSPs to contribute to the overall meaning of the verb. In this sense CSPs are not just encoding subject person/number and TAM, but are also integral in differentiating the verb from other semantically related verbs with the same lexical stem. For example consider the verb productions by Molly in lines 2, 5 and 6 of the example below. These verbs, differentiated by the CSP, mean 'turn on' and 'be on'. This example is taken from a recording at the Wadeye Barge Landing. The three children present Nathan, Molly and Felicity, are all in need of a drink. At their request I have gone to the car to collect a jerry can full of drinking water. In line 1 Nathan tells the two girls that I have the jerry can with me as I'm walking back from the car. Molly however suggests instead that we use the tap at the barge landing to get drinking water. This tap was used earlier in the recording session by Molly's mother Estelle. Consequently Molly knows that this is a functioning tap. In line 2 she tells me that the tap at the barge landing is 'working'. To indicate this she uses a verb

pirrimmum formed with the lexical stem *-wum* and the CSP STAND(3). This verb is later contrasted by the verb *mammum* in line 6. This verb also contains the lexical stem *-wum* but in this instance it is combined with the CSP HANDS(8). This combination means 'turn the water on'.

(149) Nathan 4;4, Molly 5;1 & Felicity 6;6

1	*Nathan:*	*kanhi-thu*	*kanthin=kem*			*kanhi-thu*
		here-HITH	3SGS.HAVE(22).NFUT=3SGS.SIT(1).NFUT			here-HITH
		'come here he's got it, come here'				
2	*Molly:*	*yawu*	*kura*	***pirrimmum***	*kanhi*	*Bill*
		yawu	kura	**pirrim-wum**	kanhi	Bill
		hey	CLF:WATER	**3SGS.STAND(3).NFUT-be.on**	there	name
		'hey Bill the water there is working'				
3	*Nathan:*	*wurda*	*Bill*	*kura*	*wiye-nga=ya*	
		no	name	CLF:WATER	bad-DM=DM	
		'no Bill that water's bad'				
4	*Felicity:*	*Bill*	*mam-ka*	*pirrimmum*	*xxx*	
		Bill	mam=ka	pirrim-wum	xxx	
		name	3SGS.SAY/DO(34).NFUT=FOC	3SGS.STAND(3).NFUT-be.on	xxx	
		'Bill she said it's on xxx'				
5	*Molly:*	***pirrimmummatha***				
		pirrim-wum-matha				
		3SGS.STAND(3).NFUT-be.on-ALREADY				
		'it's on already'				
6	*Molly:*	*mama*	*ngay*	***mammum***		
		mama	ngay	**mam-wum**		
		Mo	1SG	**3SGS.HANDS(8).NFUT-be.on**		
		'my mum turned it on'				

(LAMP_20130521_WF_01_V1 00:14:33)

This alternation of appropriate CSPs by Molly is clear evidence that she understands the role of these CSPs in relation to the lexical stem *-wum.* The lexical stem maintains its meaning across both combinations of something being on/or working. It is the variation in CSP which differentiates the meaning of 'to be on/working' from 'to make on/working' and encodes a difference in argument structure. In combination with HANDS(8) a transitive verb is composed encoding an agent which 'turns something on' and a patient object which is the thing 'turned on'. In combination with STAND(3) this is an intransitive verb where the grammatical subject is the thing which may 'be on'.

The question remains however to what extent Molly considers these verb structures to be composed of two independent stem elements with their own associated meaning or whether it is simply the contrast in whole word forms which is salient. These examples show that Molly can use these CSPs contrastively in this context. However it does not show that she associates meaning with CSPs independent of these bipartite stem combinations. If this alternation is regular enough it might be expected that it is extended to other similar verbs potentially resulting in errors of commission which I investigate in §7.3.

7.2.2.1 'Go' Alternation

Throughout the corpus the lexical stem *-lili,* which broadly means 'to walk', is found to occur with three different CSPs, BE(4), GO(6) and FEET(7). These combinations all encode verbs which mean 'to walk'. It is not entirely clear what the impact of these CSP alternations are in children's speech or indeed in the adult language. However some insight may be gleaned from the related language Ngan'gityemerri. As in Murrinhpatha, Ngan'gityemerri has two intransitive classifiers which encode movement of the subject (Reid, 2011). In Murrinhpatha these are GO(6) and FEET(7). In Ngan'gityemerri the less general classifier, which in Murrinhpatha is FEET(7), is preferred when a specific destination is present or the movement has more purpose. Some support for this distinction also existing in Murrinhpatha comes from experimental adult data where people were asked to describe various animations which included stick figures of various people walking 'on-the-spot' on a white background. In these instances no destination was salient. The descriptions of these animations overwhelmingly utilised verbs composed of the CSP GO(6) in combination with *-lili*.[108]

[108] This research was undertaken in the designing of an experimental acquisition study (Forshaw, 2014).

This distinction also appears to account for the different combinations identified in children's speech in the corpus. FEET(7) occurs in contexts with a salient destination and BE(4) and GO(6) are used contexts were a destination is not as salient. The examples in (150) & (151) illustrate the use of BE(4) and GO(6) with the lexical stem *-lili*. In (150) Molly uses GO(6) in combination with *-lili* in instructing Nathan and Estelle to walk along with her. In this context there is no specific destination in mind. The children are all just walking around the barge landing where the recording is taking place.

(150) Molly 4;3

kanhi-re	***purru-lili***
here-PERL	**1INCLS.GO(6).FUT-walk**

'we'll walk along this way'

(LAMP_20120830_WF_01_V1 00:05:00)

In line 6 of (151) Mavis uses BE(4) in combination with *-lili*. In this example Mavis is trying to figure out where I (Bill) am. Valerie, Mavis's mother, has spotted me some 50 metres away near a small power sub-station which she refers to as *lektrik* (line 2). Mavis however cannot spot me. In asking Valerie to clarify my location she asks where I am walking (line 6). This utterance however does not ask where I am walking to.

(151) Mavis 4;6

1	*Mavis:*	*ngarra*	*kem?*		
		where	3SGS.SIT(1).EXIST		
		'where is he (Bill) sitting?			
2	*Valerie:*	*kem*	*pangu-ya*	*lektrik*	*xxx*
		3SGS.SIT(1).EXIST	there-DM	electricity	xxx
		'he's sitting there at the electricity thing'			

3 *Mavis:* *ha ha* *ngarra* *letrik*
LOC electricity
'ha ha at the electricity'

4 *Valerie:* *karrim* *pelpith* *da-ngkardu*
3SGS.STAND(3).EXIST head 2SGS.SEE(13).FUT-look
'look there's his head'

5 *Acacia:* *xxx* *karrim?*
xxx 3SGS.STAND(3).EXIST
'he's there?'

6 *Mavis:* *ya* *ngarra* ***kanalili?***
kanam-lili
hey where **3SGS.BE(4).NFUT-walk**
'where is he walking?'

7 *Valerie:* *ngarra* *lektrik* *xxx* *xxx* *xxx* *kem-ya*
LOC electricity xxx xxx xxx 3SGS.SIT(1).EXIST-DM
'at the electricity, he's sitting'

8 *Acacia:* *kanalili*
kanam-lili
3SGS.BE(4).NFUT-walk
he's walking

(LAMP_20130524_WF_01_V1 00:27:11)

These uses are contrasted by Mavis's use of FEET(7) in (152) and (153) in combination with *-lili.* These examples are taken from a longer narrative sequence that Mavis delivers during a different recording session. The story is about a previous bush trip that included a visit to the current recording location. In both of these constructions Mavis encodes travel to a destination. In (152) this is to *palyirr wakal* 'little hill' and in (153) this is to *Wurlin*.

(152) Mavis 4;11

1	*Mavis:*	*palyirr*	*wakal*	*kanhi-ngu*	*ne*
		hill	little	here-HITH	TAG
		‘here to the little hill’			
2		*kanhi-ngu*	***ngunna-lili-ngime-dha***		
		here-HITH	**1DUS.FEET(7).PIMP-walk-PC.F-PST**		
		‘we all walked to here’			

(LAMP_20131025_WF_01_V1 00:14:23)

(153) Mavis 4;11

ngunna-lili-dha	*nganaka*	*ngarra*	*nan,*
1DUS.FEET(7).PIMP-walk	you.know	where	what’s.its.name
Wurlin			
place.name			

‘We all walked you know to what’s it called, Wurlin’

(LAMP_20131025_WF_01_V1 00:14:57)

These constructions, together with Mavis’s alternative use of the verb ‘walk’ in (151), show that Mavis is able to use both basic intransitive go classifier stems in a potentially contrastive manner with a single lexical stem. Importantly the meaning of the lexical stem is consistent across the various bipartite stem combinations showing that the CSP is necessary in differentiating verbal meaning. That is Mavis recognises that the alternation in CSP encodes a subtle difference in the meaning of the verb ‘walk’.

Future research would benefit from considering the acquisition of such an alternation experimentally both in adult and child speech as this would provide a better understanding of the nature of this alternation. It is unclear for example at what stage children are able to use this alternation. For example do children initially tend to only use the more generic GO(6) in combinations with *-lili* before later learning to use FEET(7); furthermore it is unclear whether use of the various combinations may be restricted to certain environments. For example, in the above constructions FEET(7) is only attested with the lexical stem *-lili* in past contexts,

whereas the classifier stem forms of BE(4) and GO(6) are used as non-future and future forms respectively.

7.2.2.2 'Close' Alternation

Another interesting example of contrastive CSP use by children is in relation to the verb 'to close' constructed with the lexical stem *-dhap*. This lexical stem is attested in the corpus in combination with three different CSPs HANDS(8), POKE(19) and POKE:RR(21). In this section I focus on the alternation between HANDS(8) and POKE(19). I consider uses with POKE:RR(21) in §7.2.2.3.

Both of these combinations involving CSPs HANDS(8) and POKE(19) encode verbs that mean to close something. The verb composed of POKE(19) and *-dhap* means 'close something' in general whereas the verb composed of HANDS(8) and *-dhap* specifically means 'to be quiet', literally to close one's mouth. These contrasting combinations are shown in the following examples. In examples (154) and (155) Emily and Nathan are closing items such as drinks coolers and plastic containers and thus the CSP POKE(19) is utilised.

(154) Emily 3;1

	ngay-wa	***ngadhap***[109]
AT:		**nganthap**
		ngam-dhap
	1SG-FOC	**1SGS.POKE(19).NFUT-close**
	'I closed it'	

(LAMP_20130502_WF_01_V1 00:29:37)

[109] Emily produces an inappropriate classifier stem in terms of TAM. This error is considered in §6.3.1.

(155) Nathan 5;4

ngay	*ne-birl*
1SG	2SGS.HANDS:RR(10).FUt-turn.to.look

ngandhapwarda
ngam-dhap-warda
1SGS.POKE(19).NFUT-close-NOW

'look I'm closing it (plastic container) now'

(LAMP_20140524_WF_01_V1 00:15:23)

By contrast in example (156) Mavis is demanding someone to be quiet, literally telling them to close their mouth which therefore utilises CSP HANDS(8).

(156) Mavis 5;6

ma-nhi-rlarr-nukun-warda
1SGS.HANDS(8).FUT-2SG.DO-whip-FUTIRR-NOW

na-dhap	*wunkerrere*
2SGS.HANDS(8).FUT-close	quickly

'I'll whip you if you don't be quiet quickly'

(LAMP_20140531_WF_01_V1 00:25:52)

These examples show that the lexical stem *-dhap* can be used by children with more than one CSP in an adult-like manner. In these combinations a consistent meaning can be associated with the lexical stem showing that the CSP helps to encode the verbal meaning. These sets of examples, together with the other transparent contrastive CSP uses considered thus far in §7.2.2, show children beginning to use the bipartite stem system to construct different but related verbs. This suggests that children are differentiating meaning through the juxtaposition of whole bipartite stem combinations. Further evidence of associations between semantically related stem combinations would be the use of related licit bipartite stem verb

forms in inappropriate contexts. For example if the more general ‘close’ construction was used in place of the more specific construction meaning ‘close one’s mouth’. Although these error types are not observed in relation to the transparent contrastive CSP use considered thus far they are observed for other bipartite stem verb combination sets with shared lexical stems. In particular this is observed in relation to the acquisition of reflexive/reciprocal CSP alternations which I discuss now.

7.2.2.3 Reflexive/Reciprocal Alternations

A number of the contrastive CSP alternations identified in the corpus relate to verbs where a change in the CSP results in a change in argument structure. In these combinations the meaning of the verb remains relatively stable and the meaning shifts from one which is prototypically transitive to one that is either intransitive or reflexive/reciprocal. A change in CSP that has this effect, although does not strictly belong to this set of alternations, has already been outlined in this chapter in example (149).[110] In the first combination an intransitive verb meaning ‘to be on’ is encoded by the combination of STAND(3) and the lexical stem -*wum*. In the later combination a transitive verb is produced meaning ‘to turn on’ through the combination of HANDS(8) and -*wum*.

As was outlined in §2.2.3 there exist a number of systematic relationships between different CSPs that encode this type of alternation (Nordlinger, 2011).[111] For example a verb constructed with the CSP HANDS(8) will form its reflexive/reciprocal equivalent with HANDS:RR(10) as shown by the adult examples below. These alternations are relatively wide spread as they tend to occur across a variety of lexical stems. A table of these alternations can be found on page 30.

[110] This alternation is not considered a reflexive/reciprocal alternation as it is not as wide spread as the other patterns. Furthermore verbs with HANDS(8) typically form their reflexive/reciprocal equivalents with HANDS:RR(10)

[111] These CSP alternations are not actually a strict shift between transitive and intransitive constructions as outlined in Nordlinger (2011). For the purposes of this discussion however what is most important to remember is that there are a number of CSPs with systematic relationships. These alternations of related CSPs impact the argument structure of the clause but do not change the meaning of the verb.

(157)

a) *mi* ***mam–yeth***
CLF:VEG **3SGS.HANDS(8).NFUT-slice.into**
'He cut the food.'

b) *mange* ***mem-ma-yeth***
hand **3SGS.HANDS:RR(10).NFUT-hand-slice.into**
'He cut his hand.'

(Adapted from Nordlinger, 2011, p. 722)

Children's use of these related CSPs provide clear examples that they are using the classifier stem to encode more than subject person/number and TAM. In these instances the classifer stem has a clear role in constructing the argument structure of the verb. The clearest example of the contrastive use of this alternation is produced by Molly who uses the related CSPs HANDS(8) and HANDS:RR(10) in combination with the lexical stem *–dharl* 'open'. In example (158) at age 4;5 Molly uses HANDS:RR(10) to encode reflexivity when she sees the boot[112] of a car open via remote control. In this context the subject and object of the verb 'open' are not distinct. These arguments co-refer to the car known as 'little terminator'.

(158) Molly 4;5

mentharl-pirrim
mem-dharl=pirrim
3SGS.HANDS:RR(10).NFUT-open=3SGS.STAND(3).NFUT

nerl
AT: ne-birl
2SGS.HANDS:RR(10).FUT-turn.to.look

[112] Trunk

	terminayta	*akal*
AT:		wakal
	name	small

‘look it’s opening itself, little terminator’

(LAMP_20120830_WF_01_V1 00:02:16)

This reflexive construction clearly contrasts with another construction by Molly at a similar age 4;3 in (159). In this case Molly combines HANDS(8) with *–dharl* to mean ‘open something’. Specifically Molly is asking her *maka* (MoMo), Carla, to open a toy iced coffee bottle for her. In this construction the subject ‘Carla’ and object ‘the toy iced coffee bottle’, realised as an overt nominal, are clearly distinguished participants. This requires the use of the CSP HANDS(8). It is the alternation in these systematically related CSPs that encodes this difference in argument structure. These examples provide evidence that Molly is exploiting this alternation in an adult like manner for the verb ‘to open’.

(159) Molly 4;3

kura	*kopi*	*xxx*	
CLF:VEG	coffee	xxx	
na-Ø-dharl			*mani*
2SGS.HANDS(8).FUT-3SG.DO-open			be.able
kura	*kopi*		
CLF:VEG	coffee		

‘coffee xxx, try and open the coffee’

(LAMP_20120716_WF_01_V1 00:06:15)

Similar CSP contrasts with an individual lexical stem are found in the data of other focus children. Nathan for example uses the lexical stem *-dhap* ‘close’ in combination with the

related CSPs POKE(19) and POKE:RR(21). These contrasting constructions are found at similar ages 5;3 and 5;4 as shown in (160) & (161).

(160) Nathan 5;3

[Telling someone to close the door of a car]

tha-dhap=nga

2SGS.POKE(19).FUT-close=DM

'close it [the door]'

(LAMP_20140417_WF_01_V1 00:06:18)

(161) Nathan 5;4

1 *Nathan:* *pigipigi-nu-ngatha* *xxx*
pig-DAT-if xxx

ngay-ka *ngi-nu* *kanhi-damatha*
1SG-FOC 1SGS.SIT(1).FUT-FUT there-INTS

nge-nu-ma-dhap-nu

1SGS.POKE:RR(21).FUT-RR-APPL-close-FUT

'if the pig comes I will sit right there and close myself in (the car)'

2 *Molly:* *ngaydengu*
ngay-de-wunku
1SG-same-also

'me too'

(LAMP_20140524_WF_01_V1 00:14:12)

In example (160), involving POKE(19), Nathan is instructing someone else to close a car door. In this case the subject 'the addressee' and the object 'the car door', which is a morphological zero, are clearly distinguished. In the second more complex example Nathan combines POKE:RR(21) with *-dhap* 'close'. This construction also includes the reflexive/reciprocal marker *-nu-* as well as an applicative marker *-ma-*. In this case Nathan is 'closing himself in'.

In this construction Nathan is co-indexed as both the subject and direct object of the verb whereas the car door is not encoded as a core argument. These constructions again show a child using a set of related CSPs with the same lexical stem to encode a distinct verbal structure. These alternate combinations are both appropriate and contrastive. They provide evidence that Nathan is using bipartite stem morphology contrastively for the verb 'close' at 5;4.

Although there are a number of contrastive reflexive/reciprocal alternations in the corpus they are still relatively infrequent. This is likely because one of the CSPs in an alternation is generally used much less frequently than the other. This makes the identification of contrastive CSPs with an individual lexical stem less likely. For example all the focus children used the lexical stem *-dharl* in combination with HANDS(8) to mean 'to open something', however only Molly produced the reflexive/reciprocal equivalent with HANDS:RR(10) shown in (158). This bias can also be illustrated by considering the overall use of related CSPs in the corpus. For example HANDS(8) is used in 284 verbs where as HANDS:RR(10) occurs with just 10.[113] Similarly POKE(19) is used in 114 verbs where as POKE:RR(21) is used in 25. Despite this bias this is still one of the most frequently attested transparent CSP alternations across the corpus and is therefore one of the most likely alternations that children will acquire early and potentially use productively.

The clearest evidence of such productivity would be the overgeneralisation of this pattern to an inappropriate context. Interestingly errors of this type are not attested. Children do however use related licit bipartite stem combinations in inappropriate contexts providing evidence of strong associative links between verbs with shared lexical stems and systematically related CSPs. I now consider the use of the reflexive/reciprocal CSPs HANDS:RR(10) and POKE:RR(21) in various contexts across the corpus together with examples of their related CSPs where appropriate. I argue that the appropriate use of these CSPs in a number of verbal environments with similar properties provides further evidence that children understand when to use the correct alternative of related CSPs in specific contexts.

In this analysis it should however be kept in mind that not every verb with a transitive CSP will have a logical reflexive/reciprocal equivalent and vice versa. For example the

[113] This excludes productions of the verb *nebirl* which uses HANDS:RR(10). It is excluded as it is a frequent relatively frozen verb form and does not relate to the encoding of a reflexive/reciprocal alternation.

lexical stem *-nham* can be combined with POKE:RR(21) to mean ‘to be afraid’ but cannot be combined with POKE(19) (Seiss & Nordlinger 2010:431).

(162) Mavis 4;11

i	*ngay-ka*	***ngenham***	*xxx*
i	ngay=ka	**ngem-nham**	xxx
and	1SG=FOC	**1SGS.POKE:RR(21).NFUT-be.afraid**	xxx

ku	*karrath*	*nhini*
CLF:ANIM	devil	ANAPH

‘and I was afraid of that devil’

(LAMP_20131025_WF_01_V1 00:14:00)

7.2.2.3.1 HANDS:RR(10)

CSP HANDS:RR(10) is often used by children to produce reflexive constructions where an entity, often animate, is performing an action on itself.[114] These are almost all reflexive equivalents of verbs formed with HANDS(8). Examples (163) & (164) produced by Emily (3;1) and Molly (4;5) show the use of HANDS:RR(10) in combination with the lexical stem *-purl* ‘to wash’. The classifier stem in these constructions encodes that the subject is washing themselves, in these instances parts of themselves in particular. The classifier stem is performing the same role as in (158), indicating that the subject and object are not separate entities but are co-referential.

(163) Emily 3;1

1	*Tania:*	*ne-ngka-purl-warra=nga*	*thama*
		2SGS.HANDS:RR(10).FUT-face-wash-FIRST=DM	2SGS.SAY/DO(34).FUT

‘say you wash your face first’

[114] This excludes productions of the verb *nebirl* meaning ‘turn to look’ as discussed previously.

2 *Emily:* ***ne-ngka-purl-warra***

2SGS.HANDS:RR(10).FUT-face-wash-FIRST

'wash your face first'

(LAMP_20130502_WF_01_V1 00:17:24)

(164) Molly 4;5

shower	*shower*	***mena-me-purl-dha***
shower	shower	**1SGS.HANDS:RR(10).PIMP-feet-wash-PST**

'I washed my feet in the shower'

(LAMP_20120830_WF_01_V1 00:11:17)

Emily's production is prompted by her mother. It is possible that this construction may not actually represent Emily's independent knowledge especially considering the lack of reflexive constructions in children's speech at this age in the corpus.[115] Molly's usage in (164) on the other hand, partnered with her productions in (158) and (159) at a similar age, provides further support that she has acquired the alternation between HANDS(8) and HANDS:RR(10) at least in relation to some verbs.

Molly also displays the appropriate use of HANDS:RR(10) at a later age. In this instance however HANDS:RR(10) is used in contrast to SAY/DO(34) in combination with the preverb *thenthim* 'transform' derived from the Aboriginal English 'change him'. It is unclear however what impact the alternation of the CSP has in these related constructions. Both constructions are used by Molly while playing a make believe game with Nathan in which they both transform into various characters. The game is related to the earlier spotting of a feral pig and a crocodile near the recording location. The children imagine fantastical stories as to what might happen if either of these animals returns. In (165) Molly uses *thenthim* in combination with HANDS:RR(10) in talking to Nathan. She tells him to transform himself into a soldier. The use of HANDS:RR(10) in this context is understandable as the subject and object are not clearly distinguished. It is Nathan in this case who will be causing as well as undergoing the

[115] This is an example of a well-formed relatively complex verb for this age including an incorporated body part –ngka- 'face' and an adverbial element –warra 'first'.

transformation into a soldier. However in a previous utterance in (166) Molly uses *thenthim* in combination with SAY/DO(34) to indicate that each of them will transform, Nathan into a kangaroo and Molly into a red-tailed black cockatoo. Despite the alternation in CSP there appears to be little difference in verb meaning. Both combinations were confirmed as adult-like by more than one consultant. This alternation in this context requires further investigation including analysis of adult productions.

(165) Molly 6;1

aa	*nhinhi=ka*	*ami*
INTJ	2SG=FOC	soldier

thenthim	***ne-nu-ma-nu***
transform	**2SGS.HANDS:RR(10).FUT-RR-???-FUT**

'hey you turn yourself into a soldier'

(LAMP_20140524_WF_01_V1 00:09:45)

(166) Molly 6;1

nhinhi	***thenthim***	***thama-nu***	*ku*	*kumpit*
2SG	**transform**	**2SGS.SAY/DO(34).FUT-FUT**	CLF:ANIM	kangaroo

ngay-warda=ka	*ku*	*tek-warda*
1SG-TEMP=FOC	CLF:ANIM	red.tailed.black.cockatoo

thenthim	***ngama-nu***
transform	**1SGS.SAY/DO(34).FUT-FUT**

'you turn into a kangaroo and I will turn into a red-tailed black cockatoo'

(LAMP_20140524_WF_01_V1 00:09:03)

In examining the younger children's language use it appears that they initially have not acquired an adult-like competency in regard to the relationship between the related CSPs HANDS(8) and HANDS:RR(10). In particular there are examples of constructions in which one of these CSPs is used in place of the other. This suggests that children are aware of a

relationship between these forms from an early age but they are not yet aware of the nature of the CSP alternation. This results in the use of licit bipartite stem combinations in inappropriate contexts. This type of error and its importance is explored more broadly in the corpus in §7.3. An example of this type of error is shown in (167) where a reflexive/reciprocal verb is used in place of its transitive equivalent. In this example Acacia is inside a parked car in the front passenger seat. The door is closed. Her *pipi* (FaZi) comes to the door and opens the door. Once out of the car Acacia attempts to say that she opened the door but does not do this in an adult manner. Acacia uses the verb *mentharl* 'it's open', a 3rd singular non-future reflexive form of 'open' formed with HANDS:RR(10) which describes a state. This is used in place of the adult target *mantharl* 'I opened it', a 1st singular non-future transitive form of 'open' formed with HANDS(8). This is understood to be the target verb given Acacia's preceding use of the 1st singular pronoun *ngay*. It appears in this context that Acacia is unable to construct the appropriate 1st singular non-future transitive form of the verb 'open' *mantharl*. Instead she juxtaposes two words she does know, *ngay* 'I' and *mentharl* 'it's open', to construct her intended meaning in this context.

(167) Acacia 3;6

	ha ha	*ngay*	***mentharl***
			mem-dharl
			1SGS.HANDS:RR(10).NFUT-open
AT:			**mantharl**
			mam-dharl
	ha ha	1SG	**1SGS.HANDS(8).NFUT-open**
	'I opened it'		

(LAMP_20140413_WF_01_V1 00:32:34)

In addition to the above use of the reflexive/reciprocal alternation of the verb 'open', Acacia also produces appropriate forms of the transitive alternation of 'open'. Acacia produces two forms of this verb. In (168) Acacia uses *-dharl* in combination with HANDS(8) to refer to opening a door. In this instance the classifier stem encodes a 1st singular subject and future tense.

(168) Acacia 3;6

1	*Acacia:*	*Adam*	***madharllu***	*kanhi*	*ne?*
			ma-dharl-nu		
		name	**1SGS.HANDS(8).FUT-open-FUT**	this	TAG
		‘Adam I’ll open this yeah?’			
2	*Acacia:*	*ki?*			
		key			
		‘key’			
3	*Adam:*	*XX*			
		‘xx’			
4	*Acacia:*	*ki*	***ma-dharl-lu***		
			ma-dharl-nu		
		key	**1SGS.HANDS(8).FUT-open-FUT**		
		‘I’ll open it with a key’			

(LAMP_20140416_WF_01_V1 00:36:09)

In (169) Acacia uses *-dharl* in combination with HANDS(8) to refer to opening an orange.[116] In this instance the classifier stem encodes a 2nd singular subject and future tense.

(169) Acacia 3;7

mama	***na-nga-dharl***	*mani*
Mo	**2SGS.HANDS(8).FUT-1SG.IO-open**	be.able

‘Mum can you open it (an orange) for me’

(LAMP_20140531_WF_01_V1 00:11:23)

[116] This is an example of a semantic overextension of ‘open’. In this context *nangarara* ‘peel it for me’ would be more appropriate as discussed in §5.2.2.

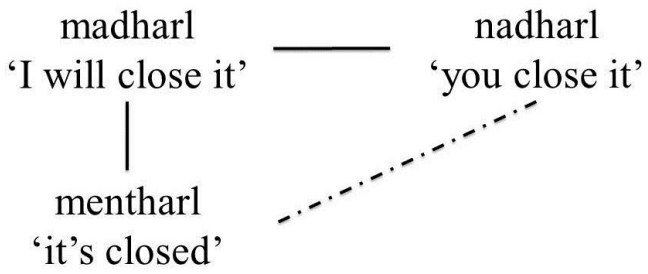
Taken together these three examples show that Acacia knows a variety of forms of the verb 'open' including forms with the CSP HANDS(8) and at least one with the CSP HANDS:RR(10). Acacia likely has strong associative links between these forms which result in the use of HANDS:RR(10) in an inappropriate context. It appears that Acacia is aware of a link between these forms but has not yet acquired the meaning of the CSP alternation with regard to the lexical stem *-dharl* 'open'. It is also a possibility that the error in (167) is due to the fact that Acacia has not acquired non-future forms of the verb 'open' with CSP HANDS(8) at this stage. This explanation seems less likely as non-future forms of classifier stems begin to emerge in children's speech between age 2;8 and 3;7 as shown in chapter 6.

These observations are consistent with findings regarding the development of cell diversity in CSPs that children tend to acquire the future forms of verbs, in particular 1st and 2nd singular forms, first as described in chapters 5 and 6. By 3;6 Acacia has also learnt the form of the reflexive 3rd singular non-future form of 'open' *mentharl*. It is perhaps not surprising that she has learned this particular reflexive form as it would likely be the most common form of this stem combination. For example it would be used to describe that various things are 'open' such as doors, or even the shop. By contrast a 1st singular form meaning 'I open myself' will logically be less useful and less frequent.

These various forms of the verb 'open' constitute a miniparadigm (Pinker, 1984) in Acacia's lexicon with strong associations between these wordforms as shown below.[117] I hypothesise that stronger connections will exist between *ma-dharl* and *na-dharl* and between *ma-dharl* and *men-tharl* than between *men-tharl* and *na-dharl* due to semantic and phonological similarities between the various forms. Importantly the structure of this miniparadigm contains verbs which contain HANDS(8) and those which contain HANDS:RR(10). This highlights the emergence of this CSP alternation and that children have not disassociated the CSPs from bipartite stem verb contexts. As children gradually acquire this CSP alternation later in development it will likely be associated with the emergence of product- and source-oriented schemas (Bybee, 1995) which will allow for the extension of this pattern to new contexts.

[117] In the usage-based approach of Bybee (1995) this would constitute the early foundation of a source-orineted schema.

Figure 23. Miniparadigm of 'to open' Acacia (3;6-3;7)



The use of a related CSP in an inappropriate context is also found in Molly's speech at the later age of 4;3. In this case Molly uses HANDS(8) in place of HANDS:RR(10) with the lexical stem *-dharrkirrk* 'tangle' to describe a tangled piece of fishing line as shown in line 3 of (170) and in line 2 of (171). Molly produces this error on more than one occasion despite the fact that the appropriate construction is used previously by her mother Estelle in line 1 of (170).

(170) Molly 4;3

1	*Estelle:*	*nanthi*	***mentharrkirrk-dim***	
			mem-dharrkirrk=dim	
		CLF:THING	**3SGS.HANDS:RR(10).NFUT-tangle:RDP=3SGS.SIT(1).NFUT**	
		peningintha-wu		
		2DU.F.NSIB-DM		
		'it's all tangled, you two'		
2	*Estelle:*	*Felicity*	*mi*	*thip-gathu*
		name	CLF:VEG	chip-HITH
		na-nge-bath		
		2SGS.HANDS(8)-3SG.F.IO-bring		
		'Felicity bring those chips to her'		

3	*Molly:*	*nanthi*	***mantharrk-dim***
			mam-dharrk=dim
			3SGS.HANDS(8).NFUT-tangle=3SGS.SIT(1).NFUT
	AT:		**mentharrk-dim**
			mem-dharrk=dim
		CLF:THING	**3SGS.HANDS:RR(10).NFUT-tangle=3SGS.SIT(1).NFUT**
		‘it’s all tangled’	

(LAMP_20120717_WF_01_V1 00:24:02)

(171) Molly 4;3

1	*Molly:*	*aa*	*pithing*	*ngala*	*mini-ya*
		INTJ	fishing.line	big	another=DM
		‘hey another big fishing line’			

2	*M:*	***mantharrkirrk-pirrim***	*xxx*
		mam-dharrkirrk=pirrim	
		3SGS.HANDS(8).NFUT-tangle:RDP=3SGS.STAND(3).NFUT	
	AT:	**mentharrkirrk-pirrim**	
		mem-dharrkirrk=pirrim	
		3SGS.HANDS:RR(10).NFUT-tangle:RDP=3SGS.STAND(3).NFUT	xxx
		‘it’s all tangled up’	

(LAMP_20120717_WF_01_V1 00:30:20)

As with the previous examples of the verb ‘open’ these non-standard productions suggest that Molly is aware of a relationship between CSPs HANDS(8) and HANDS:RR(10) in relation to the lexical stem *-dharrkirrk.* At this stage however she has not learnt the distinction encoded by this alternation in CSPs in relation to this lexical stem. These findings suggest that children learn to identify relationships between whole wordforms and it is the strong associations between these wordforms that lead children to seemingly use one CSP in place of its related CSP in certain contexts. These CSP alternations consequently emerge from these associative networks as they become more complete and adult-like.

Despite the relative regularity of this CSP alternation I have not found evidence that children use it productively and extend it to new contexts in acquiring new verb forms. As mentioned previously evidence of this would be the overgeneralisation of this CSP alternation pattern to an inappropriate context. For example a child, having acquired this alternation, may attempt to form the reflexive/reciprocal equivalent of the verb 'turn on', which is constructed of the CSP HANDS(8) and the lexical stem -*wum*, by using the CSP HANDS:RR(10). This would however be an error of commission as the equivalent form of the verb 'turn on' which means 'be on' is formed with the CSP STAND(3) and the lexical stem -*wum* as shown previously in (149). Errors of this type are however not found in the corpus. This does not mean that such errors do not occur and this prospect could be explored in future research.

7.2.2.3.2 POKE:RR(21)

CSP POKE:RR(21) is the reflexive/reciprocal alternative of POKE(19). These related CSPs are used contrastively by children to encode different verbal meanings as shown previously in examples (160) & (161). Children's use of POKE:RR(21) shows some similar characteristics to that of HANDS:RR(10) described in the previous section. There is evidence that children are aware of a link between related transitive and reflexive/reciprocal constructions but acquiring the meaning of this alternation takes time occurring in a piecemeal fashion. Nathan was shown to use this alternation appropriately at age 5;4 in relation to the verb 'close' but other examples show children have not acquired this alternation for other verbs at age 4;11 as shown momentarily.

Evidence of a strong relationship between related bipartite stem combinations is illustrated by the use of related licit stem combinations in inappropriate contexts such as the use of verbs containing POKE(19) being used in place of targets which require use of POKE:RR(21). The following example involving Emily and Mavis, aged 3;7 and 4;11 respectively, interacting with Emily's mother Tania shows both Emily and Mavis using POKE(19) in place of POKE:RR(21).[118] These three are sitting round a fire with Carla. Tania is tending to the fire and boiling water in a billy can. Emily notices that the billy can is balancing on the fire at a precarious angle. She calls out to Tania in line 1, Mavis then reiterates Emily's observation in line 2. Tania then seeks to clarify what is going to tip and in

[118] It is possible that the form of Mavis's production is influenced by Emily's preceding production.

doing so models the girls' productions back to them. In doing this she importantly uses CSP POKE:RR(21) where the girls have both produced POKE(19).[119] Tania then adjusts the billy can.

(172) Emily 3;7, Mavis 4;11

1	*Emily:*	***ka-yipak-nu***	
		3SGS.POKE(19).FUT-spill-FUT	
	AT:	**ke-winhipak-nu**	
		3SGS.POKE:RR(21).FUT-spill-FUT	
		'it's going to spill'	
2	*Mavis:*	***ka-wiyipak-nu***	
		3SGS.POKE(19).FUT-spill-FUT	
	AT:	**ke-winhipak-nu**	
		3SGS.POKE:RR(21).FUT-spill-FUT	
		'it's going to spill'	
3	*Tania:*	***ke-winhipak-nukun***	*ngarra?*
		3SGS.POKE:RR(21).FUT-spill-FUTIRR	what
		'what might spill?'	

(LAMP_20131105_WF_01_V1 00:16:14)

In this example Emily and Mavis both use an inappropriate CSP constructing the verb 'pour' instead of the related verb 'spill'. These verbs are distinguished by the alternation in CSP between POKE(19) and POKE:RR(21) respectively. As with Molly's description of the tangled fishing line previously both Emily and Mavis are using the transitive CSP instead of the required reflexive equivalent. Both children produce the correct subject person/number and TAM category for the classifier stem but they take this form from the wrong but related CSP.

[119] Tania models the pronunciation of the lexical stem *–winhipak* along with using the more appropriate tense inflection *–nukun* in place of *–nu*.

The adult-like contrast between the related CSPs POKE(19) and POKE:RR(21) has been shown previously in (160) & (161) in combination with the lexical stem *-dhap* 'close' at age 5;4. If we consider further uses of POKE:RR(21) we find additional support that children are able to use the reflexive/reciprocal variant in an appropriate manner in combination with some lexical stems. These examples are typically only found later in development after age 4;6. This further supports findings that this alternation does not emerge early in development. It also suggests that transitive variants of verbs will typically be acquired earlier than reflexive/reciprocal equivalents. Interestingly as with previous examples involving HANDS:RR(10) these constructions are almost exclusively non-future verbs and are used to denote the states of inanimate objects as in (173) & (174). This suggests that the development of cell diversity in reflexive/reciprocal CSPs may follow a different developmental pathway to that identified for four non-reflexive/reciprocal CSPs in §6.2. This point is left for future research.

(173) Nathan 4;10

1 *N:* *Molly* *pirtpirt*
name quickly
'Molly quickly'

2 *N:* *kura* *nhinhi*
CLF:WATER 2SG
dem-pinthipak-warda=kanam
AT: **dem-pinhipak-warda=kanam**
dem-winhipak-warda=kanam
3SGS.POKE:RR(21).NFUT-spill-NOW=3SGS.BE(4).NFUT
'your drink is spilt/spilling'

(LAMP_20131201_WF_01_V1 00:16:32)

(174) Molly 5;8

1 *thelput* *kanhi-ka*
house that-FOC
'that house there'

2	*thelput*	***dem-pek***	*xxx*
	house	**3SGS.POKE:RR(21).NFUT-burn**	xxx
	‘the burnt house’		
3	*thelput*	*Bill-lukun*	
	thelput	Bill-nukun	
	house	name-POSS	
	‘Bill’s house’		

(LAMP_20131201_WF_01_V1 00:34:16)

Examples (173) & (174) provide good evidence that children are using CSPs to contribute to the argument structure of verbs in appropriate contexts. This is because both these constructions have logical transitive equivalents in ‘pour’ and ‘cause to burn’.[120] Although this contrast is not found within the data of a single child there are examples of *–winhipak* being used appropriately with POKE(19) to mean ‘pour’ in the corpus. One such example is Mavis 5;6 telling her younger sister Acacia to not pour water from a plastic water bottle on to the ground.

(175) Mavis 5;6

	mere	***thawiyipak***
AT:	mere	**tha-winhipak**
	NEG	**2SGS.POKE(19).FUT-spill**
	‘don’t you pour it’	

(LAMP_20140531_WF_01_V1 00:17:40)

CSP POKE:RR(21) is also used in verbs that do not have transitive equivalents. These are used by some focus children to describe their own physical or mental states as seen previously in

[120] The verb ‘cause to burn’ is formed with HEAT(27). This CSP forms its reflexive reciprocal forms with POKE:RR(21) similar to POKE(19).

(162) ‘to be afraid’ and below in (176) ‘to be thirsty’. The verb ‘to be thirsty’ in line 2 of (176) encodes a human experiencer as a grammatical object. Although this is a non-standard production relating to the encoding of subject person as discussed in §6.3.3, it again provides evidence that Mavis is using POKE:RR(21) in an appropriate context.

(176) Mavis 4;6

1		*martnu*	*(kura)*	*patha-wa*
		ma-art-nu	kura	patha=wa
		1SGS.GRAB(9).FUT-get-FUT	CLF:WATER	good=EMPH
		‘I will get some water’		
2		***ngerntalal***		*ngay-yu*
		ngem-ralal		
		1SGS.POKE:RR(21).NFUT-be.thirsty		
	AT:	**dem-ngi-ralal**		
		3SGS.POKE:RR(21).NFUT-1SG.DO-be.thirsty		1SG-DM
		‘I’m thirsty’		

(LAMP_20130524_WF_01_V1 00:14:55)

7.2.3. Development of Contrastive CSP Use

The previous sections provide an overview of children’s contrastive CSP use in bipartite stem verbs in the corpus. In §7.2.1 I argued that for some verbs with shared lexical stems these are likely learned as distinct verbs with distinct lexical stems which happen to be homophonous. In these cases the contribution of the CSP to the verbal meaning is less significant as the meanings of lexical stems are not clearly related. This means that it is not solely the CSP differentiating meaning. In §7.2.2 I analysed a number of contrastive CSP uses which showed that children were able to use several CSPs contrastively in an adult like manner. In these cases the CSP was necessary to encode different verbs. Interestingly despite the importance of being able to use contrastive bipartite stem combinations and co-vary stem elements transparent contrastive CSP use was relatively infrequent and tended to be identified later in the corpus than might have been anticipated, after 3;8. The most numerous evidence of the

contrastive use of CSPs was found in the use of reflexive/reciprocal CSP alternations §7.2.2.3.

Analysis of the reflexive/reciprocal CSP alternation showed that children are able to use a number of these alternations appropriately and contrastively at least for some verbs. The earliest example of this contrast was observed at 4;5 in Molly's language use in (158) and (159) for the verb 'open'. In addition to this example contrastive use was also seen in Nathan's language use by 5;4 in (160) and (161) for the verb 'close' and potentially by Molly in relation to the phrasal verb structures in (165) and (166) meaning 'transform'. Further evidence that children had likely acquired this alternation was the use of reflexive/reciprocal CSPs in appropriate contexts. For example Molly's use of HANDS:RR(10) at 4;5 with *-purl* meaning 'to wash oneself' in contrast to other examples of verbs using HANDS(8) and HANDS:RR(10) suggests she has acquired this alternation for this verb. These examples provide evidence that children are using CSPs to encode more than just differences in subject person/number and TAM and that they are contributing to the argument structure of bipartite stem verbs.

In addition to these well-formed contrastive examples of the reflexive/reciprocal alternation there were also a number of errors identified in the corpus where licit combinations, closely related to the target verb, were used in inappropriate contexts. These involved examples where a transitive CSP was used in place of its reflexive/reciprocal equivalent (170), (171) & (172) as well as examples where the reverse was true as in (167). These errors were all produced by children aged 3;6 - 4;11. The co-occurance of both well-formed contrastive verbs as well as errors suggests that this alternation is acquired on a verb by verb basis. The use of related verbs in inappropriate contexts suggests that these forms have strong associative networks but that children may not have acquired an adult understanding of the CSP alternation in relation to these verbs. These findings, partnered with the lack of overgeneralisation errors of entire CSPs on semantic grounds, suggests that children do not associate meaning with the individual stem elements independent from bipartite stem combinations.

In acquiring the reflexive/reciprocal alternation children gradually build up miniparadigms (Pinker, 1984) of whole wordforms based on semantic and phonological similarities. This was illustarted in Acacia's acquisition of the verb 'open'. This

miniparadigm was composed of related verbs that included verbs containing the CSP HANDS(8) as well as verbs containing the reflexive/reciprocal equivalent CSP HANDS:RR(10). The CSP alternation in this miniparadigm emerges over time based on further use of already acquired forms and the acquisition of new forms. It is difficult to identify at what stage of development this alternation emerges but in relation to the verb 'open' for Acacia this is likely after 3;6 month when she produces a verb with HANDS:RR(10) used in place of HANDS(8). Importantly these different related CSPs form part of a single network of whole verb forms.

As children build up more of these paradigms with the same or similar alternations they are likely able to extend these patterns to new verbs. These patterns are based on relationships between wordforms and do not necessarily entail the association of meaning with individual independent elements. Although children will recognise that it is the form of the classifier stem that is relevant to this alternation this does not entail that decontextualised meaning separate form this bipartite stem environment is associated with individual stems. This is similar to the pathway of development described for the acquisition of the inflectional patterns of CSPs in chapter 6. Bipartite stem verb combinations and alternations appear to be learned through the learning of associative networks between whole wordforms as predicted by a usage-based network model (e.g. Bybee, 1995). This model importantly also predicts that errors are more likely to occur when there is a close semantic and phonological relationship between the target and the non-standard form as was observed in relation to reflexive/reciprocal CSP alternations. These findings do not support a rule-based approach where children learn to segment and store individual stem elements with associated meaning while also learning how to combine these elements productively to produce verbal meanings (e.g. Pinker, 1984).

This analysis is importantly reflective of the bipartite stem verb system. If the system were more regular and meaning was more clearly compositional then children would be more likely to asssociate meaning with individual stem elements. Evidence of this would be the overgeneralisation of CSPs similar to the overgeneralisation of 'light verbs' and 'preverbs' in Persian (Family, 2009) and Georgian (Imedadze & Tuite, 1992) respectively as described in §3.6. Furthermore the production of novel stem combinations would also be predicted. Somewhat surprisingly despite the notable similarities of these various systems no overgeneralisation errors on the basis of semantics or frequency were observed in the corpus

in relation to contrastive CSP use. This highlights that differences in the structure of the system being learned will greatly impact its acquisition. In this case differences in relation to the overall semantic transparency of the bipartite stem verb system and flexibility and frequency of individual stem elements likely impact acquisition. These factors have been shown to be influential in the acquisition of other somewhat related systems (Berman, 2011; Family, 2009; Imedadze & Tuite, 1992). There are however a number of errors related to the combination of CSPs and lexical stems elsewhere in the corpus. These errors or non-standard productions, which I now explore, are typically the result of the use of licit stem combinations in inappropriate contexts similar to what was observed with the reflexive/reciprocal CSP alternation. Interestingly these do not include the overgeneralisation of CSPs on grounds of semantics or frequency as might have been anticipated, suggesting that children are not aware of the compositional principles of the bipartite stem system at the age range considered in this study (1;9-6;1).

7.3 Non-Standard Bipartite Stem Combinations

Children's errors of commission provide some of the best evidence of their understanding of linguistic structures (e.g. Stoll, 2015). In the acquisition of systems with similarities to Murrinhpatha's bipartite stem verbs, as presented in §3.6, it was found that children produced errors of commission overgeneralising particular elements of a word or phrase on grounds of frequency or semantics (e.g. Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). These included the production of novel combinations, such as the novel noun-noun compounds produced by English acquiring children (e.g. Berman, 2011), and the overgeneralisation of preverbs and light verbs in Georgian (Imedadze & Tuite, 1992) and Persian (Family, 2009) respectively. These errors are evidence that children may associate meaning with certain elements that contribute to the final compositional meaning of the construction and that children are aware of the principles of composition of these structures.

Children acquiring Murrinhpatha produce stem combinations that are not appropriate in a given context. For example, previously in this chapter I have highlighted examples of transitive CSPs being used in place of their reflexive/reciprocal equivalents and vice versa. Also in §6.3.2 it was shown with regard to the development of phonologically closely related CSPs, only differentiated in their non-future forms, that the CSP belonging to the non-future

supra-inflection class with the greater type frequency was used in place of the related CSP. This is shown again in the below example where CSP HANDS(8) is used in place of GRAB(9).

(177) Mavis 4;11

	yawu	*mup*	*ku*	*karrath*
	INTJ	stop	CLF:ANIM	devil
	mam-nhi-tha=kanam			*mam*
	3SGS.HANDS(8).NFUT-			
AT:	**mangan-nhi-tha=kanam**			
	3SGS.GRAB(9).NFUT-2SG.DO-chase=3SGS.BE(4).NFUT			3SGS.SAY/DO(34).NFUT

'she said, "wait the devil is chasing you"'

(LAMP_20131025_WF_01_V1 00:16:49)

The above example provides the most likely example in the corpus of a CSP being overgeneralised according to its semantics or frequency. HANDS(8) is a particularly frequent CSP in the corpus occurring in 14% of all standard verb productions, see §6.2.1. Furthermore it is often associated with the semantic meaning 'do with hands' which fits relatively well with the target verb meaning of 'chase' as the result of chasing will be to grab the thing being chased. I argue that the source of this error is not based on CSP semantics or frequency for a number of reasons. Firstly, if it was overgeneralised on these grounds we might expect it to be overgeneralised further and combine with other lexical stems whose target form does not include the closely related GRAB(9). Errors of this type are not attested in the corpus. Secondly this same error pattern is also observed for the related CSPs SEE(13) and BASH(14), see §6.3.2. In this instance however, SEE(13) is neither much more frequently used in the corpus than BASH(14), see §6.2.1, nor does it have a clear semantic association, see §2.2.3. Therefore, considered in concert, these examples show that a better explanation of the source of these errors relates to non-future patterns of inflection in CSPs and is not due to incorrect combinations of CSPs and lexical stems.

The examination of other bipartite stem combination errors in the corpus surprisingly also do not include examples where CSPs in particular are overgeneralised on semantic or

frequency grounds as may have been predicted. Indeed, apart from the anomalous examples such as in (177) which can be explained according to CSP patterns of inflection, children do not produce novel bipartite stem combinations. This suggests that children either do not acquire the underlying compositional principles of the bipartite stem verb system in the age range considered due to its complexity, or that the system itself is not regular or transparent enough to allow for verbs to be formed compositionally from distinct stem elements with their own associated meanings. Interestingly children do produce a number of licit stem combinations in inappropriate contexts as has already been observed to some extent regarding reflexive/reciprocal CSP alternations (§7.2.2.3). These types of errors are further evidence that children acquire associative networks of semantically and phonologically related bipartite stem combinations and that they do not disassociate these stem elements in to independent semantic units. I now present a variety of non-standard productions which support this position.

7.3.1. The Encoding of 'Stance'

The first error I consider relates to the encoding of stance by CSPs. The intransitive CSPs 1-7 can be used to encode the physical stance or posture of the subject referent (Street, 1987). For example in the following verbs meaning 'to laugh' the subject is encoded as 'sitting', 'lying', 'standing' and 'moving' based on the particular CSP utilised. CSPs SIT(1) and BE(4) tend to be used as defaults in contexts where the stance of the subject referent is not salient. These CSPs do however likely encode an aspectual distinction in relation to each other (Nordlinger & Caudal, 2012).[121]

(178)

a) ***ngi-kampa-nu***
1SGS.SIT(1).FUT-laugh-FUT
'I will laugh while sitting.'

[121] It should also be noted that the stance of subjects is also able to be encoded through the use of serial verbs (e.g. Nordlinger & Caudal, 2012). To my knowledge the use of serial verb constructions to encode stance is used with much greater frequency.

b) ***ngu-kampa-nu***
1SGS.LIE(2).FUT-laugh-FUT
'I will laugh while lying.'

c) ***ngirra-kampa-nu***
1SGS.STAND(3).FUT-laugh-FUT
'I will laugh while standing.'

d) ***ngurru-kampa-nu***
1SGS.GO(6).FUT-laugh-FUT
'I will laugh while moving.'

(Elicited WF_20160413)

Consider the following verb production by Molly at age 6;1 in (179). Molly produces a verb composed of the lexical stem *-ngurrkurrk* 'lie' and the CSP SIT(1). This production was described as an error during transcription. This is shown in (180) where Laura, a RA, first reproduces Molly's production and then offers the adult target form. The adult target form uses the CSP LIE(2) in place of SIT(1).

(179) Molly 6;1

aa	*pana-matha*	*din*	*din*	*me-tha-dini*
INTJ	there-just	xxx	xxx	3SGS.SAY/DO(34).PIMP-PST-3SGS.SIT(1).PIMP

	dani-ngurrk..	***dingurrkurrktha***	*kanhi*
		dini-ngurrkurrk-tha	
		3SGS.SIT(1).PIMP-lie-PST	
AT:		**yu-ngurrkurrk-tha**	
		3SGS.LIE(2).PIMP-lie-PST	there

'aa right there, it (the crocodile) was doing this, it was lying/sleeping there'

(LAMP_20140524_WF_01_V1 00:07:17)

(180) Laura

dingurrkurrktha	*mam*
dini-ngurrkurrk-tha	mam
3SGS.SIT(1).PIMP-lie-PST	3SGS.SAY/DO(34).NFUT

murrinh	*thathpirr-ka*	***yu-ngurrkurrk-tha***
CLF:TIME	correct-FOC	**3SGS.LIE(1).PIMP-lie-PST**

thama

2SGS.SAY/DO(34).FUT

'she said *dingurrkurrktha*, the right way you say it is *yungurrkurrktha'*

(LAMP_20140529_WF_01_A1 00:10:58)

Interestingly the stem combination used by Molly in (179) is acceptable in adult speech but not acceptable in this context. For example consider the following production taken from an adult narrative recorded by Rachel Nordlinger which contains CSP SIT(1) combined with the lexical stem *-ngurrkurrk.*

(181)

Bape-ka	***dini-ngurrkurrk***
name-FOC	**3SGS.SIT(1).PIMP-lie**

dhi-gathu-wa	*ngarra*	*thay*	*malangan*
there-TOWARDS-EMPH	LOC	CLF:TREE	black.plum

'Bape was lying there under the black plum tree'

(RN - MP-20120724-RN01.wav 388.286 394.329)

Furthermore the lexical stem *-ngurrkurrk* is also found to combine with CSP BE(4) in adult speech as shown in (182). This raises the question as to why Molly's production is considered to be an error in the previous example (179) but is used in adult speech as in (181).

(182)

ngardi-ngurrkurrk-tha	*i*		
1SGS.BE(4).PIMP-lie-PST	and		
dim-ngintha-rulkut		*kardu*	*perrkenku*
3SGS.SIT(1).NFUT-DU.F-?argue		CLF:HUMAN	two

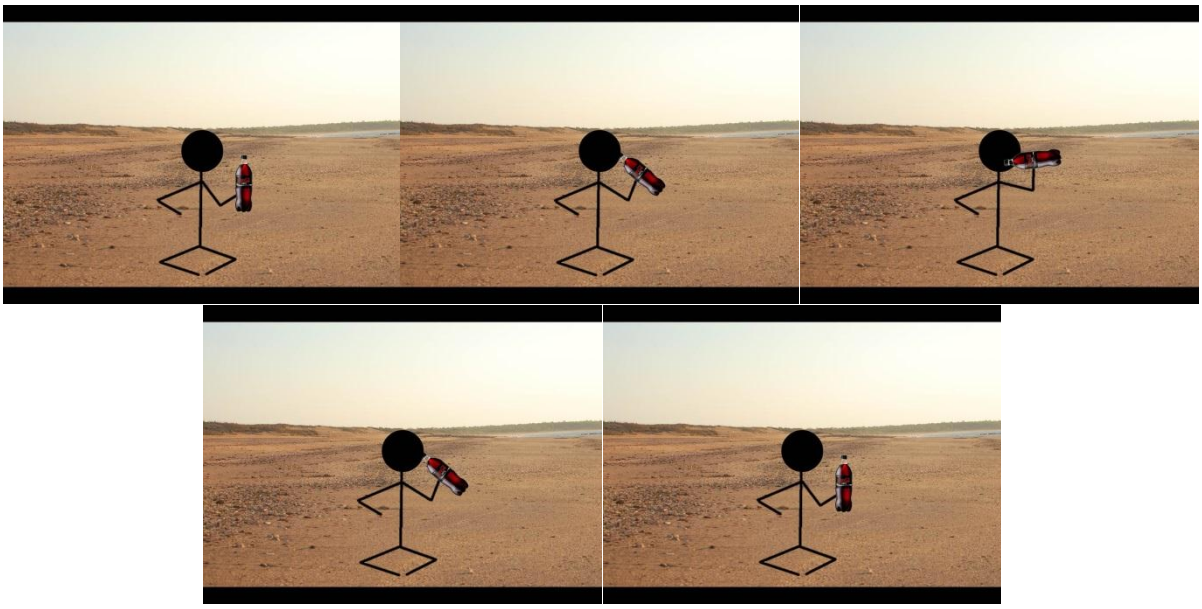
'I was sleeping and two people had a fight (argument).'

(RN - Book 002:143-148)

One possible explanation as to why the use of LIE(2) is preferred in the verb in (179) may be due to the nature of the subject referent, a salt-water crocodile. The salt-water crocodiles that live throughout the coastal regions of Northern Australia are long creatures often resembling logs as they float along. Adult males can grow up to 7 metres in length (Cogger 2014). The length of this animal is so salient that in this context the use of LIE(2) is potentially highly preferred. This explanation however requires further analysis both of adult and child productions of verbs with the lexical stem *-ngurrkurrk.* According to this analysis Molly's dis-preferred verb production can be understood as being underspecified with regard to the stance of the subject referent in a context where the stance of the subject referent is particularly salient. This potentially shows that it takes a long time for children to acquire the use of intransitive CSPs to encode the stance of subject referents. This is understandable as CSPs such as LIE(2) and ALOFT(5), which are particularly marked in terms of encoding stance, are not regularly utilised CSPs in bipartite stem verbs in adult speech (Forshaw et al., 2012).

The potentially late acquisition of CSPs being used to encode stance in bipartite stem verbs also has potential support from experimental data (Forshaw, 2014). In exploratory trials for a production experiment focused on the production of rarer verb forms, adults and children were asked to describe animations and flip-book picture stimuli. Two of the flip-book stimuli showed people drinking from a bottle whilst sitting. An anonymised version of this stimulus is shown below. In the actual experiments heads of people known to the participant, including the participant themselves, were used.

Figure 24. Anonymised Drink Stimulus Image Sequence



Two adults, Estelle and Josephine, participated in preliminary adult trials of this experiment. The adult participants were presented with two drinking stimuli during the experiment. The first was an image sequence of two male non-siblings drinking and the second was an image sequence of the participant themselves drinking. In response to these stimuli both adults predominantly encoded the stance of the subject referent. In Estelle's two responses she encoded the subject as sitting combining SIT(1) with the lexical stem *-kurdugurduk*. Josephine on the other hand encoded the subject twice as standing using STAND(3) in combination with *-kurdugurduk* and once as neutral in using SEE(13) with *-gurduk*. Their responses are shown below with a) responses referring to the first drink stimulus and b) examples referring to the second drink stimulus.

(183) Estelle

a) ***dim-kurdugurduk***
3SGS.SIT(1).NFUT-drink:RDP
'he is sitting drinking'

(LAMP_20131206_WF_01_V1 00:13:25)

b) ***ngem-kurdugurduk***
1SGS.SIT(1).NFUT-drink:RDP
'I am sitting drinking'

(LAMP_20131206_WF_01_V1 00:06:01)

(184) Josephine

a) *I* ***bam-gurduk***
1SGS.SEE(13).NFUT-drink
'I'm drinking'

(LAMP_20131206_WF_02_V1 00:02:30)

a) *II* ***ngarrim-kurdugurduk***
1SGS.STAND(3).NFUT-drink:RDP
'I am standing drinking'

(LAMP_20131206_WF_02_V1 00:02:33)

b) ***pirrim-kurdugurduk***
3SGS.STAND(3).NFUT-drink:RDP
'he is standing drinking'

(LAMP_20131206_WF_02_V1 00:09:36)

In the child trials of the experiment each child was asked to describe two drinking stimuli. The first contained an image sequence of the participant themselves drinking and the second showed an image sequence of two sisters drinking. One of the two sisters was a grandmother of the participants. This grandmother also posed the questions during the experiment. The various responses are shown below with a) responses referring to the first drink stimulus and b) examples referring to the second drink stimulus.

(185) Nathan 4;11

a) *no verb response*

b) *kura* *tarak* ***bam-ngintha-gurduk***[122]
CLF:WATER soft.drink **3SGS.SEE(13).NFUT-DU.F-drink**

'those two non-siblings are drinking soft drink'

(LAMP_20131216_WF_03_V1)

(186) Mavis 5;1

a) ***ngamam=ngem***
1SGS.SAY/DO(34).NFUT-1SGS.SIT(1).NFUT

'I'm sitting doing this (accompanying drinking gesture)'

b) *no verb response*

(LAMP_20131217_WF_03_V1)

(187) Molly 5;8

a) *ngay* ***bam-gurduk=ngem*** *kura*
1SG **1SGS.SEE(13).NFUT-drink=1SGS.SIT(1).NFUT** CLF:WATER

'I am sitting drinking a drink'

b) *kura* ***nubamka-gurduk***
CLF:WATER **2DUS.SEE(13).NFUT-drink**

'you two siblings are drinking drinks'

(LAMP_20131216_WF_01_V1)

(188) Felicity 7;1

a) ***bam-gurduk***
1SGS.SEE(13).NFUT-drink

'I'm drinking'

b) ***pubamka-gurduk*** *kura* *tarak*
3DUS.SEE(13).NFUT-drink CLF:WATER soft.drink

'those two siblings are drinking soft drink'

(LAMP_20131216_WF_02_V1)

[122] Note that Nathan has encoded the incorrect subject form as he is referring to two siblings and not two non-siblings. He does however use the correct non-sibling form for two females.

In contrast to the adult responses almost all the children's responses did not encode the stance of the subject referent. The 'drink' verbs used by children were constructed of the lexical stem *-gurduk* and the CSP SEE(13) which does not encode stance. On the two occasions children did encode the stance of the subject this was done with a serial verb as in (186a) and (187a) rather than with a classifier stem.

There is however another key difference between the adult and child responses which explains the lack of classifier stems being used to encode the stance of the subject referent. In the above child responses when using the verb 'drink' all children use the lexical stem *-gurduk*. This stem however only combines with CSP SEE(13) meaning that children are not able to alternate CSPs to encode stance. Their only verbal option when using this lexical stem is to use a serial verb to encode stance. In contrast the adults predominantly use the reduplicated form of this lexical stem *-kurdugurduk* which can combine with the various intransitive CSPs 1-7 (Street, 2012). It is unclear why there is such a difference in lexical stem choice between the two groups. Nevertheless these examples indicate that children tend to not encode the stance of subject referents in contexts where adult speakers do. They further suggest that when children encode stance on a verb this is likely to be done with a serial verb construction rather than with the classifier stem. This suggests that the acquisition of CSPs to encode stance in bipartite stem verbs occurs later in development and is not captured by this corpus and that the complexity of encoding stance results in its late acquisition.

7.3.2. Learning 'to Find'

Another example of children using licit stem combinations in inappropriate contexts is observed in relation to bipartite stem verbs which contain the lexical stem form *-rdurt*. This lexical stem combines with BASH(14) to mean 'find' and with HANDS(8) to mean 'wake someone'. Interestingly children on occasion are found to use the verb form meaning 'wake someone' in contexts where the target verb is clearly 'find'. Consider the following examples produced by Molly at age 4;5 in a single recording session around twenty minutes apart.[123] Molly is attempting to start either a game of 'chasey' or 'hide and seek' with Nathan. She attempts to say to Nathan 'you find me', *dangirdurtnu*, but instead produces a verb with the

[123] I have provided glossed examples and translations for both the child production in the adult target in both cases. This is because although Molly does not produce the intended target her utterance is still 'meaningful' in the adult language.

same lexical stem but a different CSP meaning ‘you wake me’, *nangirdurtnu*. The difference between the target verb and the verb produced is the CSP used. Interestingly both the target and produced bipartite stem verbs are acceptable meaningful combinations in isolation in the adult language.

(189) Molly 4;5

	ngay	*ne*	***na-ngi-rdurt-nu***
	1SG	TAG	**2SGS.HANDS(8).FUT-1SG.DO-find-FUT**
	‘you wake me’		
AT:	ngay	ne	**da-ngi-rdurt-nu**
	1SG	TAG	**2SGS.BASH(14).FUT-1SG.DO-find-FUT**
	‘you find me’		

(LAMP_20120830_WF_01_V1 00:12:28)

(190) Molly 4;5

	bere	***na-ngi-rdurt-nu***	*Nathan*	*nhinhi-yu*
	alright	**2SGS.HANDS(8).FUT-1SG.DO-find-FUT**	name	2SG-DM
	‘alright you wake me, Nathan you’			
AT:	bere	**da-ngi-rdurt-nu**	Nathan	nhinhi-yu
	alright	**2SGS.BASH(14).FUT-1SG.DO-find-FUT**	name	2SG-DM
	‘alright you find me, Nathan you’			

(LAMP_20120830_WF_01_V1 00:33:45)

These errors could potentially be explained by the fact that HANDS(8) is a CSP with high type frequency. Children would be argued to first select a lexical stem and then add additional morphology to this base form in order to build-up the meaning of the bipartite stem verb. A key choice in this process is the selection of an appropriate CSP. However, if this were the case we would expect CSPs with high type frequencies to also be used with lexical stems with which they do not occur in the adult language. For example the lexical stem *-thi*, used in the verb ‘cook’, which only combines with the low type frequency CSP HEAT(27), might be

produced by children in combination with a CSP such as HANDS(8). Instead child's errors, in which they use an incorrect CSP, are typically only found when the error form is also a meaningful combination in the adult language.

Errors of this type point towards a process of acquisition in which meaning is developed through the contrasting relationships of wordforms rather than the construction of meaning through bases and affixation which must be extracted from the input. The source of Molly's errors in (189) and (190) are due to the relationship between the paradigms relating to the verbs 'find' and 'wake'. This relationship appears to be based primarily on the phonological similarity of the lexical stems. It is unclear why this error occurs in this direction and without further data and a better understanding of how these verbs are used in adult speech speculating as to the cause is difficult. It is likely however that this would be explained by factors such as the frequency of the wordforms or the CSPs, or indeed the frequency of the supra-inflection classes to which the CSPs belong. This type of error shares great similarity with those attested regarding the acquisition of the reflexive/reciprocal alternation (§7.2.2.3), although in these instances the related verbs shared a close semantic as well as phonological relationship.

7.3.3. Learning 'to Throw/Fish'

The use of licit stem combinations in inappropriate contexts is also found in children's use of bipartite stem verbs with the lexical stem *-ku.* This lexical stem is used by children in combination with four different CSPs in the corpus. It combines with SIT(1) and STAND(3) to mean 'to go quickly' (191) & (192), with BE(4) to mean 'be fishing with a line' (193) and with FEET(7) to mean 'throw' (194). Each of these combinations is exemplified below.

(191) Acacia 3;6

kay=ya	***pi-ku***	*mani=ka*
let's.go=DM	**1INCLS.SIT(1).FUT-move.quickly**	be.able=DM

'come on let's go'

(LAMP_20140416_WF_01_V1 00:32:33)

(192) Mavis 5;4

bere-matha	*tharra*	***ngibimka-ku-ngime***
then-INTS	quickly	**1DUS.STAND(3).NFUT-move.quickly-PC.F.NSIB**

'and then we (excl.) all quickly ran'

(LAMP_20140413_WF_01_V1 00:45:36)

(193) Molly 5;8

[Molly is describing a stick figure picture of herself fishing with a handline.]

ngay	*ngay*	*pithing*	***nganam-ku***
1SG	1SG	fishing	**1SGS.BE(4).NFUT-move.quickly**

'me me I'm fishing'

(LAMP_20131216_WF_01_V1 00:11:50)

(194) Molly 4;3

thunu-ku	*xxx*	*ngarra*	*lalingkin*
2SGS.FEET(7).FUT-move.quickly	xxx	LOC	salt.water

'throw it in the salt water'

(LAMP_20120717_WF_01_V1 00:27:43)

In addition to these combinations *-ku* can be used in combination with CSPs SIT(1) and STAND(3) to mean 'fish with a line'. Adult productions of these combinations are given in (195) & (196). This means that the combination of *-ku* with these two stems, SIT(1) and STAND(3), can be used to mean either 'go quickly' or 'fish with a line' depending on the context. Initially I had treated these verbs as semantically opaque with distinct lexical stems (e.g. Forshaw, 2015) but similar patterns of related verb stems are also found in other languages of Northern Australia such as Mawng (Singer, 2005) suggesting that the lexical stems of these constructions share both a phonological and semantic connection.

(195) Lauren

ku	*nugunu-dha*	***ngem-nge-ku***
CLF:ANIM	3SG.F-XXX	**1SGS.SIT(1).NFUT -3SG.F.IO-move.quickly**

Emily-nukun
name-POSS

'it's her fish, I caught it for Emily'

(LAMP_20140601_WF_01_V1 01:04:23)

(196) Joseline

ku	*pithing*	*xxx*	***thirrim-ku***
CLF:ANIM	fishing	xxx	**2SGS.STAND(3).NFUT-move.quickly**

'you are fishing with a line'

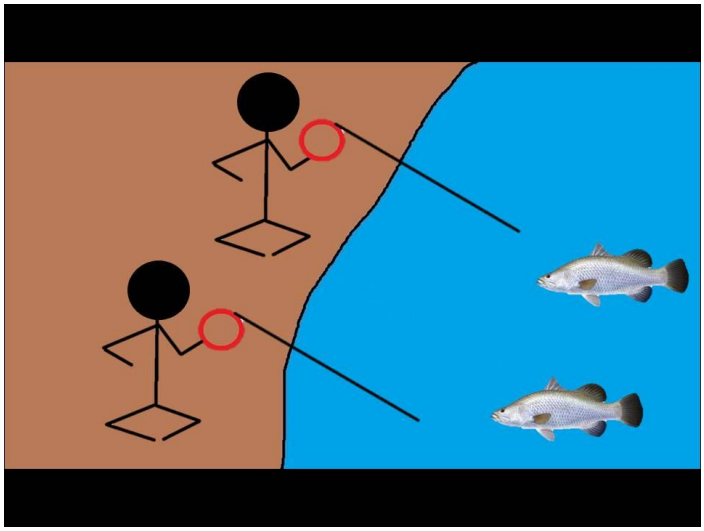
(LAMP_20131206_WF_02_V1 00:10:11)

The majority of these stem combinations are acquired by children without interference from related combinations. The combination of BE(4) and *-ku* to mean 'fish with a line' however causes some problems for acquisition. Some children are found to use the stem combination meaning 'throw', composed of FEET(7) and the lexical stem *-ku*, in contexts where the target verb is 'fish with a line'. This error is best exemplified in an example from outside the corpus produced in an experimental setting. In the following example (197), Felicity, aged 7;1, is shown a picture on a computer monitor of her father and grandfather fishing with hand reels. An anonymised version of this picture is shown below. She is then asked by a Murrinhpatha speaking research assistant, Carla, who cannot see the picture, to describe it.

In lines 4 and 6 Felicity constructs a verb from CSP FEET(7) and the lexical stem *–ku* meaning 'throw'. Although this is an acceptable combination it does not denote the event of 'fishing with a line' that Felicity is attempting to describe. Instead Felicity's production is best translated as 'he is throwing fish.' The fact that Felicity has produced an error is highlighted by Carla's initial reaction to seek clarification of Felicity's production in line 5 and then Carla's subsequent laughter and reproduction of Felicity's error in line 7. In line 10 Carla models the appropriate target construction the only difference being the CSP utilised

which is BE(4) instead of FEET(7). Felicity takes up this correction in line 11 but reverts to her initial non-standard production in line 18 when asked again to describe what her father, pictured in the stimulus, is doing.

Figure 25. Anonymised Fish with a Line Stimulus



(197) Felicity 7;1

1	*Carla:*	*thangku*	*dam-ngkardu=thim?*	
		what	2SGS.SEE(13).NFUT-see=2SGS.SIT(1).NFUT	
		‘what do you see?’		
2	*Felicity:*	*dedi*	*ngay*	
		Fa	1SG	
		‘my dad’		
3	*Carla:*	*ngarra*	*mam=pirrim?*	
		what	3SGS.SAY/DO(34).NFUT=3SGS.STAND(3).NFUT	
		‘what’s he doing?’		
4	*Felicity:*	*ku*	*ngurlmirl*	***nungam-ku***
		CLF:ANIM	fish	**3SGS.FEET(7).NFUT-move.quickly**
		‘he’s throwing fish’		

5 *Carla:* *ay?*
INTJ
'huh?'

6 *Felicity:* *ku* *ngurlmirl* ***nungam-ku***
CLF:ANIM fish **3SGS.FEET(7).NFUT-move.quickly**
'he's throwing fish'

7 *Carla:* *ha ha* *ku* *ngurlmirl* ***nungam-ku***
ha ha CLF:ANIM fish **3SGS.FEET(7).NFUT-move.quickly**
'ha ha he's throwing fish'

8 *Bill:* *could you say it louder?*

9 *Carla:* *lurruth-gathu* *thim-nga-ngerren*
strong-HITH 2SGS.SIT(1).NFUT-1SG.IO-speak:RDP
'speak loudly to me'

10 *Carla:* *ku* *ngurlmirl* ***kanam-ku*** *thama*
CLF:ANIM fish 3SGS.BE(4).NFUT-**move.quickly** 2SGS.SAY/DO(34).FUT
'say he's fishing'

11 *Felicity:* *ku* *ngurlmirl* ***kanam-ku***
CLF:ANIM fish **3SGS.BE(4).NFUT-move.quickly**
'he's fishing'

12 *Bill:* *i* *nangkal?*
and who
'and who?'

13 *Carla:* *i* *nangkal?*
and who
'and who?'

14 *Felicity:* *dedi* *ngay*
Fa 1SG
'my dad'

15 *Carla:* *thangku* *wan* *nukunu=yu?*
what one 3SG.M=DM
'is he alone?'

16 *Bill:* *i*
and
'and'

17 *Carla:* *ngarra* *mam=pirrim* *dedi=yu?*
what 3SGS.SAY/DO(34).NFUT=3SGS.STAND(3).NFUT Fa=DM
'what's dad doing?'

18 *Felicity:* *ku* *ngurlmirl* ***nungam-ku***
CLF:ANIM fish **3SGS.FEET(7).NFUT-move.quickly**
'he's throwing fish'

(LAMP_20131216_WF_02 00:04:18)

Another example of this same error is produced by Nathan at age 4;4. He is about to go fishing and produces an utterance meaning something like 'I will throw fishing' instead of the adult target 'I will fish with a line'. This is once again an example of FEET(7) being used in place of BE(4).

(198) Nathan 4;4

pithing-wa ***ngunu-ku-nu***
fishing-FOC **1SGS.FEET(7).FUT-move.quickly-FUT**
'I will throw fishing.'

AT: pithing-wa **ngani-ku-nu**
fishing-FOC **1SGS.BE(4).FUT-move.quickly-FUT**
'I will go fishing.'

(LAMP_20130521_WF_01_V1 00:38:13)

Appropriate uses of the target verb ‘fish with a line’ are also used at the same age that errors are produced. This is shown by Nathan’s production in line 3 of (199). This example comes from the same recording session as the error shown in (198). Nathan’s adult like production in (199) may in part be due to the use of this verb by his *pipi* (FaZi) Estelle in line 1.

(199) Nathan 4;4

1	*Estelle:*	*nangkal-wa*		*pani-ku-nu=yu*	
		who-EMPH		3SGS.BE(4).FUT-move.quickly-FUT=DM	
		‘who is going to fish?’			
2	*Felicity:*	*Nathan*			
		name			
		‘Nathan’			
3	*Nathan:*	*awu*	*ku*	*nhinhi*	***thani-ku-nu***
		no	CLF:ANIM	2SG	**2SGS.BE(4).FUT-move.quickly-FUT**
		‘no you can fish’			

(LAMP_20130521_WF_01_V1 00:04:37)

The use of the verb ‘throw’ in place of ‘fish with a line’ is the only example of a licit verb containing the lexical stem *-ku* being used in an inappropriate context. This raises the question of what the source of this error is and why there are not errors identified in the production of other verbs which also contain the lexical stem *-ku* given its combinatorial flexibility.

In considering the production and structures of other related verbs with the lexical stem *-ku* it appears that this error is in part due to the phonological similarity of the verb forms, similar to the discussion of the verb ‘to find’ in the previous section. However, in this instance the error also appears due to the semantic similarity of the constructions. Both stem combinations with BE(4) and FEET(7) encode events that involve throwing an object. In the first instance this relates to casting a fishing line and in the second instance this refers to throwing an object in general. Indeed given the appropriate context the verb ‘throw’ can be

used to refer to casting a line highlighting the semantic similarity of these verbs. This is shown in the adult production in (200) where the verb 'throw' is preceded by the overt object *pithing layn* 'fishing line'. Similar productions are also found in children's speech. The example in (201) is taken from experimental data outside the corpus. In this example Matthew aged 6;10 is describing picture stimulus similar to that shown previously in Figure 25 of his brother Cameron fishing with a line.

(200)

ngay=ka	*pithing*	*layn*	***ngunu-ku-nu***
1SG=FOC	fishing	line	**1SGS.FEET(7).FUT-throw-FUT**

'I will throw a fishing line'

(Lucy Davidson Personal Communication 20150414)

(201) Matthew 6;10

pithing	*line*	***nungam-ku***	*Cameron*
fishing	line	**3SGS.FEET(7).FUT-move.quickly**	name

'he is throwing the fishing line, Cameron

(LAMP_20131217_WF_02_V1 00:14:01)

The close phonological and semantic similarity of these stem combinations is the source of the errors illustrated in (197) & (198). It is not that the CSP FEET(7) is overextended based on its own individual frequency or associated semantics. It is likely that 'throw' is the verb that is overextended as it is semantically more general and can encode the meaning of 'casting a fishing line' central to the activity of 'fishing with a line'. By contrast throw is not overextended to contexts where the verb 'go quickly', typically constructed of the CSP SIT(1) and lexical stem *-ku*, is the target verb. This is potentially due to the frequency of this verb and the fact that there is less semantic similarity between these verbs than between 'throw' and 'fish with a line'.

These findings further support the position that children do not associate semantics with CSPs and that these are not overgeneralised on either semantic or frequency grounds as might have been anticipated given findings from other similar systems (e.g. Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). It suggests that, at the stages of development considered in the corpus, children acquire bipartite stem combinations rather than learning to abstract classifier stems and lexical stems and learning to produce verbs compositionally. Although it is the case that CSPs are learned to be used contrastively these contrastive alternations are acquired through the association and juxtaposition of whole stem combinations rather than the association of meaning with individual stem elements. This is evidenced by the fact that non-standard stem combinations are the result of phonological and in some cases semantic similarity of whole bipartite stem combinations which result in the use of licit stem combinations in inappropriate contexts and not the overgeneralisation of individual stem elements such as relatively frequent and flexible CSPs.

7.4 Summary

This chapter has provided an overview of children's acquisition of contrastive bipartite stem morphology across the corpus with a focus on the contrastive use of CSPs. It has shown that the contrastive use of CSPs increases with age and is not readily observed before age 3;8 (§7.2). Interestingly despite the importance of being able to use CSPs contrastively in bipartite stem verbs in Murrinhpatha contrastive CSP use continues to be relatively infrequent across the corpus. This may be a result of the complexity of the system meaning that contrastive CSP use is acquired later in development and is perhaps a characteristic of more 'advanced' speakers. It may also indicate that the importance of contrastive CSP use is not as fundamental to the system as may have been anticipated.

Contrastive CSP use ranged from combination sets with shared lexical stems that were semantically opaque (§7.2.1) to those which were relatively transparent (§7.2.2). Transparent contrastive CSP use was observed most readily in widespread reflexive/reciprocal CSP alternations (§7.2.2.3). These alternations emerged in a piecemeal fashion through the association and juxtaposition of phonologically and semantically related verbs. This association was evidenced most clearly by the use of reflexive/reciprocal CSPs in place of their related transitive CSPs and vice-versa. Despite the emergence of these CSP alternations they were not found to be overgeneralised in the corpus.

This chapter also considered whether children learn to compose bipartite stem verbs from individual stem elements or whether they are learned as whole combinations. It was anticipated that frequent, flexible and transparent CSPs may be overgeneralised given findings from the acquisition of systems with similar characteristics in other languages (e.g. Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). These types of errors would have provided the best evidence of children's acquisition of the underlying compositional principles of the bipartite stem verb system and that they were treating certain stem elements as independent semantic units. Interestingly such errors were not attested in the corpus. There were however a number of instances where children used licit stem combinations in inappropriate contexts where the target verb contained the same lexical stem. This type of error appeared to be more likely to occur when the target verb and the produced verb were semantically related (§7.3.3).

These findings suggest that children learn bipartite stem verbs as fixed stem combinations and do not learn to construct verbs from individual stem elements. They also highlight the existence of associative networks of whole wordforms. This supports usage-based approaches to acquisition of morphology which highlight the importance of associative networks and do not focus on incremental rule-based morphology (e.g. Bybee, 1995). This point is discussed further in §8.4. This process of acquisition also highlights the fact that the structure of the system being acquired has a great impact on its acquisition. If for example the Murrinhpatha bipartite stem verb system were more transparent and indeed productive this would likely enable a more compositional approach to its acquisition. It still remains a possibility however, that children will become aware of the compositional nature of the more regular parts of the bipartite stem system later in development than the age range (1;9-6;1) considered in this study.. It is indeed interesting that licit stem combinations used in inappropriate contexts are still being observed in children as old as 7;1, as shown in (197), and that these types of errors are attested across such a wide age range. These later errors may provide important clues to children's discovery of linguistic structure (e.g. Bowerman, 1982, 2005) and could be investigated by future studies.

8 Discussion & Conclusions

This thesis has investigated the acquisition of verbs in Murrinhpatha by five children over a two-year period covering an age range from 1;9 to 6;1. As a polysynthetic language, Murrinhpatha presents a number of challenges to the language learner that are under investigated in language acquisition (Kelly et al., 2014), and have potential to substantially inform our understanding of language acquisition crosslinguistically. Firstly, long complex verbs require truncation in the earlier stages of development raising questions as to whether the factors that influence early verb productions are phonological/prosodic (e.g. Demuth, 1996b; Peters, 1985; Slobin, 1985), morphosyntactic (Rizzi, 1993; Wexler, 1998) or a mixture of these factors (Courtney & Saville-Troike, 2002). Secondly, the extensive and irregular paradigms of Murrinhpatha classifier stems are not predictable enough to allow for children to acquire abstract rules underpinning their formation. They are also so large that having to acquire all forms individually seems unlikely. Finally, in addition to forming large paradigms, verbs in Murrinhpatha have a bipartite stem structure constructed of a classifier and lexical stem which co-vary to encode different verbs (e.g. Nordlinger & Caudal, 2012). Such a verbal system has not previously been studied from an acquisition perspective and

raises questions as to how children acquire the underlying compositional principles of the bipartite stem system.

This chapter considers each of the three major research questions (§1.2) addressed in this thesis. It examines implications for the broader field of language acquisition arising from the analysis of these research questions in the Murrinhpatha child language corpus. Research question 1 sought to describe the characteristics of children's early verbs both in terms of their structure and their semantics and pragmatics. In terms of their structure (§5.1) it was found that children's early verb productions are impacted by prosodic/phonological factors (e.g. Demuth, 1996b; Peters, 1985; Slobin, 1985) and that verbs develop from the right-edge of the verbal PWord and gradually incorporate larger prosodic structures. With regard to the semantics and pragmatics of early verbs (§5.2) Murrinhpatha-acquiring children's early verb use shows a number of similarities to English-acquiring children despite the great typological difference of these languages. There was some limited evidence that children may initially tend to use general-purpose verbs before acquiring those which are semantically more specific. It was also found that children's early verb use in Murrinhpatha is dominated by a small number of functions, similar to findings for English acquiring children (Huttenlocher et al., 1983; Naigles et al., 2009). This pragmatic restriction was also shown to have an impact on children's acquisition of verbal morphology particularly in relation to the acquisition of CSPs (§5.2.3). Research question 1 is considered in a broader perspective in §8.1 & §8.2.

Research question 2, addressed further in §8.3, focused on how children are able to acquire the complex verbal paradigms of Murrinhpatha classifier stems. In chapter 6 I investigated the development of the diversity of CSPs, specifically investigating the development of a matched sample of four CSPs (§6.2). I found that children start by encoding a small number of subject person/number and TAM categories due to the restricted pragmatic function of early verbs (§5.2.3). Children then gradually expand these paradigms according to a predictable pathway. In acquiring new forms children are sensitive to inter- and intra-paradigmatic patterns of inflection as evidenced by errors of commission (§6.3.2 & §6.3.3). The acquisition of this system relies on considerable storage of inflected wordforms as well as the use of low level analogy in acquiring new forms. It largely supports a usage-based approach to acquisition (e.g. Bybee, 1995) that highlights the importance of associative networks, the role of type and token frequency and the gradual emergence of grammar.

The acquisition of Murrinhpatha bipartite stem morphology represents a new frontier for acquisition research and was the focus of research question 3 addressed in chapter 7. In particular I investigated at what stage children became aware of the underlying compositional principles of the bipartite stem system and whether children acquire verbs compositionally or as fixed bipartite stem combinations. Findings regarding the acquisition of bipartite structures in other languages suggest that children will acquire the underlying compositional principles of the Murrinhpatha bipartite stem verb system (e.g. Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). The stage of development at which this occurs will be influenced by the characteristics of the systems being acquired. For example in acquiring compounding in English, children are sensitive to compositional principles before age 2 (Clark, 1981), whereas for Hebrew acquring children, this emerges much later around age 5 (Clark & Berman, 1987). Surprisingly, despite the importance of the bipartite stem verb system within the Murrinhpatha, even by 6;1 children did not appear to be aware of the compositionality of bipartite stem verbs instead treating these as fixed combinations. Contrastive use of bipartite stem morphology was found to emerge through the juxtaposition of whole combinations and not through the association of meaning with individual stem elements. This illustrates that the characteristics of the system being acquired greatly impact how it is acquired. In this instance it appears that the system is not regular or transparent enough to facilitate compositional acquisition at the stages of development considered in this study.

In addressing all three research questions in relation to the Murrinhpatha child language corpus this study reveals the impacts of complex bipartite polysynthetic verb structures on the process of language acquisition, particularly with regards to the acquisition of morphology. This has the potential to contribute substantially to our understanding of how children acquire typologically different languages and to ensure that theoretical approaches take into account findings from a broad spectrum of languages, as I elaborate below.

8.1 Structure of Early Verbs

It has been found for many languages that children's early verb forms are often truncated in some way (e.g. Demuth, 1996b). For example children may omit inflectional morphology and produce bare verb stems (Deen, 2005). Accounts of this phenomenon have tended to fall into two categories, those which highlight the influence of prosodic/phonological factors (e.g.

Demuth, 1996b; Slobin, 1985) and those which highlight the influence of morphosyntactic factors (e.g. Rizzi, 1993; Wexler, 1998). In order for morphosyntactic factors to influence children's early verb productions children must be aware to some extent of the underlying morphological structure of complex verb forms. Given the potentially high morph-to-word ratio of polysynthetic verbs it may take some time for children to uncover the underlying morphological structure of such words and indeed this complexity may be a barrier to their early acquisition (Stoll et al., 2012). This makes it less likely that morphosyntactic factors will influence early verb productions in a morphologically complex system. Alternatively, the morphological richness of polysynthetic verbs may lead to an early awareness of morphological structure as has been found in the acquisition of other morphologically rich systems (Laaha & Gillis, 2007). This would raise the likelihood of morphosyntactic factors influencing early verb productions. This suggests that the interaction of the richness and complexity of verbal morphology will impact what factors are more likely to influence early verb production.

The analysis of children's early verb productions in Murrinhpatha (§5.1) focused on the production of verbal PWords which begin with the classifier stem and conclude at the end of the lexical stem. It was found that children do truncate some early verb productions and that some verbs continue to be truncated until at least 4;5. These productions exhibited a developmental pathway largely predicted by a prosodic licensing model (e.g. Demuth, 1996b, 2001). Initially children's early verbal PWord productions were predominantly disyllabic trochaic feet with PWords larger than a disyllabic trochaic foot prone to truncation. When children produced truncated verbs the trochaic foot at the right edge of the PWord in the adult target form was preserved. There were also instances where the initial syllable of the trochaic foot was realised as a 'filler syllable'. It is unclear whether children further truncate verbs at an earlier stage of development to produce monosyllabic verb forms as found in languages such as Quiché (Pye, 1983). Early verb productions in the corpus support the hypothesis that children's early word productions are influenced by their current psychological representation of what constitutes an acceptable PWord in the language being acquired (e.g. Demuth, 1996b). As children's understanding of permissible prosodic structures develops, so does their production of these structures.

The prominence of disyllabic verbal PWords persisted until around age 2;8. Children's verb productions then grow leftward from the initial head trochee at the right edge

of the verbal PWord. Between the age of around 2;7 to 3;6 children produced both disyllabic and trisyllabic verbal PWords while continuing to truncate tetrasyllabic verbal PWords. During this stage children continued to reduce some tri- and tetra-syllabic PWords to disyllabic trochees similar to the previous stage. Between the ages of approximately 3;6 to 4;5 children's productions of trisyllabic verbal PWords were no longer prone to truncation showing that this structure was now licensed by children. Children did however continue to truncate some tetrasyllabic PWords reducing these to trisyllabic forms. Interestingly there was variation in which syllable was omitted in these contexts with examples including the omission of the initial syllable as well as examples with the omission of the second syllable and preservation of the initial syllable. It is unclear why this variation occurred. Importantly however these productions are consistent with a prosodic licensing account (e.g. Demuth, 1996b, 2001) as the resulting word form is licensed by the child's prosodic representation despite the variable preservation of certain placed syllables.

This leftward development of complex verbs has been attested in a number of morphologically complex languages including Mohawk (Mithun, 1989), Navajo (Courtney & Saville-Troike, 2002) and a number of Mayan languages (C. Pye et al., 2007) although it is by no means a universal feature of the acquisition of morphologically complex verbs, see Quechua (Courtney & Saville-Troike, 2002). This developmental pathway is predicted by a combined model of perceptual salience (Peters, 1985; Slobin, 1985) and prosodic licensing (e.g. Demuth, 1996b, 2001). While it has been shown for Murrinhpatha that children truncate their verb productions according to prosodic licensing constraints it is also necessary for a prosodic licensing model to account for why the child begins at the right edge of the verbal PWord instead of somewhere else, for example at the left edge. Children acquiring Murrinhpatha begin by producing the trochaic foot at the right-edge of the verbal PWord for a number of reasons. Firstly this foot includes the penultimate primary stressed syllable which is salient for children and is also predictive of the end of the verbal PWord. Furthermore, this is also the part of the word that contains the lexical stem which is formally more stable than the classifier stem.

In a study of a number of Mayan languages (C. Pye et al., 2007) it was found that in languages where the verb stem occurs frequently at the edge of words children tend to produce more bare stems as this arguably makes the segmentation of stem elements easier. Given that lexical stems in Murrinhpatha verbs occur at the right edge of the verbal PWord

(Mansfield, In Prep.a) and frequently occur at the right edge of the verbal complex (Forshaw et al., 2012), it was anticipated that children would produce bare lexical stems. Children were found to produce bare lexical stems, however these were relatively infrequent as they relied on the lexical stem having certain formal characteristics. Children produced bare lexical stems when the truncated prosodic shape of the child's production was consistent with the shape of the lexical stem. For example if a child reduced a trisyllabic verbal PWord to a disyllabic form and the adult target contained a disyllabic lexical stem this could result in the production of a bare lexical stem, if no other suffixes were used. However if the trisyllabic verbal PWord contained a monosyllabic lexical stem a bare stem would not be produced. This finding supports the characterisation that bare verb stems tend to only occur in languages where the production of such forms is partnered with some regular perceptual property which enables identification, such as stress, word position and morphosemantic transparency (Kelly et al., 2014). An important addition to this position is that bare stems must be no bigger or smaller than a PWord representation currently held by the child.

Courtney & Saville-Troike (2002) claim that the production of bare verb stems in Navajo and Quechua is evidence that children have an innate category of ROOT/STEM following Pinker (1984, Ch. 5). They argue that the existence of this category explains the early extraction and production of bare stems in these languages despite the fact that stem morphs in these languages may not always be the most 'salient' verb elements. Furthermore, they note that children typically preserve stem morphology and that non-stem morphology is prone to omission. This is also the case in Murrinhpatha where the lexical stem, or parts thereof, is typically preserved, whereas the more inflectional like classifier stem is prone to omission. The Murrinhpatha data however does not support an appeal to an innate stem category as children do not truncate their early verb forms according to morphological boundaries. Truncated verbs are composed in a number of different ways from the perspective of the adult language. For example, verbs that have been truncated and are produced by children as disyllabic forms may be bare lexical stems, where the lexical stem is disyllabic, or they may consist of a monosyllabic lexical stem with a preceding syllable that does not form part of the lexical stem. Although there are examples of monosyllabic lexical stems being produced with only a preceding filler syllable, which may suggest segmentation of the lexical stem, there are also examples where the first syllable of a disyllabic lexical stem is produced as a filler syllable illustrating that the production of such forms is not due to the extraction of the lexical stem. Instead these examples have in common that the final syllable

of the verbal PWord tends to be preserved in the most adult-like way, likely an effect of the final syllable of the verbal PWord being particularly salient for children. Furthermore given that the lexical stem is also typically associated with lexical stress means that their early production is associated with factors of perceptual salience. Consequently appealing to the existence of innate categories is not necessary. I also question whether the existence of an innate ROOT/STEM category actually predicts the production of bare verb stems. Pinker's (1984, Ch. 5) approach, presented in §3.5.1, proposes that the innate ROOT/STEM category is important in uncovering inflectional patterns. He suggests that children initially treat verb forms as unanalysed chunks and that the acquisition of morphological patterns occurs later after the construction of verb specific miniparadigms. It does not suggest that this should lead to the production of bare verb stems.

Notably the corpus reveals a great amount of variation in the way Murrinhpatha children truncate their early verb productions, as is commonly found in other languages (Deen, 2005). Although there are tendencies with regard to the type of prosodic structures produced by the focus children and patterns of truncation, it was not uncommon for children to truncate and not truncate similar word structures at the same age. In fact variation was observed for Acacia in the production of a single verb form in consecutive utterances p.165. A prosodic licensing account, while allowing for this variation, does not predict when and where it will occur. Research into contexts of truncation has been undertaken in relation to the acquisition of Inuktitut (Skarabela & Allen, 2004; Swift & Allen, 2002). This research suggests that in addition to structural factors, errors of omission may be influenced by emotional and discourse-pragmatic factors. This was not explored in this thesis although provides an interesting avenue for future research.

Morphosyntactic explanations of children's early verb forms (e.g. Rizzi, 1993; Wexler, 1998), outlined in §3.3.2, propose that children are aware of morphological structure from an early age and that the omission of inflectional morphology is due to the underspecification of particular grammatical categories (e.g. Schütze & Wexler, 1996) or the truncation of syntactic representations (Rizzi, 1993). These approaches have in common a reliance on M. Baker's (1985) Mirror Principle which states that the ordering of morphological affixes reflects the order of syntactic derivations. This allows for the construction of syntactic trees to reflect the composition of polymorphemic words. The omission of morphemes is consequently linked to underspecification or omission at a specific

node. Although this approach is attractive for describing the acquisition of languages where the Mirror Principle holds, the application of such theories is difficult in languages with fusional morphology, as constructing appropriate trees is not a straightforward process. Murrinhpatha CSPs encode subject number/person and TAM as well as contributing to verb semantics and argument structure. Therefore, in cases where the classifier stem is omitted it is not clear whether this is due to an underspecification of subject agreement, tense agreement or perhaps related to verbal semantics. Furthermore, Murrinhpatha has been described as having templatic morphology meaning "that affix ordering cannot be given a semantic, syntactic or phonological explanation synchronically, but that the ordering of affixes is determined by very specific morphological environments" (Nordlinger, 2010a, p. 332). This means that it is not possible to construct an underlying syntactic representation of complex verb forms according to the Mirror principle (M. Baker, 1985) as morphs are not linked to hierarchically structured nodes. The application of such a syntactic model would thus be problematic for Murrinhpatha and lacks empirical motivation given that early verb forms have been accounted for by prosodic factors and are not able to be explained in relation to the underlying grammatical structure of verbs.

A potential problem for children acquiring verbs and verbal morphology in a polysynthetic language is that single verbs can be long complex polymorphemic structures. The production of such words is typically beyond the capabilities of young children. However analysis of adult speech, as discussed in §2.2.1, has shown that verbs in Murrinhpatha typically do not have as high a morph-to-word ratio as might be expected from the presentation of the potentially rich morphological structure (Forshaw et al., 2012). Much of the potential morphological richness, such as adverbial morphs and incorporated body parts, is not obligatory. This means that children can gradually learn to exploit this richness as they become more advanced speakers without producing ungrammatical verbs. Furthermore the types of verbs used by children, such as those which encode singular subjects, tend to be less rich morphologically. This allows children to acquire this morphological richness gradually as they begin to use verbs to encode a greater diversity of categories such as dual subjects, which have morphologically more complex structures. That is, the types of verbs used by children in the early stages of development, as highlighted in §5.2.3, tend to be less complex morphologically than those they begin to use later in development. Although acquisition of the morphological richness of Murrinhpatha verbs

emerges over a long period this is not necessarily associated with a long period of ungrammatical verb production.

This study has shown that Murrinhpatha acquiring children's early verbs are influenced by prosodic/phonological factors. While this shares similarities to a number of other morphologically complex languages (Kelly et al., 2014; e.g. C. Pye et al., 2007) it is also in contrast to others where children appear to truncate early verbs on a morphosyntactic basis (Courtney & Saville-Troike, 2002). While a prosodic licensing account (e.g. Demuth, 1996b, 2001) argues that variation in children's early word productions crosslinguistically can be accounted for by differences in the prosodic structure of the adult language being acquired it may also be that morphological richness and complexity plays an additional role. That is if children's verb productions are to be influenced by morphosyntactic factors children will need to be aware of the internal morphological structure of verbs in their language. In a morphologically complex language such as Murrinhpatha the complexity of the verbal morphology, in particular the bipartite stem verb morphology, may prevent the influence of such morphosyntactic factors on early verb productions. This is despite findings that children acquiring morphologically rich systems tend to become aware of internal morphological structure of words earlier (Laaha & Gillis, 2007). Consequently further study is needed regarding the interaction of morphological complexity and richness and its impact on acquisition.

8.2 Semantics & Pragmatics of Early Verbs

There has been relatively little study with regard to the semantics and pragmatics of early verbs in first language acquisition, whether in specific languages or crosslinguistically. With regard to semantics a common claim for English acquiring children is that general-purpose verbs tend to be acquired before those which are semantically more specific (Bloom, 1991; Clark, 1978, 1993). Studies have also suggested that children's early verbs may be pragmatically restricted (Huttenlocher et al., 1983; Smiley & Huttenlocher, 1995). These tend to be used as directives to request action or gain attention from a hearer or as commissives to state a child's intention to act. These functions reflect the fact that children's speech is centred on their own communicative needs and wants (Edwards & Goodwin, 1986). These claims have however remained underexplored particularly from a crosslinguistic perspective

and consequently this thesis has sought to examine whether such observations are also true of a typologically very different language.

The semantics and pragmatics of children's early verbs in the Murrinhpatha child language corpus were analysed in §5.2. It was found that while children's verb use was very infrequent before age 2, the few verbs identified were general-purpose verbs used as directives to request action or attention from a hearer. Verbs were used at a greater rate between the ages of 2;4 to 2;7. At this age general-purpose verbs such as 'do', 'give', 'put', 'make' and 'hold' continued to dominate verb use lending some support to claims that general-purpose verbs are acquired earlier than those which are semantically more specific (Bloom, 1991; Clark, 1978, 1993). There were also limited examples where children overgeneralised more semantically general verbs to contexts where a semantically more specific verb was expected. There was no evidence however to suggest that simple verbs, those without a lexical stem and having typically general semantics, are acquired earlier than bipartite stem verbs. This shows that the greater complexity of bipartite stem verbs compared to simple verbs does not delay their acquisition. This is because children are not yet aware of the underlying morphological structure as discussed in chapter 7. This is similar to findings for the acquisition of complex verbs in German where complex verbs are found to not be more difficult to acquire as children are not initially aware of their greater morphological complexity (Behrens, 1998).

There are however a number of additional factors relating to the nature of the corpus which may influence the likelihood of semantically general verbs occurring compared with semantically more specific verbs. A number of arguments have been made against claims that semantically general verbs are acquired ahead of semantically more specific verbs based on sparse longitudinal data and diary accounts (e.g. Naigles et al., 2009; Theakston et al., 2004). It has been shown that semantically light verbs tend to be more frequent in language input to children. Consequently their early acquisition may be due to their relative frequency rather than their semantic generality (Theakston et al., 2004). Furthermore, if these types of verbs are more frequent in the language in general, as they can be used in a wider variety of contexts, these are the types of verbs that will most likely be identified in child language corpora of the type in this thesis (Tomasello & Stahl, 2004). Semantically more specific verbs, which by definition are used in a narrower set of contexts, are less likely to be documented under this methodological approach, but this is not the same as a child not

knowing these forms. Therefore, although this thesis provides some limited support that semantic generality may play a role in children's verb acquisition this remains a somewhat open question that would benefit from future investigation based on either dense corpora or through the use of experimental methodologies.

With regard to the pragmatics of early verbs in Murrinhpatha a number of general tendencies were observed in the corpus. It was found that children's early verbs were typically used in future contexts and preceded the events that they encoded while some verbs were also used to describe ongoing events, states of affairs and the location of entities. Early verbs were not identified as encoding past events. The verbs which preceded events were typically either directives, used to request action or attention from a hearer, or commissives, which encoded the child's intention to act. Children's early verb use in Murrinhpatha can consequently be described as having a 'self-interest' bias. Despite great typological differences these findings are consistent with observations for verb use in English acquiring children, in particular that children's early verbs are frequently used to encode their own actions and to request action and attention from hearers, as detailed in (e.g. Huttenlocher et al., 1983; Smiley & Huttenlocher, 1995). This is also consistent with findings that children's early language use is focused on the immediate surrounding context (Clark, 1993) and centred on their own communicative needs and wants (Edwards & Goodwin, 1986).

Given that children's early verbs are typically used for a small number of functions I investigated whether this may have an impact in children's acquisition of verbal morphology and verbal constructions. It was shown that the functions of children's early verbs were closely associated with certain types of verb constructions and verbal morphology (§5.2.3). Directives were typically realised as imperative verbs, commissives were typically realised as 1st singular indicative verbs and representatives were realised as both 3rd singular non-future and 3rd singular existential verbs. I argue that this is evidence of a link between the way in which children use early verbs and the acquisition of verbal morphology. Children tend to produce these types of inflected verb forms first and use these to construct initial verb-specific miniparadigms on which they will begin to extract morphological patterns, as explored in chapter 6. This link between form and function also helps to explain why imperative constructions are acquired early in a wide variety of non-related languages. Although others have suggested that this is due to imperative verbs being tenseless and propose that they are an analogue to root infinitives in other languages (Salustri & Hyams,

2003), I argue that the early acquisition of imperative verbs is driven by the fact that children produce directives from an early age, even before they begin to speak (Bates et al., 1975, 1976), and that imperatives are a default construction for encoding directive function (König & Siemund, 2007; Levinson, 1983; Sadock & Zwicky, 1985). Indeed in Murrinhpatha imperative verbs are not tenseless as the obligatory classifier stem encodes TAM. Similar explanations have been made for the acquisition of verbal morphology in other languages. Laalo (2003, p. 346) states in analysis focusing on the acquisition of Finnish inflectional morphology that "It is interesting to note that - apparently for pragmatic reasons - the 2S(g) imperatives are used by children acquiring quite different languages." Consequently despite great differences typologically, imperative verbs will be acquired early in a wide variety of languages due to children's early use of directives (Küntay et al., 2014) and the link between directives and imperative constructions (Sadock & Zwicky, 1985).

8.3 Acquisition of Complex Verb Paradigms

There has been little research into how children acquire complex verbal paradigms (Stoll, 2015). These pose a problem for acquisition as they are typically too complex to learn through the acquisition of abstract rules and consist of so many forms that learning all forms individually would seem to be beyond the capabilities of the learner (Mithun, 2010). This topic was addressed in chapter 6 which considered the acquisition of the complex inflectional paradigms of Murrinhpatha CSPs. Classifier stem paradigms are fusional portmanteau morphs which as well as contributing to the overall semantics and argument structure of the verb also encode subject person/number and TAM. These paradigms present a challenge for the acquisition of morphology as they do not have clearly discernible regular or default patterns of inflection (Nordlinger, 2015; Walsh, 1976). Individual paradigms encode up to 40 distinct morphological property sets meaning that children must acquire a large number of forms. CSPs do however have many semi-regularities both within and across paradigms.

I investigated the development of inflectional diversity in a 'matched' sample of four CSPs using both qualitative investigation and an adapted measure of Normalised Mean Size of Paradigm (MSP) (Xanthos & Gillis, 2010), see §6.2. It was found that the inflectional diversity of these CSPs increased markedly between the ages of 3;1 to 3;7 with an initial MSP(20) of less than 2 growing to around 2.5. After this age the rise in inflectional diversity was more gradual rising to around 3 by 5 years of age. I then considered whether the rise in

CSP inflectional diversity identified in the corpus could be linked to particular developmental pathways or whether this increase was more sporadic. It was found that initially children only use a small number of inflected verb forms. These forms were driven by the way in which children typically use their early verbs, detailed in chapter 5, consisting primarily of 1st and 2nd singular future forms. The increase in diversity by age 3;7 can largely be attributed to the use of 3rd singular future forms as well as a number of non-future forms with 1st, 2nd and 3rd singular subjects. After this stage the more gradual increase in inflectional diversity is associated with the use of 1st inclusive and later dual and plural classifier stems as well as the use of some past imperfective forms. Thus the increase in diversity is associated with the addition of particular types of categories to CSPs. This suggests that children acquire complex verbal paradigms by first learning a small number of inflected forms. These inflected verbs form miniparadigms which children gradually build upon with the addition of new paradigmatic dimensions to construct more complex verbal paradigms.

Further evidence for this developmental trajectory is evidenced by children's errors of commission (§6.3). Children were found to use future forms in place of later acquired non-future forms (§6.3.1). Additionally the acquisition of closely related CSPs, which are homophonous in the future tense, suggests that children acquire the future forms of CSPs before the non-future for at least some CSPs. In §6.3.2 I considered the acquisition of closely related CSPs such as HANDS(8) and GRAB(9) with extensive homophony. When constructing non-future forms for GRAB(9), which belongs to the NGAM.NFUT supra-inflectional class, children overgeneralised the M.NFUT inflectional pattern associated with HANDS(8). These errors of commission illustrate that children are sensitive to the type frequency of semi-regular patterns of inflection and that they use these to acquire new forms as argued by a usage-based network model of acquisition (e.g. Bybee, 1995).

The mapping of children's inflectional diversity supported by qualitative analysis and the consideration of children's errors of commission show that children acquire CSPs by starting small and gradually learning to encode new subject and TAM categories. Although it remains unclear what exactly underpins this pathway of development it is likely to be linked to language use and the pragmatic function of verbs to some extent. I claimed in §5.2.3 that children's early verbs are functionally restricted and that these functions are associated with particular types of verb constructions. It is therefore possible that as children need to encode a wider variety of functions in their daily interactions they also acquire verbal morphology

associated with these functions. For example when children begin to tell stories about past events this will be associated with the production of past imperfective CSPs. Indeed this is the context in which such morphology is initially observed in the corpus. Furthermore if the encoding of siblinghood and kinship is functionally important in children's interactions this will lead to the acquisition of verbal morphology which encodes siblinghood. This means that children's interaction with and conceptualisation of the social world may drive the acquisition of verbal morphology. Further investigation of such factors which potentially underpin the pathway of development of CSPs is left for future research.

These findings regarding the acquisition of CSPs are consistent with various proposals of morphological acquisition, including Pinker's Generativist Model (1984), Protomorphology (e.g. Dressler & Karpf, 1995) and Network Models (e.g. Bybee, 1985). These argue that children are initially unaware of the morphological composition of words and initially acquire rote learned chunks (MacWhinney, 1978). When children have acquired a number of phonologically and semantically related verb forms these are used to form miniparadigms ('source-oriented' schemas in a Network Model). Children are sensitive to the 'regular/semi-regular' morphological patterns of these miniparadigms and extend these patterns to new forms. This brings about the production of errors of commission. This stage is defined as the beginning of the protomorphological stage in Protomorphology (Dressler, 2007). Studies in Protomorphology have found that this stage tends to emerge earlier in languages with rich morphology (Laaha & Gillis, 2007). Despite the rich morphological patterns of Murrinhpatha CSPs this stage appears to emerge relatively late (§6.5). This is likely due to the fusional nature of CSPs and the high degree of irregularity within and across paradigms. This supports findings that fusional morphology delays the onset of the protomorphological stage and that fusional morphology is more difficult to acquire than agglutinative morphology (e.g. Laaha & Gillis, 2007). At the onset of the stage of protomorphology the various approaches to morphological acquisition considered diverge in a number of ways.

The Generativist Model (Pinker, 1984) and Protomorphology (e.g. Dressler & Karpf, 1995) focus on the existence and emergence of an autonomous morphological module respectively, whereas a Network model (e.g. Bybee, 1995) does not propose such a disassociation. The existence of a morphological module is most clearly associated with the existence of regular morphological rules by Generativist approaches. In this case children

store both stem and inflectional morphology as individual elements and are able to construct inflected verb forms through the application of abstract rules (Pinker & Prince, 1991). This approach presents problems for the acquisition of complex verbal paradigms as simply devising a set of rules to account for the inflectional patterns of Murrinhpatha CSPs is not a simple task. It therefore seems unlikely that children will be able to acquire such a collection of complex rules and, even if they could, that this would be beneficial to the acquisition process. Similar arguments have been made by researchers investigating the acquisition of complex inflectional paradigms such as Polish (Krajewski et al., 2012) and Serbian (Mirković et al., 2011) noun morphology.

Theoretical approaches which focus on the abstraction and application of abstract morphological rules are not well suited to the acquisition of complex morphological paradigms such as Murrinhpatha CSPs as the rules that would potentially describe such a system are not straightforward (e.g. Mirković et al., 2011). Furthermore they do not easily capture findings that children are sensitive to 'semi-regular' patterns in such systems. Instead children must rely on associative patterns of phonologically and semantically related wordforms, which is indeed allowed to some extent by rule-based approaches. In a network model (e.g. Bybee, 1995) it is the contrast of associated whole verb forms, or in this case cells of a CSP, which encode meaning rather than the composition of smaller meaningful morphemes. According to a network model children are sensitive to patterns across these stored forms through product- and source-oriented schemas. Schemas with high type frequency are likely to be more productive and result in the production of novel forms just as has been observed in the acquisition of Murrinhpatha CSPs (§6.3).

This does not however discount the possibility of rule based inflection and modularised morphology for other morphological systems or parts of these systems. Indeed the more regular parts of Murrinhpatha verbal morphology, such as the past suffix *-dha*, may potentially be learned as abstract rules. The debate about whether this is truly a rule or simply an extremely productive schema is somewhat inconsequential to the current discussion as both predict and explain similar morphological systems. The key question of interest is whether these types of morphology are processed differently both by adults and by children. This question is not able to be addressed through the analysis of 'naturalistic' longitudinal data and requires the use of experimental neurolinguistic techniques. The current study does however highlight that theories need to recognise the range of regularities found in

morphological systems and propose accounts which are sensitive to the nature of the system being acquired. Regular inflectional morphology such as the English past tense, which is ideally suited to rule-based accounts (Stoll & Bickel, 2013a), is not found in all languages and theories of acquisition should ideally reflect this.

It has been claimed by some usage-based proponents that evidence against rule-based accounts is that the acquisition of morphology may initially be lexically restricted (Krajewski et al., 2012). This piecemeal emergence of inflection is also observed in Murrinhpatha with certain subject and TAM categories encoded by particular CSPs before others. I do not agree however that a rule-focused approach such as Pinker's (1984, Ch. 5) could not also account for the gradual emergence of morphology. As with a network model (e.g. Bybee, 1995) this approach is top-down, meaning that children learn unanalysed chunks before acquiring morphological patterns and rules. The initial abstraction of abstract rules is based on a small number of paradigms meaning that rules are initially lexically restricted. Furthermore when an abstract rule becomes productive there is no requirement that this would need to apply across all stems. Such an approach is therefore also capable of capturing the emergent nature of morphological acquisition.

8.4 Acquisition of Bipartite Stem Verbs

This thesis investigated children's acquisition and use of contrastive bipartite stem morphology and explored whether children acquire the semantic compositional principles which underlie the transparent end of this verbal system (Ch. 7). Central to this investigation was whether children learn to construct verbal meaning compositionally from two stem elements or whether these two elements are learned as fixed combinations with contrastive alternations of stem morphology emerging based on the juxtaposition of whole wordforms. This question is similar to the debate regarding the acquisition of inflectional morphology between abstract rule-based (e.g. Pinker & Prince, 1991) and usage-based associative network (e.g. Bybee, 1995) approaches describing the acquisition of morphology. In considering how children acquire the Murrinhpatha bipartite stem verbal system it is important to consider the characteristics of the system regarding regularity and transparency and whether these allow for children to acquire and construct bipartite stem verbs compositionally.

Findings from other languages regarding the acquisition of bipartite constructions, which share similarities with Murrinhpatha bipartite stem verbs, have shown that children do acquire the underlying compositional principles of such systems (Behrens, 1998; Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). Evidence of the acquisition of these principles are children's errors of commission which include the overgeneralisation of elements such as light verbs (Family, 2009) and preverbs (Imedadze & Tuite, 1992) on semantic and frequency grounds resulting in novel combinations not permitted in the adult language. These studies also show that children are more likely to associate meaning with an element which contributes to a compositional meaning when the element is both flexible (occurs in a wide variety of combinations) and frequent in the target language (Berman, 2011; Family, 2009; Imedadze & Tuite, 1992). Furthermore if the bipartite system is frequent and productive in the adult language, including in the formation of new words, the underlying compositional principles are likely to be acquired earlier (Berman, 2011).

My analysis considered children's contrastive use of stem morphology across the corpus with a particular focus on the contrastive use of CSPs with individual lexical stems (§7.2). I focused on CSPs as these are typically used in more bipartite stem combinations than lexical stems and also tend to have more general semantics such as 'do with hands' when they are semantically transparent. These were therefore the most likely to be overgeneralised by children and consequently the most likely to provide evidence that children had begun to acquire the underlying compositional principles of the Murrinhpatha bipartite stem verb system.

The findings suggest that children do not readily divide semantic meaning across stem elements. The core semantic meaning of verbs is either associated with the lexical stem alone or is associated with the whole stem *combination*. There was no evidence that children overgeneralised the use of CSPs based on semantics associated with them from a synchronic perspective, or that CSPs with a high type frequency were overextended to produce novel stem combinations. This was surprising as such errors have been found in the acquisition of bipartite structures in other languages such as Persian light verb constructions (Family, 2009). Thus, according to the corpus, children were found not to associate meaning with CSPs independent of bipartite stem verbs and were found not to acquire the compositional principles of the bipartite stem verb system by age 6;1.

Children did however use licit combinations in inappropriate contexts (§7.3). In these instances children produced verbs with the appropriate lexical stem of the target verb but with an inappropriate CSP. The verb produced by the child was an acceptable combination in the adult language but did not encode the intended meaning. These errors are evidence of strong associative links between phonologically related whole verb forms. Such errors also appeared more likely to occur when the inappropriate verb produced by the child was semantically similar to the target verb. For example the verb 'throw' was used in place of the target verb 'to fish with a line' (§7.3.3). Importantly the action of throwing is included in the act of fishing with a line through the casting of a line. In cases where children used licit combinations in inappropriate contexts it is likely that the combination used was more frequent or had a greater type frequency, although this requires further investigation of both child-directed and child speech.

Contrastive CSP alternations, where a lexical stem was used with more than one CSP by a child over the length of the corpus, were observed in the data predominantly after age 3;7. Such examples, where there was a semantic link between the verbs, illustrated that children were able to use CSPs in an adult-like manner to contribute to the meaning and argument structure of the verb. In these cases the classifier stem was encoding more than simply subject person/number and TAM (§7.2.2). Initially these tended to be CSP alternations that had a high type frequency occurring with a large number of lexical stems such as the reflexive/reciprocal alternation (§7.2.2.3).

Reflexive/reciprocal CSP alternations, sets of systematically linked CSPs which encode a difference in argument structure (§2.2.3), emerged gradually in a piecemeal fashion. Children were found to use such alternations in an adult-like manner by 4;5 in relation to some verbs. Before the acquisition of these alternations children were found to use related forms in place of one another so that transitive verbs were used in reflexive/reciprocal contexts and vice versa. These are further examples of children utilising licit stem combinations in inappropriate contexts. This supports the position that children develop strong associative links between semantically and phonologically related word forms. The acquisition of CSP alternations emerges through the contrast of verb forms with different but related CSPs and a shared lexical stem. These alternation patterns do not appear to be regular or transparent enough to allow for their disassociation from whole verb forms resulting in overgeneralisation, although the possibility of this cannot be discounted.

Children were also are found to use semantically less specific stem combinations than otherwise might be expected, particularly in the use of CSPs that encode the stance/posture of the subject (§7.3.1). In a comparison of preliminary experimental data children did not encode the stance of a subject through the use of a CSP. By contrast adults were more likely to encode the stance of a subject through the use of a relevant CSP. Furthermore, in naturalistic speech Molly was found not to encode the stance of the subject even in a context were this might be considered a particularly salient feature. Adult research assistants described this production as 'babytalk' and suggested that the adult target verb would encode stance through a CSP. Children appear to take a long time to acquire some contrastive CSP alternations in Murrinhpatha and do not readily associate semantic information, such as the stance of a subject, with CSPs.

Overall the contrastive CSP alternations attested in the corpus tended to have a relatively minimal impact on overall verb semantics. For example a change in CSP encoded the fact that 'a tap was turned on by someone' and that 'a tap was on/running'. Given these types of alternations it is unlikely that semantics associated with CSPs will be particularly salient in isolation from lexical stems. Contrasts in CSPs in combination with lexical stems are able to encode shifts in verb meaning, however the meaning associated with CSPs does not seem to be regular or salient enough for children to store CSPs along with specific semantic information such as 'do with hands' or 'involve heat' as might be anticipated given findings regarding the acquisition of bipartite constructions in other languages (Behrens, 1998; Clark, 1981; Family, 2009; Imedadze & Tuite, 1992). If this were the case we would anticipate children to produce novel stem combinations based on these meanings.

These findings raise a number of questions for future investigation. Key amongst these is whether the lack of contrastive use of CSPs and lack of novel stem combinations which would indicate the acquisition of underlying compositional principles is due to the fact that these have not yet been acquired by children during the age range considered in this study. These questions would likely be best addressed through an experimental cross-sectional methodology examining what semantic information children associate with CSPs, at what stage this emerges, what types of semantic associations are acquired earlier or later and whether children are able to comprehend or produce novel stem combinations. Such a study would also benefit from a better understanding of how adults process bipartite stem verbs. The question of whether adults associate CSPs in bipartite stem verbs with specific semantic

information remains open. Furthermore the extent to which adults are able to either produce or comprehend novel stem combinations should be explored. If this is not something that adults are able to do then there is logically not a need for children to acquire such an ability.

To understand why bipartite stem verbs are not acquired in a compositional rule-based manner it is important to consider the overall structure of the system similar to the acquisition of Murrinhpatha CSPs. Studies of the acquisition of bipartite structures in other languages have argued that factors of type frequency as well as morphosemantic transparency are influential in how children acquire a system (Berman, 2011; Family, 2009; Imedadze & Tuite, 1992). If elements of a bipartite structure have a high type frequency, that is they occur in a wide variety of combinations, and are morphosemantically transparent, then these are more likely to be segmented and stored as individual elements by children.

The Murrinhpatha bipartite verb system is not uniform. Stem combinations range from those that are relatively semantically transparent to those that are idiosyncratic (§2.2.3). This means that for much of the system it is unclear what semantic value a CSP may have and it is therefore more of an inflectional class than a contributing semantic element. Although this system may have been more productive and transparent in the past (Schultze-Berndt, 2003), in its current form the semantic bipartite structure is not transparent or regular enough to be salient for children. In terms of type frequency there are a number of CSP alternations in Murrinhpatha, such as the reflexive/reciprocal alternations, that have a high type frequency that tend to be acquired earlier (§7.2.2.3). These alternations are also more predictable in their impact on the verbal meaning as they can be contrasted by a minimally different equivalent verb with a related CSP. However CSPs in these cases tend not to play a large semantic role. They instead fulfil a role of impacting argument structure of semantically related verbs. Alternations which do encode a clearer shift in semantics, such as the stance alternation, tend to be acquired later and potentially have a lower type frequency, although this requires future investigation. This means that the possible semantic compositional nature of the system is not observed in the age range considered in this corpus and does not greatly impact the acquisition of the system before age 6.

As with the acquisition of Murrinhpatha CSPs the lack of regularity and transparency across the bipartite stem verb system means that it is not well suited to a semantically compositional rule-based approach to acquisition. Instead the acquisition of combinations and the reliance on associative networks of phonologically and semantically related verb forms to

acquire certain stem alternations is much more plausible. This position is also supported by the types of errors identified in children's speech with the apparent lack of novel combinations and the production of licit combinations in inappropriate contexts (§7.3). These findings highlight how the complexity of a system influences its acquisition.

8.5 Reflections & Future Directions

This thesis provides insights into the acquisition of a complex verbal system and contributes to the growing crosslinguistic understanding of how children acquire language. The importance of crosslinguistic validity in our understanding of first language acquisition is fundamental (Bowerman, 2011; Kelly et al., 2015; Stoll & Bickel, 2013a). Theories which aim to address the question of how children can acquire any language they are raised in must consider findings from a diverse typological perspective in order to identify and accommodate for linguistic and culturally specific factors. It is my hope that the research contained in this thesis contributes to this larger aim by beginning to fill a significant typological gap in acquisition research through the study of an Australian polysynthetic language.

The need to study the acquisition of typologically diverse languages is currently an urgent one as languages continue to be lost from the world. According to a recent catalogue of language vitality it is estimated that 3,176 or approximately 46% of the world's current 'living' languages are endangered (Campbell, Lee, Okura, Simpson, & Ueki, 2013).[124] With each language that is no longer acquired by children the opportunity is lost to consider how children acquire that specific language with its own unique set of complexities and characteristics. This is particularly the case in Australia where between 15 to 18 of the approximately 250 traditional Indigenous languages spoken at the time of colonisation continue to be acquired by children (Koch & Nordlinger, 2014, p. 4)

This thesis, as well as the broader Language Acquisition of Murrinhpatha (LAMP) project, provides a valuable starting point for future investigations into how children acquire Murrinhpatha. In particular the ongoing development of a longitudinal 'semi-naturalistic'

[124] There are a number of criteria which can result in a language being considered endangered. This includes that the language is no longer spoken to, and therefore no longer acquired, by children.

corpus of child speech is an important trove for future research. Future research into the acquisition of Murrinhpatha would benefit from the adoption of complementary methodologies such as the collection of dense longitudinal speech corpora, particularly at earlier stages of development, and the use of various structured and semi-structured experimental methodologies focused both on children's language production as well as comprehension.

This thesis has contributed to our understanding of language acquisition and how this interacts with linguistic diversity. In particular it has examined how the structure of polysynthetic and bipartite stem verbs influences acquisition. Similar to a number of other languages (e.g. Demuth, 1996b) phonological/prosodic factors impact Murrinhpatha-acquiring children's early verb productions. Morphosyntactic factors appear to not play a role. This may be due in part to the complexity of Murrinhpatha verbal morphology meaning that it takes some time for children to become aware of the rich internal morphological structure or verbs. If children are not yet aware of this structure it will not impact their early verb productions. Regarding the types of early verbs used and the way in which these are used Murrinhpatha-acquiring children appear similar to English-acquiring children. Given the extensive typological differences between the two languages, this suggests that certain aspects of acquisition may apply more broadly independently of the language being acquired.

This examination of how early verbs are used partnered with a focus on the acquisition of verbal morphology has also provided an explanation as to why imperative verbs are acquired early in a number of languages. I find that the early acquisition of imperative verbs is in part coupled with the early use of directives. This thesis has also found that rule-focused approaches to the acquisition of morphology (e.g. Pinker & Prince, 1991) are ill-equipped to deal with the acquisition of rich and complex morphological systems. Instead theories which focus on associative networks and the emergence of contrastive morphological patterns (e.g. Bybee, 1995) provide a more adequate picture of how a Murrinhpatha-speaking child acquires inflectional paradigms such as CSPs and bipartite stem verb morphology.

Throughout this thesis I have argued that the great complexity of Murrinhpatha verbal structures influences how they are acquired. Complexity has impacted nearly all areas I have considered including children's early verb productions, the acquisition of CSPs and the acquisition of bipartite stem morphology. Complexity broadly includes factors such as

morphological transparency, predictability/regularity of inflectional patterns, morphological richness and factors of type and token frequency which all interact to make a morphological system more or less complex. Morphological complexity as a typological variable needs to become both better understood within the field of first language acquisition and central to our understanding of morphological acquisition. This will allow us to better understand how differences in morphological systems crosslinguistically, impact their acquisition.

Appendix I - Murrinhpatha Classifier Stem Paradigms

This appendix provides a comprehensive document of the Murrinhpatha classifier stem paradigms. It is largely a reproduction of the manuscript *Murriny Patha finite verb paradigms* (Blythe et al., 2007) included with the permission of the authors. This manuscript is essentially a 'rejigged' version of the paradigms included in *An Introduction to the Language and Culture of the Murrinh-Patha* (Street, 1987) and *The Murinypata language of north-west Australia* (Walsh, 1976). I have slightly altered the presentation of these paradigms to match the glossing used throughout the thesis although the original number glosses have been maintained. For example, CSP (11) has the label BREAK which is not present in the original manuscript. I have also updated a small number of forms where these have been transcribed incorrectly from the original source as shown in the table below. These errors were identified by Raphael Finkel in producing 'plats' (Stump & Finkel, 2013) for morphological analysis with CATS CLAW.[125] Many paradigms have multiple forms in a single cell. This reflects the fact that these paradigms have been compiled from a variety of sources. In addition to Street

[125] https://www.cs.uky.edu/~raphael/linguistics/claw.html

(1987) and Walsh (1976) these include documentation form Blythe (2009). Where multiple forms exist they were included in the manuscript of Blythe et al. (2007).

Table AI 1. Changes Made to Classifier Stem Paradigm Cells

CSP Cell	Past Form	Updated Form
1INCLS.SEE(13)NFUT	*thuban*	*thubam*
1PLS.LOWER:INTR(18)NFUT	*nguban*	*ngubam*
2DUS.FEET(7)NFUT	*nunungamka*	*nunnungamka*

SIT(1)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngem*	*ngini*	*ngi*	*ngi*	*ngini*	
	2	*thim*	*thini*	*thi*	*thi*	*thini*	
	3	*dim*	*dini*	*pi*	*ki*	*dini*	*kem*
1 INCL		*thim*	*thini*	*pi*	*pi*	*thini*	
DU	1	*ngarrimka*	*ngarrine*	*nge*	*nge*	*ngarrine*	
	2	*nirrimka*	*nirrine*	*ne*	*ne*	*nirrine*	
	3	*pirrimka*	*pirrine*	*pe*	*ke*	*pirrine*	*karrimka*
PL	1	*ngarrim*	*ngarrini*	*nguyu*	*nguyu*	*ngarrini*	
	2	*nirrim*	*nirrini*	*nuyu*	*nuyu*	*nirrini*	
	3	*pirrim*	*pirrini*	*puyu*	*kuyu*	*pirrini*	*karrim*

LIE(2)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngabim*	*ngu*	*ngu*	*ngu*	*ngungi*	
	2	*thibim*	*thu*	*thu*	*thu*	*thungi*	
	3	*yibim*	*yu*	*pu*	*ku*	*yungi*	*kabim*
1 INCL		*thibim*	*thu*	*pu*	*pu*	*thungi*	
DU	1	*ngarrimka*	*ngarrine*	*nge*	*nge*	*ngarrine*	
	2	*nirrimka*	*nirrine*	*ne*	*ne*	*nirrine*	
	3	*pirrimka*	*pirrine*	*pe*	*ke*	*pirrine*	*karrimka*
PL	1	*ngarrim*	*ngarrini*	*nguyu*	*nguyu*	*ngarrini*	
	2	*nirrim*	*nirrini*	*nuyu*	*nuyu*	*nirrini*	
	3	*pirrim*	*pirrini*	*puyu*	*kuyu*	*pirrini*	*karrim*

STAND(3)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngarrim*	*ngirri*	*ngirra*	*ngirra*	*ngirrangi* *ngirra*	
	2	*thirrim*	*thirri*	*thirra*	*thirra*	*thirrangi* *thirra*	
	3	*pirrim*	*pirri*	*pirra*	*kirra*	*pirrangi* *pirra*	*karrim*
1 INCL		*thirrim*	*thirri*	*pirra*	*pirra*	*thirrangi*	
DU	1	*ngibimka*	*nge*	*ngira*	*ngira*	*ngirangi*	
	2	*nibimka*	*ne*	*nira*	*nira*	*nirangi*	
	3	*pibimka*	*pe*	*pira*	*kira*	*pirangi*	*kibimka*
PL	1	*ngibim*	*ngi*	*ngira*	*ngira*	*ngirangi*	
	2	*nibim*	*ni*	*nira*	*nira*	*nirangi*	
	3	*pibim*	*pi*	*pira*	*kira*	*pirangi*	*kibim*

BE(4)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*nganam*	*ngardi*	*ngani*	*ngani*	*ngani*	
	2	*thanam*	*thardi*	*thani*	*thani*	*thani*	
	3	*kanam*	*kardi*	*pani*	*kani*	*karni*	*kanam*
1 INCL		*thanam*	*thardi*	*pani*	*pani*	*thani*	
DU	1	*ngarnamka*	*ngarde*	*ngarne*	*ngarne*	*ngarne*	
	2	*narnamka*	*narde*	*narne*	*narne*	*narne*	
	3	*parnamka*	*parde*	*parne*	*karne*	*parne* *karne*	*karnamka*
PL	1	*ngarnam*	*ngardi*	*ngarni*	*ngarni*	*ngarni*	
	2	*narnam*	*nardi*	*narni*	*narni*	*narni*	
	3	*parnam*	*pardi*	*parni*	*karni*	*parni* *karni*	*karnam*

ALOFT(5)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*nganthim*	*nginthanyi*	*ngintha*	*ngintha*	*nginthangi*	
	2	*thinthim*	*thinthanyi*	*thintha*	*thintha*	*thinthangi*	
	3	*pinthim*	*pinthanyi*	*pintha*	*kintha*	*pinthangi*	*kanthim*
1 INCL		*thinthim*	*thinthanyi*	*pintha*	*pintha*	*thinthangi*	
DU	1	*nganthimka*	*nginthanye*	*ngintha*	*ngintha*	*nginthange*	
	2	*ninthimka*	*ninthanye*	*nintha*	*nintha*	*ninthange*	
	3	*pinthimka*	*pinthanye*	*pintha*	*kintha*	*pinthange*	*kanthimka*
PL	1	*nganthim*	*nginthanyi*	*ngintha*	*ngintha*	*nginthangi*	
	2	*ninthim*	*ninthanyi*	*nintha*	*nintha*	*ninthangi*	
	3	*pinthim*	*pinthanyi*	*pintha*	*kintha*	*pinthangi*	*kanthim*

GO(6)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngurran*	*ngurrini*	*ngurru*	*ngurru*	*ngurri*	
	2	*thurran*	*thurrini*	*thurru*	*thurru*	*thurri*	
	3	*wurran*	*wurrini*	*purru*	*kurru*	*wurri*	*kurran*
1 INCL		*thurran*	*thurrini*	*purru*	*purru*	*thurri*	
DU	1	*ngumbanka*	*ngurne*	*nga*	*nga*	*nguye*	
	2	*numbanka*	*nurne*	*na*	*na*	*nuye*	
	3	*pumbanka*	*purne*	*pa*	*ka*	*puye*	*kumbanka*
PL	1	*ngumban*	*ngurni*	*nguru*	*nguru*	*nguyi*	
	2	*numban*	*nurni*	*nuru*	*nuru*	*nuyi*	
	3	*pumban*	*purni*	*puru*	*kuru*	*puyi*	*kumban*

FEET(7)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngunungam*	*nguna*	*ngunu*	*ngunu*	*nguni*	
	2	*thunungam*	*thuna*	*thunu*	*thunu*	*thuni*	
	3	*nungam*	*na* *nura*	*punu*	*kunu*	*nuy*	*kunungam*
1 INCL		*thunungam*	*thuna*	*punu*	*punu*	*thuni*	
DU	1	*ngunnungamka*	*ngunna*	*ngunna*	*ngunna*	*ngunne*	
	2	*nunnungamka*	*nunna*	*nunna*	*nunna*	*nunne*	
	3	*punnungamka*	*punna*	*punna*	*kunna*	*punne*	*kunnungamka*
PL	1	*ngunnungam*	*ngunni*	*ngunnu*	*ngunnu*	*ngunni*	
	2	*nunnungam*	*nunni*	*nunnu*	*nunnu*	*nunni*	
	3	*punnungam*	*punni*	*punnu*	*kunnu*	*punni*	*kunnungam*

HANDS(8)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*mam*	*me*	*ma*	*ma*	*me*	
	2	*nam*	*ne*	*na*	*na*	*ne*	
						ni	
	3	*mam*	*me*	*ma*	*ma*	*me*	
1 INCL		*thumam*	*thume*	*puma*	*puma*	*thume*	
						thumi	
DU	1	*ngumamka*	*ngume*	*nguma*	*nguma*	*ngume*	
						ngumi	
	2	*numamka*	*nume*	*numa*	*numa*	*nume*	
						numi	
	3	*pumamka*	*pume*	*puma*	*kuma*	*pume*	
						pumi	
PL	1	*ngumam*	*ngume*	*nguma*	*nguma*	*ngume*	
						ngumi	
	2	*numam*	*nume*	*numa*	*numa*	*nume*	
						numi	
	3	*pumam*	*pume*	*puma*	*kuma*	*pume*	
						pumi	

GRAB(9)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*mangan*	*me*	*ma*	*ma*	*me*	
	2	*nangan*	*ne*	*na*	*na*	*ne*	
	3	*mangan*	*me*	*ma*	*ma*	*me*	
1 INCL		*thumangan*	*thume*	*puma*	*puma*	*thume*	
DU	1	*ngumanganka*	*ngume*	*nguma*	*nguma*	*ngume*	
	2	*numanganka*	*nume*	*numa*	*numa*	*nume*	
	3	*pumanganka*	*pume*	*puma*	*kuma*	*pume*	
PL	1	*ngumangan*	*ngume*	*nguma*	*nguma*	*ngume*	
	2	*numangan*	*nume*	*numa*	*numa*	*nume*	
	3	*pumangan*	*pume*	*puma*	*kuma*	*pume*	

HANDS:RR(10)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*mem*	*mena*	*me*	*me*	*mena*	
	2	*nem*	*nena*	*ne*	*ne*	*nena*	
	3	*mem*	*mena*	*me*	*me*	*mena*	
1 INCL		*thumem*	*thumena*	*pume*	*pume*	*thumena*	
DU	1	*ngumemka*	*ngumena*	*ngume*	*ngume*	*ngumena*	
	2	*numemka*	*numena*	*nume*	*nume*	*numena*	
	3	*pumemka*	*pumena*	*pume*	*kume*	*pumena*	
PL	1	*ngumem*	*ngumena*	*ngume*	*ngume*	*ngumena*	
	2	*numem*	*thumena*	*nume*	*nume*	*thumena*	
	3	*pumem*	*pumena*	*pume*	*kume*	*pumena*	

BREAK(11)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*mungam*	*muni*	*mu*	*mu*	*muy*	
	2	*nungam*	*nuni*	*nu*	*nu*	*nuy*	
	3	*mungam*	*muni*	*mu*	*mu*	*muy*	
1 INCL		*thumungam*	*thuni*	*pumu*	*pumu*	*thumuy*	
DU	1	*ngumungamka*	*ngumune*	*ngumu*	*ngumu*	*ngumuy*	
	2	*numungamka*	*numune*	*numu*	*numu*	*numuy*	
	3	*pumungamka*	*pumune*	*pumu*	*kumu*	*pumuy*	
PL	1	*ngumungam*	*ngumuni*	*ngumu*	*ngumu*	*ngumuy*	
	2	*numungam*	*numuni*	*numu*	*numu*	*numuy*	
	3	*pumungam*	*pumuni*	*pumu*	*kumu*	*pumuy*	

PEER(12)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*mim*	*mina*	*mi*	*mi*	*mina*	
	2	*nim*	*nina*	*ni*	*ni*	*nina*	
	3	*mim*	*mina*	*mi*	*mi*	*mina*	
1 INCL		*thumim*	*thumina*	*pumi*	*pumi*	*thumina*	
DU	1	*ngumimka*	*ngumina*	*ngumi*	*ngumi*	*ngumina*	
	2	*numimka*	*thumina*	*numi*	*numi*	*thumina*	
	3	*pumimka*	*pumina*	*pumi*	*kumi*	*pumina*	*kumimka*
PL	1	*ngumim*	*ngumina*	*ngumi*	*ngumi*	*ngumina*	
	2	*thumim*	*thumina*	*numi*	*numi*	*thumina*	
	3	*pumim*	*pumina*	*pumi*	*kumi*	*pumina*	*kumim*

SEE(13)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*bam*	*be*	*ba*	*ba*	*be*	
	2	*dam*	*de*	*da*	*da*	*de*	
	3	*bam*	*be*	*ba*	*ba*	*be*	
1 INCL		*thubam*	*thube*	*puba*	*puba*	*thube*	
DU	1	*ngubamka*	*ngube*	*nguba*	*nguba*	*ngube*	
	2	*nubamka*	*nube*	*nuba*	*nuba*	*nube*	
	3	*pubamka*	*pube*	*puba*	*kuba*	*pube*	
PL	1	*ngubam*	*ngube*	*nguba*	*nguba*	*ngube*	
	2	*nubam*	*nube*	*nuba*	*nuba*	*nube*	
	3	*pubam*	*pube*	*puba*	*kuba*	*pube*	

BASH(14)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*bangam*	*be*	*ba*	*ba*	*be*	
	2	*dangam*	*de*	*da*	*da*	*de*	
	3	*bangam*	*be*	*ba*	*ba*	*be*	
1 INCL		*thubangam*	*thube*	*puba*	*puba*	*thube*	
DU	1	*ngubangamka*	*ngube*	*nguba*	*nguba*	*ngube*	
	2	*nubangamka*	*nube*	*nuba*	*nuba*	*nube*	
	3	*pubangamka*	*pube*	*puba*	*kuba*	*pube*	
PL	1	*ngubangam*	*ngube*	*nguba*	*nguba*	*ngube*	
	2	*nubangam*	*nube*	*nuba*	*nuba*	*nube*	
	3	*pubangam*	*pube*	*puba*	*kuba*	*pube*	

BASH:RR(15)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*bem*	*bena*	*be*	*be*	*bena*	
	2	*dem*	*dena*	*de*	*de*	*dena*	
	3	*bem*	*bena*	*be*	*be*	*bena*	
1 INCL		*thubem*	*thubena*	*pube*	*pube*	*thubena*	
DU	1	*ngubemka*	*ngubena*	*ngube*	*ngube*	*ngubena*	
	2	*nubemka*	*nubena*	*nube*	*nube*	*nubena*	
	3	*pubemka*	*pubena*	*pube*	*kube*	*pubena*	
PL	1	*ngubem*	*ngubena*	*ngube*	*ngube*	*ngubena*	
	2	*nubem*	*nubena*	*nube*	*nube*	*nubena*	
	3	*pubem*	*pubena*	*pube*	*kube*	*pubena*	

HEAR(16)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*bim*	*bina*	*bi*	*bi*	*bina*	
	2	*dim*	*dina*	*di*	*di*	*dina*	
	3	*bim*	*bina*	*bi*	*bi*	*bina*	
1 INCL		*thubim*	*thubina*	*pubi*	*pubi*	*thubina*	
DU	1	*ngubimka*	*ngubina*	*ngubi*	*ngubi*	*ngubina*	
	2	*thubim*	*thubina*	*pubi*	*pubi*	*thubina*	
	3	*pubamka*	*pubana*	*pubuy*	*kubuy*	*pubana*	
PL	1	*ngubim*	*ngubina*	*ngubi*	*ngubi*	*ngubina*	
	2	*nubim*	*nubina*	*nubi*	*nubi*	*nubina*	
	3	*pubim*	*pubina*	*pubi*	*kubi*	*pubina*	

LOWER(17)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ban*	*buni*	*bu*	*bu*	*buy*	
	2	*dan*	*duni*	*du*	*du*	*duy*	
	3	*ban*	*buni*	*bu*	*bu*	*buy*	
1 INCL		*thuban*	*thubuni*	*pubu*	*pubu*	*thubuy*	
DU	1	*ngubanka*	*ngubune*	*ngubu*	*ngubu*	*ngubuy*	
	2	*nubanka*	*nubune*	*nubu*	*nubu*	*nubuy*	
	3	*pubanka*	*pubune*	*pubu*	*kubu*	*pubuy*	
PL	1	*nguban*	*ngubuni*	*ngubu*	*ngubu*	*ngubuy*	
	2	*nuban*	*nubuni*	*nubu*	*nubu*	*nubuy*	
	3	*puban*	*pubuni*	*pubu*	*kubu*	*pubuy*	

LOWER:INTR(18)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*bam*	*bana*	*buy*	*buy*	*bana*	
	2	*dam*	*dana*	*duy*	*duy*	*dana*	
	3	*bam*	*bana*	*buy*	*buy*	*bana*	
1 INCL		*thubam*	*thubana*	*pubuy*	*pubuy*	*thubana*	
DU	1	*ngubamka*	*ngubana*	*ngubuy*	*ngubuy*	*ngubana*	
	2	*nubamka*	*nubana*	*nubuy*	*nubuy*	*nubana*	
	3	*pubamka*	*pubana*	*pubuy*	*kubuy*	*pubana*	
PL	1	*ngubam*	*ngubana*	*ngubuy*	*ngubuy*	*ngubana*	
	2	*nubam*	*nubana*	*nubuy*	*nubuy*	*nubana*	
	3	*pubam*	*pubana*	*pubuy*	*kubuy*	*pubana*	

POKE(19)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngam*	*ngani*	*nga*	*nga*	*nge*	
	2	*tham*	*thani*	*tha*	*tha*	*the*	
	3	*dam* *(W:pam)*	*dani*	*pa*	*ka*	*de*	*kam*
1 INCL		*tham*	*thani*	*pa*	*pa*	*the*	
DU	1	*ngarramka*	*ngarrane*	*nga*	*nga*	*ngerra*	
	2	*narramka*	*narrane*	*na*	*na*	*nerra*	
	3	*parramka*	*parrane*	*pa*	*ka*	*perra*	
PL	1	*ngarram*	*ngarrani*	*nga*	*nga*	*ngerra*	
	2	*narram*	*narrani*	*na*	*na*	*nerra*	
	3	*parram*	*parrani*	*pa*	*ka*	*perra*	

ARRIVE(20)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngangam*	*ngani*	*nga*	*nga*	*nge*	
	2	*thangam*	*thani*	*tha*	*tha*	*the*	
	3	*pangam*	*dani*	*pa*	*ka*	*de*	*kangam*
1 INCL		*thangam*	*thani*	*pa*	*pa*	*the*	
DU	1	*ngarramka*	*ngarrane*	*nga*	*nga*	*ngerra*	
	2	*narramka*	*narrane*	*na*	*na*	*nerra*	
	3	*parramka*	*parrane*	*pa*	*ka*	*perra*	
PL	1	*ngarram*	*ngarrani*	*nga*	*nga*	*ngerra*	
	2	*narram*	*narrani*	*na*	*na*	*nerra*	
	3	*parram*	*parrani*	*pa*	*ka*	*perra*	

POKE:RR(21)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngem*	*ngena*	*nge*	*nge*	*ngena*	
	2	*them*	*thena*	*the*	*the*	*thena*	
	3	*dem*	*dena*	*pe*	*ke*	*dena*	
1 INCL		*them*	*thena*	*pe*	*pe*	*thena*	
DU	1	*ngerremka*	*ngerrene*	*nge*	*nge*	*ngerrene*	
	2	*nerremka*	*nerrene*	*ne*	*ne*	*nerrene*	
	3	*perremka*	*perrene*	*pe*	*ke*	*perrene*	
PL	1	*ngerrem*	*ngerrena*	*nge*	*nge*	*ngerrena*	
	2	*nerrem*	*nerrena*	*ne*	*ne*	*nerrena*	
	3	*perrem*	*perrena*	*pe*	*ke*	*perrena*	

HAVE(22)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*nganthin*	*nganthi*	*nga*	*nga*	*nge*	
	2	*thanthin*	*thanthi*	*tha*	*tha*	*the*	
	3	*kanthin*	*kanthi*	*pa*	*ka*	*de*	
1 INCL		*thanthin*	*thanthi*	*pa*	*pa*	*the*	
DU	1	*nganthinka*	*nganthe*	*nga*	*nga*	*ngerra*	
	2	*nanthinka*	*nanthe*	*na*	*na*	*nerra*	
	3	*panthinka*	*panthe*	*pa*	*ka*	*nerra*	
PL	1	*nganthin*	*nganthi*	*nga*	*nga*	*ngerra*	
	2	*nanthin*	*nanthi*	*na*	*na*	*nerra*	
	3	*panthin*	*panthi*	*pa*	*ka*	*nerra*	

SLASH(23)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*pan*	*nguni*	*ngu*	*ngu*	*nguy*	
	2	*than*	*thuni*	*thu*	*thu*	*thuy*	
	3	*pan*	*puni*	*pu*	*ku*	*puy*	
1 INCL		*than* *thumban*	*thuni*	*pu*	*pu*	*thuy*	
DU	1	*ngumbanka*	*ngurne*	*ngu*	*ngu*	*nguye*	
	2	*numbanka*	*nurne*	*nu*	*nu*	*nuye*	
	3	*pumbanka*	*purne*	*pu*	*ku*	*puye*	
PL	1	*ngumban*	*ngurni*	*ngu*	*ngu*	*nguyi*	
	2	*numban*	*nurni*	*nu*	*nu*	*nuyi*	
	3	*pumban*	*purni*	*pu*	*ku*	*puyi*	

SLASH:RR(24)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngam*	*ngana*	*nguy*	*nguy*	*ngana*	
	2	*tham*	*thana*	*thuy*	*thuy*	*thana*	
	3	*pam*	*pana*	*puy*	*kuy*	*pana*	*kam*
1 INCL		*tham*	*thana*	*puy*	*puy*	*thana*	
DU	1	*nguyemka*	*nguyena*	*nguy*	*nguy*	*nguyena*	
	2	*nuyemka*	*nuyena*	*nuy*	*nuy*	*nuyena*	
	3	*puyemka*	*puyena*	*puy*	*kuy*	*puyena*	
PL	1	*nguyem*	*nguyena*	*nguyu*	*nguyu*	*nguyena*	
	2	*nuyem*	*nuyena*	*nuyu*	*nuyu*	*nuyena*	
	3	*puyem*	*puyena*	*puyu*	*kuyu*	*puyena*	

FORM(25)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngingam*	*nginga*	*ngi*	*ngi*	*nginga*	
	2	*thingam*	*thinga*	*thi*	*thi*	*thinga*	
	3	*yingam*	*yinga*	*pi*	*ki*	*yinga*	*kingam*
1 INCL		*thingam*	*thinga*	*pi*	*pi*	*thinga*	
DU	1	*ngingamka*	*nginga*	*nge*	*nge*	*nginga*	
	2	*ningamka*	*ninga*	*ne*	*ne*	*ninga*	
	3	*pingamka*	*pinga*	*pe*	*ke*	*pinga*	
PL	1	*ngingam*	*nginga*	*ngi*	*ngi*	*nginga*	
	2	*ningam*	*ninga*	*ni*	*ni*	*ninga*	
	3	*pingam*	*pinga*	*pi*	*ki*	*pinga*	

WIPE(26)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngilam*	*ngila*	*ngila*	*ngila*	*ngila* *ngilangi*	
	2	*thilam*	*thila*	*thila*	*thila*	*thila* *thilangi*	
	3	*dilam*	*dila*	*pila*	*kila*	*dila* *dilangi*	
1 INCL		*thilam*	*thila*	*pila*	*pila*	*thila* *thilangi*	
DU	1	*ngillamka* *ngillangamka*	*ngilla*	*ngilla*	*ngilla*	*ngilla* *ngillangi*	
	2	*nillamka* *nillangamka*	*nilla*	*nilla*	*nilla*	*nilla* *nillangi*	
	3	*pillamka* *pillangamka*	*pilla*	*pilla*	*killa*	*pilla* *pillangi*	
PL	1	*ngillam* *ngillangam*	*ngilla*	*ngilla*	*ngilla*	*ngilla* *ngillangi*	
	2	*nillam* *nillangam*	*nilla*	*nilla*	*nilla*	*nilla* *nillangi*	
	3	*pillam* *pillangam*	*pilla*	*pilla*	*killa*	*pilla* *pillangi*	

HEAT(27)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*nginangam*	*nginanga*	*ngina*	*ngina*	*nginangi* *nginanga*	
	2	*thinangam*	*thinanga*	*thina*	*thina*	*thinangi* *thinanga*	
	3	*ningam* *ninangam*	*ninga*	*pina*	*kina*	*ninga*	*kinangam*
1 INCL		*thinangam*	*thinanga*	*pina*	*pina*	*thinangi* *thinanga*	
DU	1	*nginnangamka* *nginnamka*	*nginnanga*	*nginna*	*nginna*	*nginnangi* *nginnanga*	
	2	*ninnangamka* *ninnamka*	*ninnanga*	*ninna*	*ninna*	*ninnangi* *ninnanga*	
	3	*pinnangamka* *pinnamka*	*pinnanga*	*pinna*	*kinna*	*pinnangi* *pinnanga*	
PL	1	*nginnangam* *nginnam*	*nginnanga*	*nginna*	*nginna*	*nginnangi* *nginnanga*	
	2	*ninnangam* *ninnam*	*ninnanga*	*ninna*	*ninna*	*ninnangi* *ninnanga*	
	3	*pinnangam* *pinnam*	*pinnanga*	*pinna*	*kinna*	*pinnangi* *pinnanga*	

WATCH(28)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngirrangan ngirran*	*ngirra*	*ngirra*	*ngirra*	*ngirrangi*	
	2	*thirrangan thirran*	*thirra*	*thirra*	*thirra*	*thirrangi*	
	3	*dirrangan dirran*	*dirra*	*pirra*	*kirra*	*dirrangi*	
1 INCL		*thirrangan thirran*	*thirra*	*pirra*	*pirra*	*thirrangi*	
DU	1	*nganganka*	*ngira*	*ngira*	*ngira*	*ngirange*	
	2	*nanganka*	*nira*	*nira*	*nira*	*nirange*	
	3	*panganka*	*pira*	*pira*	*kira*	*pirange*	
PL	1	*ngangan*	*ngira*	*ngira*	*ngira*	*ngirangi*	
	2	*nangan*	*nira*	*nira*	*nira*	*nirangi*	
	3	*pangan*	*pira*	*pira*	*kira*	*pirangi*	

TURN(29)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngurdan*	*ngurdini*	*ngurdu*	*ngurdu*	*ngurdi*	
	2	*thurdan*	*thurdini*	*thurdu*	*thurdu*	*thurdi*	
	3	*wurdan*	*wurdini*	*purdu*	*kurdu*	*wurdi*	*kurdan*
1 INCL		*thurdan*	*thurdini*	*purdu*	*purdu*	*thurdini*	
DU	1	*nguddanka*	*nguddene*	*ngudda*	*ngudda*	*ngudde*	
	2	*nuddanka*	*nuddene*	*nudda*	*nudda*	*nudde*	
	3	*puddanka*	*puddene*	*pudda*	*kudda*	*pudde*	
PL	1	*nguddan*	*nguddini*	*nguddu*	*nguddu*	*nguddi*	
	2	*nuddan*	*nuddini*	*nuddu*	*nuddu*	*nuddi*	
	3	*puddan*	*puddini*	*puddu*	*kuddu*	*puddi*	

TURN:INTR(30)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngurdam*	*ngurdana*	*ngurdi*	*ngurdi*	*ngurdana*	
	2	*thurdam*	*thurdana*	*thurdi*	*thurdi*	*thurdana*	
	3	*wurdam*	*wurdana*	*purdi*	*kurdi*	*wurdana*	
1 INCL		*thurdam*	*thurdana*	*purdi*	*purdi*	*thurdana*	
DU	1	*nguddamka*	*nguddana*	*ngudde*	*ngudde*	*nguddana*	
	2	*nuddamka*	*nuddana*	*nudde*	*nudde*	*nuddana*	
	3	*puddamka*	*puddana*	*pudde*	*kudde*	*puddana*	
PL	1	*nguddam*	*nguddana*	*nguddi*	*nguddi*	*nguddana*	
	2	*nuddam*	*nuddana*	*nuddi*	*nuddi*	*nuddana*	
	3	*puddam*	*puddana*	*puddi*	*kuddi*	*puddana*	

EAT(31)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngulam*	*ngule*	*ngula*	*ngula*	*ngule*	
	2	*thulam*	*thule*	*thula*	*thula*	*thule*	
	3	*wulam*	*wule*	*pula*	*kula*	*wule*	
1 INCL		*thulam*	*thule*	*pula*	*pula*	*thule*	
DU	1	*ngullamka*	*ngulle*	*ngulla*	*ngulla*	*ngulle*	
	2	*nullamka*	*nulle*	*nulla*	*nulla*	*nulle*	
	3	*pullamka*	*pulle*	*pulla*	*kulla*	*pulle*	
PL	1	*ngullam*	*ngulle*	*ngulla*	*ngulla*	*ngulle*	
	2	*nullam*	*nulle*	*nulla*	*nulla*	*nulle*	
	3	*pullam*	*pulle*	*pulla*	*kulla*	*pulle*	

REMOVE(32)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngungan*	*ngunguni*	*ngungu*	*ngungu*	*ngunguni*	
	2	*thungan*	*thunguni*	*thungu*	*thungu*	*thunguni*	
	3	*yungan*	*yunguni*	*pungu*	*kungu*	*yunguni*	
			yinguni				
1 INCL		*thungan*	*thungi*	*pungu*	*pungu*	*thungi*	
DU	1	*ngunganka*	*ngungune*	*ngunga*	*ngunga*	*ngungune*	
	2	*nunganka*	*nungune*	*nunga*	*nunga*	*nungune*	
	3	*punganka*	*pungune*	*punga*	*kunga*	*pungune*	
PL	1	*ngungan*	*ngunguni*	*ngungu*	*ngungu*	*ngunguni*	
	2	*nungan*	*nunguni*	*nungu*	*nungu*	*nunguni*	
	3	*pungan*	*punguni*	*pungu*	*kungu*	*punguni*	

REMOVE:RR(33)							
		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngungam*	*ngungana*	*ngungi*	*ngungi*	*ngungana*	
	2	*thungam*	*thungana*	*thungi*	*thungi*	*thungana*	
	3	*yungam*	*yungana*	*pungi*	*kungi*	*yungana*	
1 INCL		*thungam*	*thungana*	*pungi*	*pungi*	*thungana*	
DU	1	*ngungamka*	*ngungana*	*ngunge*	*ngunge*	*ngungana*	
	2	*nungamka*	*nungana*	*nunge*	*nunge*	*nungana*	
	3	*pungamka*	*pungana*	*punge*	*kunge*	*pungana*	
PL	1	*ngungam*	*ngungana*	*ngungi*	*ngungi*	*ngungana*	
	2	*nungam*	*nungana*	*nungi*	*nungi*	*nungana*	
	3	*pungam*	*pungana*	*pungi*	*kungi*	*pungana*	

SAY/DO(34)*

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngamam*	*me*	*ngama*	*ngama*	*mi* *ngimi*	
	2	*nam*	*ne*	*thama*	*thama*	*ni*	
	3	*mam*	*me*	*pama*	*kama*	*mi*	*kamam*
1 INCL		*thamam*	*thume*	*pama*	*pama*	*thumi*	
DU	1	*ngamamka*	*ngume*	*nguyema* *ngiyema*	*nguyema*	*ngumi*	
	2	*namamka*	*nume*	*nuyema*	*nuyema*	*numi*	
	3	*pamamka*	*pume*	*puyema* *piyema*	*kuyema*	*pumi*	
PL	1	*ngamam*	*ngume*	*nguyema* *ngiyema*	*nguyema*	*ngumi*	
	2	*namam*	*nume*	*nuyema* *niyema*	*nuyema*	*numi*	
	3	*pamam*	*pume*	*puyema* *piyema*	*kuyema*	*pumi*	

*This paradigm does not combine with lexical stems.

BALANCE(35)

		NFUT	PIMP	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*nganthangan*	*ngantha*	*ngantha*	*ngantha*	*nganthangi*	
	2	*thanthangan*	*thantha*	*thantha*	*thantha*	*thanthangi*	
	3	*kanthangan*	*kantha*	*pantha*	*kantha*	*kanthangi*	
1 INCL		*thanthangan*	*thantha*	*pantha*	*pantha*	*thanthangi*	
DU	1	*nganthanganka*	*ngantha*	*ngantha*	*ngantha*	*nganthangi*	
	2	*nanthanganka*	*nantha*	*nantha*	*nantha*	*nanthangi*	
	3	*panthanganka*	*pantha*	*pantha*	*kantha*	*panthangi*	
PL	1	*nganthangan*	*ngantha*	*ngantha*	*ngantha*	*nganthangi*	
	2	*nanthangan*	*nantha*	*nantha*	*nantha*	*nanthangi*	
	3	*panthangan*	*pantha*	*pantha*	*kantha*	*panthangi*	

BECOME(36)

		NFUT[126]	PIMP	FUT	FUTIRR	PSTIRR[127]	EXIST
SG	1	*ngirrim*	*ngirri*	*ngirri*	*ngirri*	*ngirrini*	
	2	*thirrim*	*thirri*	*thirri*	*thirri*	*thirrini*	
	3	*dirrim*	*dirri*	*pirri*	*kirri*	*dirrini*	*kirrim*
1 INCL		*thirrim*	*thirri*	*pirri*	*pirri*	*thirrini*	
DU	1	*ngim*	*ngi*	*ngiri*	*ngiri*	*ngiri*	
	2	*nim*	*ni*	*niri*	*niri*	*niri*	
	3	*pim*	*pi*	*piri*	*kiri*	*piri*	
PL	1	*ngim*	*ngi*	*ngiri*	*ngiri*	*ngiri*	
	2	*nim*	*ni*	*niri*	*niri*	*niri*	
	3	*pim*	*pi*	*piri*	*piri*	*piri*	

DRY(37)

		NFUT[128]	pimp	FUT	FUTIRR	PSTIRR	EXIST
SG	1	*ngilim*	*ngili*	*ngili*	*ngili*	*ngilingi*	
	2	*thilim*	*thili*	*thili*	*thili*		
	3	*dilim*	*dili*	*pili*	*kili*	*dilingi*	*kilim*
1 INCL		*thilim*	*thili*	*pili*	*pili*	*thilingi*	
DU	1	*ngilimga ngilim*	*ngili*	*ngili*	*ngili*	*ngilingi*	
	2	*nilimga nilim*	*nili*	*nili*	*nili*	*nilingi*	
	3	*pilimga pilim*	*pili*	*pili*	*pili*	*pilingi*	*kilimga*
PL	1	*ngilim*	*ngili*	*ngili*	*ngili*	*ngilingi*	
	2	*nilim*	*nili*	*nili*	*nili*	*nilingi*	
	3	*pilim*	*pili*	*pili*	*pili*	*pilingi*	

[126] For the dual, –nunggu RR dual appears to be obligatory for this verb. Adding –ga to the given forms and dropping –nunggu were viewed as ungrammatical.

[127] Since this paradigm obligatorially takes a reflexive/reciprocal (-nu/-nunggu) the dual and plural forms are realised as ngirnunggu, nirnunggu and pirnunggu (< ngiri+nunggu, <niri+nunggu, <piri+nunggu) and ngirnu, nirnu and pirnu (< ngiri+nu, <niri+nu, <piri+nu) respectively.

[128] The dual non-future forms without –ga occur before the –nunggu RR dual. If the RR dual is not present the other forms with –ga will be used.

MISS(38)

		NFUT	PIMP	FUT	FUTIRR[129]	PSTIRR	EXIST
SG	1	*nginim*	*nginanga*	*ngini*	*ngini*	*nginanga* *ngina*	
	2	*thinim*	*thinanga*	*thini*	*thini*	*thinanga* *thina*	
	3	*ningam*	*ninga*	*pini*	*kini* *ku*[130]	*ninga*	
1 INCL		*thinim*	*thinanga*	*pini*	*pini*	*thinanga*	
DU	1	*nginnam* *nginnim* *nginnum* *nginnangam*	*nginanga*	*ngini* *nginu*	*ngini*	*nginanga*	
	2	*ninnam* *ninnim* *ninnum* *ninnangam*	*ninanga*	*nini* *ninu*	*nini*	*ninanga*	
	3	*ninnam* *ninnim* *ninnum* *pinnangam*	*pinanga*	*pini* *pinu*	*pini*	*pinanga*	
PL	1	*nginnam* *nginnim* *nginnum* *nginnangam*	*nginanga*	*ngini* *nginu*	*ngini*	*nginanga*	
	2	*ninnam* *ninnim* *ninnum* *ninnangam*	*ninanga*	*nini* *ninu*	*nini*	*ninanga*	
	3	*pinnam* *pinnim* *pinnum* *pinnangam*	*pinanga*	*pini* *pinu*	*pini*	*pinanga*	

[129] The dual and plural forms of the future irrealis like the corresponding future forms were deemed acceptable with final –u although they were not produced spontaneously.

[130] This form can only occur before the RR –nu ie pernintha mere kununinthanubirrnukun. The alternative kini occurs with or without a following –nu ie. kininuninthanubirrnukun/ kinininthanubirrnukun.

Appendix II - Coding of Child Verb Productions

This appendix outlines the coding of children's verb productions utilised in this thesis. As was outlined in §4.7 each child verb production included in the corpus used in this thesis was morphologically analysed and coded in an SPSS Database (*IBM SPSS Statistics for Windows*, 2011). This database was then used to explore children's verb productions across the corpus. Once completed this database was exported to a Minitab project (*Minitab 17 Statistical Software*, 2010) in which all statistical analysis and counts presented in this thesis were undertaken. Each verb token produced by a child was represented as a single row in the database. Coding included the coding of metadata, status of the utterance including if it was a non-standard production and morphological analysis. Where the child produced a non-standard form the adult target was coded morphologically. For all coding categories if the value of the category was unclear this was coded as '99'. These coding categories were as follows. In order to exemplify this coding process I use the following child verb production from Acacia as an example.

(202) Acacia 2;7

ˈ***ipirt-nga?***

AT: **ngu**ˈ**ngu-pirt**-nu=nga

1SG.REMOVE(32).FUT-take.off-FUT=DM

'I will take it off?'

[Acacia is fiddling with the buckle on the microphone backpack she is wearing]

(LAMP_20130524_WF_01_V1 00:20:33)

AII 1 Metadata

Table AII 1. Metadata Coding

Coding Category	Value for Example Production
Recording Transcript ID	LAMP_20130524_WF_01_V1
Time of Utterance (HH:MM:SS)	00:20:33
Focus Child	Acacia
Age at Time of Recording (Months)	31
No. Data Collection Feildtrip (1-4)	2

AII 2 Status of Utterance

Table AII 2. Status of Utterance Coding

Coding Category	Value for Example Production
Status of Utterance (Spontaneous, Repetition, Reformulation)	Spontaneous
Child Production (Non-Standard)	ipirt-nga
Whole Utterance (Adult Target if Non-Standard)	ngungupirtnu-nga
Verb Form (Adult Target if Non-Standard)	ngungupirtnu-nga
Standard Utterance (Standard, Non-Standard)	Non-Standard
Error Type Impacting Classifier Stem (NA, Omission, Commission, Filler Syllable)	Omission
Error Type Not Impacting Classifier Stem (NA, Omission, Commission, Filler Syllable)	Omission

AII 3 Morphological Analysis

In instances where children produced non-standard verb productions the adult target verb was coded for. The slot numbers refer to those of the Murrinhpatha verbal template presented in §2.2.

Table AII 3. Morphological Analysis Coding

Coding Category	Value for Example Production
Verb Type (Simple, Bipartite)	Bipartite
Preverb (Present, Absent)	Absent
Verb General Meaning	'take off'
CSP	REMOVE(32)
Classifier Stem Form	ngungu
Lexical Stem Form	pirt
No. of Morphs (excl. clitics and serial verbs)	3
No. of Affixes (excl. clitics and serial verbs)	1
No. of Morphs (incl. serial verbs, excl. clitics)	3
CSP Person (1st, 2nd, 3rd, 1st Inclusive)	1st
CSP Number (Singular, Dual, Plural, Ist Inclusive)	Singular
CSP TAM (Future, Non-Future, Past Imperfective, Past Irrealis, Existential)	Future
Slot 2 (Direct Object, Indirect Object, Subject Number, Absent)	Absent
Slot 3 (Reflexive/Reciprocal, Absent)	Absent
Slot 4 (Incorporated Body Part, Absent)	Absent
Slot 6 (Future, Future Irrealis, Past, Absent)	Future
Slot 7 (Adverbial, Absent)	Absent
Slot 8 (Subject Number, Object Number, Absent)	Absent
Slot 9 (Adverbial, Absent)	Absent

Serial Verb (CSP e.g. BE(4), Absent)	Absent
Serial Verb Person (1st, 2nd, 3rd, 1st Inclusive, N/A)	N/A
Serial Verb Number (Singular, Dual, Plural, Ist Inclusive, N/A)	N/A
Serial Verb TAM (Future, Non-Future, Past Imperfective, Past Irrealis, Existential, N/A)	N/A
Non-Serial Verb Clitic (Clitic, Absent)	Clitic

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