DEVELOPMENTAL LANGUAGE IMPAIRMENT IN EGYPTIAN ARABIC

BY DONIA FAHIM

BIRKBECK

UNIVERSITY OF LONDON

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

Ph.D.

2005

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

Abstract

Developmental Language Impairment in Egyptian Arabic

Three longitudinal case studies were conducted to investigate developmental language impairment (DLI) in Egyptian Arabic (EA). While there have been descriptions of adult acquired aphasic deficits in Arabic, this study details the linguistic characteristics of children with impairments specific to language. To select the subjects, an exclusionary checklist was used based on the criteria used for specific language impairment (SLI, Leonard, 1998). The subjects consisted of two males and one female, first seen at less than 5;00 years and recorded longitudinally (21-36 months). Data from 12 normally developing children, aged between 1;00-4.04 years, was also collected for comparative purposes and to detail normal developmental errors in EA.

Patterns of language impairment and development were investigated using spontaneous language measures and specific structured tasks. The language samples were phonetically transcribed from video tapes during non-directive therapy and parent child play sessions. The spontaneous language measures included, Mean Morphemes per Unit (MPU), percent structural errors, functional analysis of utterances and an error analysis of specific grammatical morphemes.

The three EA-DLI children shared similar patterns of errors although cognitively they had different strengths. Their patterns of impairment reflected primarily morpho-syntactic difficulties. Many of the linguistic characteristics observed in the EA-DLI children's language were also produced by the controls, but less frequently. The EA-DLI children's MPUs were found to be restricted with higher percentages of morphological errors than the language matched controls. An unmarked default verb form resembling the Imperfective-stem was a frequent substitution error. The functional analysis revealed that the EA-DLI children were similar to the controls in their use of requests and labels, however they produced more Learnt Repetitive phrases and disordered sentences and fewer Intraverbals due to their difficulties with abstract verbal reasoning.

The difficulties described in this study comprise of some linguistic features specific to EA and other features that have been reported in cross-linguistic studies of SLI. The shared features included difficulty with grammatical morphology, lack of mastery at expected developmental stages and limited use of inflectional morphology leading to agreement errors. Verbs were difficult, percentages of errors were high and fewer verbs were produced than nouns. In

contrast to the findings of SLI in other languages Tense and Aspectual marking was not problematic, but difficulty was with subject verb agreement for gender, number and person. Prepositions, pronouns, plurals and negative particles were either omitted or substituted resulting in error patterns. The grammatical theories developed to account for SLI reported in English, German and Swedish (Hakansson *et al.*, 2003; Clahsen and Hansen, 1997; van der Lely, 2002) were judged against the evidence acquired in this study on the three EA-DLI children. The limitations of these theories are discussed and alternative interpretations are provided.

TABLE OF CONTENTS

TABLES

FIGURES

Acknowledgements

I gratefully acknowledge the help of Dr Marjorie Lorch my supervisor for providing me with the opportunity to undertake this study. She provided stimulating dialogues, valuable critiques and has always been so generous with her time and academic expertise. I would also like to extend my thanks to Dr Malcolm Edwards, who helped me understand the mysteries of Egyptian Arabic linguistics, an integral part of this work. I am grateful to the families of AEL, MHB and NAD, for allowing me numerous child language research opportunities.

I would also like to thank the University of London, Central Research Fund for the loan of equipment and for the financial aid that assisted towards this project.

I would also like to thank my co-workers and friends at the Advance School. I would especially like to thank my friend and colleague Chris Nicholls for helping me proof read drafts and for all her ongoing support and kind attention over the past six years. I would also like to thank Maha Helali and all the staff at the Advance School. I would also like to thank my fellow colleagues and friends at the LRC—Penny Brooke, who covered for me, when I took my study leave. I appreciate the generous assistance of Maha Shabana and Dahlia Mostafa who assisted with the validation of the data. My thanks also go to Beth Noujaim, for her assistance in interpreting the psychological evaluations and for her support throughout my time spent at the LRC.

I would like to thank my parents, for their emotional and financial support. They were both excellent research assistants helping me interpret data and they assisted with the translations of the texts. Firstly to my mother to whom this work is dedicated to who always had the time to encourage me whilst I was doing my PhD and never doubted my abilities. To my father, who has always encouraged my professional and academic development— Thank you. I would also like to thank my brother Mohammed and sister Basmah for their support and encouragement over the years.

My thanks extend, to my friend and mentor in Cairo, Claude for the structured advice and ongoing support the last two years. Thank you for helping me realise why I really undertook this work. I would also like to thank my friend and colleague Mehri Abaza for helping me label the videos and for her support. I would like to thank to Mo Hefzy for the advice on spoken Egyptian Arabic, the coffee and ongoing supplies of rice pudding. I would also like to thank my dear friend Yasmin Khamis for always encouraging me when needed and for listening to my ideas. Thank you to Kim, Hoda, Samira and Soha for the Excel advice and help with references. A special thanks to Dominique and Camy for helping with printing out drafts.

Preface

Six years ago I moved to Cairo Egypt to become the Clinical Director and one of the founders of the Advance School, a school for children with special needs but servicing primarily children with Autistic Spectrum Disorders. When we started the school we had a single class of seven children, we now have seven classes and in each class there are seven children. The Advance School is clinically run by the Learning Resource Centre, a paediatric multi-disciplinary diagnostic and therapeutic centre for children with specific learning difficulties. As Head of the Speech and Language Therapy department I have worked with families and children from different cultures providing assessments, therapy, as well as assisting in staff development training. It is in Cairo that I have been able to collect the data for my research.

Although I have a spoken command of Arabic it is not my first language and I soon realised the difficulties I would encounter and the vastness of the project that I had undertaken. My motivation to assist in the development of services and assessment tools for children speaking Arabic encouraged me to continue in pursuit of my research and I have since developed my skills in spoken Arabic. I am told that my vocabulary and syntax are generally correct but I still sound like a non-native speaker, a xawaga! It has been humbling being in situations where I have not had the usual command of language to always enable the clear expression of my ideas. The past six years have been challenging, I have exchanged culture and language in pursuit of knowledge and every minute spent has been worthwhile.

Earlier versions of this work have been presented at conferences. At the Child Language Seminar, City University London, September 1999 a paper titled— Specific Language Impairment in an Egyptian Arabic Pre-school Child was given. At the International Arabic Linguistics Seminar in Alexandria, Egypt, in May 2003, a paper titled— Specific Language Impairment in Egyptian Arabic was given. More recently at the Child Language Seminar, at Newcastle Upon Tyne University, in July 2003, a poster presentation was given titled— Morphological Issues in a case of Arabic Specific Language Impairment.

Notes on transcriptions and Glosses

Abbreviation	**glossary**	**Abbreviation**	**glossary**
1st	1st person	Neg.	Negative
2nd	2nd Person	Neg.Part.	Negative Particle
3rd	3rd Person	Prep.	Preposition
Asp.	Aspectual Marker	Prog.	Progressive Aspect
Def.Art.	Definite Article	Hab.	Habitual Aspect
Fem.	Feminine marker	Pro.	Pronoun
Masc.	Masculine marker	Perfec.	Perfective
Plu.	Plural number	Fut.	Future Tense
Sing.	Singular number	Part.	Participle

Abbreviations

Abbreviation	Glossary	Abbreviation	Glossary
EA	Egyptian Arabic	MPU	Mean Morphemes per Utterance
MSA	Modern Standard Arabic	NDE	Normal developmental errors
LI	Language Impairment	MP	Morphological productivity
DLI	Developmental Language Impairment	Oth.	Others
SLI	Specific Language Impairment	Intrav.	Intraverbals
L/RP	Learnt Repetitive phrase	Vocalic Par.	Vocalic paraphasia
MLU	Mean length of utterance		

INTRODUCTION

Over the past twenty years, published research on child language development has been devoted to a group of children who, when compared to their normally developing peers, have a specific developmental disorder that interferes with their ability to develop language from birth. What differentiates these children from others with childhood language impairments is that their difficulties arise in the absence of any obvious neurological, psychological or sensori-motor impairment. In addition, these children's cognitive abilities assessed through non-verbal intelligence scores are typically within the normal range. The aim of this study is to examine an additional Semitic language, Egyptian Arabic (EA) and the linguistic features of language impairment in three developmentally language impaired children. The data obtained from three longitudinal single case studies of Egyptian Arabic speaking children with developmental language impairment, and the data obtained from 12 normally developing Arabic speaking children will be used to describe how language impairment manifests in Egyptian Arabic.

Most research on child language impairment (LI) has in the past focused on the Romance and Germanic languages (English: van der Lely, 1994; Rice *et al.*, 1995; Rice and Wexler, 1996; Cleave and Rice, 1995; Oetting and Horohov, 1997; Leonard, 1998; Italian: Bortolini *et al.*, 2002; Bottari *et al.*, 2001; French: Le Normand *et al.*, 1993; Gerard, 1991; Le Normand and Chevrie-Muller, 1991; and Van Hout, 1989; Spanish: Merino, 1983; Restrepo, 1995; Bedore, 1999a; German: Grimm, 1993; Clahsen, 1991; Grimm and Weinert, 1990; Swedish and Dutch: Hansson *et al.*, 2000; Hansson and Leonard, 2003). In recent years other languages have been examined, such as Japanese (Fukuda and Fukuda, 1994), Greek (Dalalakis, 1994) and Inuktitut (Crago and Allen, 1994). The only Semitic language to have been studied is

Hebrew (Leonard *et al.*, 2000, Dromi *et al.*, 1999, 1993, Leonard and Dromi, 1994 and Leonard, 1998).

The diagnostic term for children who have difficulties with language acquisition relative to good cognitive and behavioural development has changed over the years. The term **Specific Language Impairment (SLI)** is typically used by researchers (e.g., Leonard, 1981, Fey and Leonard, 1983) but the diagnostic criteria varies among researchers and clinicians. Furthermore, there is difficulty in using this term with young children as the pattern of cognitive development is not revealed until the age of 7 years. Therefore the term **Developmental Language Impairment (DLI)** will be used in this study to refer to those children under the age of 7 whose development of language is significantly impaired relative to development in all other areas, such as non-verbal intelligence, motor skills and behaviour. This will be examined in detail in the literature review.

This thesis is divided into seven sections. Chapter 1 is divided into two sections—the first section is a review of the literature and will deal with a historical review of the different clinical terms used to describe language impairment, describing sub-groups of language impairment and reviewing the current diagnostic criteria used by clinicians and researchers. Emphasis will be placed on describing the morphological characteristics of language impairment across languages. Following this, in section two the objectives of the research will be discussed with the aims and linguistic areas of interest. Predictions of the manifestations for Arabic will be made based on the available cross-linguistic data, developmental studies conducted on Arabic, and studies on Agrammatic Arabic. Chapter 2 is a micro-grammar of Egyptian Arabic followed by a review of the literature published in English and Arabic on Arabic language development and Arabic Agrammatic Aphasia. Chapter 3 focuses on the methodology used to obtain the data, the structured tasks designed specifically for Arabic,

and the methods of analysis which will be explained in light of previous research methods.

In Chapter 4, the results of the non-language impaired children are presented with emphasis on normal developmental error patterns. The three case studies are presented separately in Chapter 5 and each language impaired child is compared with the controls. The features of developmental language impairment are summarised at the end of this chapter. In Chapter 6, the results are discussed in light of the aims of the study and the linguistic hypotheses. Special attention is drawn to both the shared cross-linguistic features of language impairment and the language specific features gleaned from the results of the EA-DLI children. The results are compared with investigations of languages with similar characteristics to Arabic with respect to inflectional morphology and syntax. Finally, using examples from the Arabic corpus of data, features observed to be specific for EA-DLI will be discussed in light of the most recent theories and research regarding the interaction between language impairment and language specific grammatical features.

1. THE STUDY OF EGYPTIAN ARABIC DEVELOPMENTAL LANGUAGE IMPAIRMENT (EA-DLI)

1.1 The History of Specific Language Impairment: a review of terminology

Work in the field of SLI dates back more than 150 years to the first half of the nineteenth century. Gall (1835) was one of the first to describe German speaking children with a clear difficulty with language learning in the absence of any other developmental disorders. Following Gall's work, a number of physicians in the nineteenth century presented case studies of children speaking French, German and English with specific language difficulties. The authors emphasised normal nonverbal intelligence, good comprehension, but limited expressive language abilities. During this period, Vaisse (1866) introduced the term "Congenital aphasia" when describing English speaking children with language difficulties—German literature called it "hearing Mutism" (Coen, 1886). Towards the middle of the nineteenth century the term "aphasia" was commonly used with associated medical terms. Aphasia is initially used to describe adult acquired language difficulties resulting from neurological trauma (Broca "Aphemie", 1861 and Trouseau, "Aphasia" 1865).

McCall (1911) described a sub-type of children who lacked the ability to understand language using the term "congenital word deafness". Subsequently, other physicians began to identify children with both expressive and receptive language difficulties with the terms "congenital auditory imperception" (Worster-Drought and Allen, 1929) and "congenital auditory agnosia" (Karlin, 1954).

Gesell and Amatruda (1947) were the first to use the term "infantile aphasia". Authors began to use the terms "expressive developmental aphasia" and "receptive-expressive developmental aphasia" (Benton, 1964; Eisenson, 1968) to differentiate between children with predominantly expressive language difficulties, and those with both receptive and expressive difficulties.

Beginning in the 1960's the term "dysphasia" began to appear. This was perhaps because the prefix *a-* implies the absence of language, whereas *dys-* implies only problems with language. By the 1980's authors were more likely to use "developmental dysphasia". By the end of the 20th Century the terms aphasia and dysphasia were reserved for acquired language disorders with a neurogenic pathology– caused by discrete brain damage such as that resulting from cerebral vascular accident (Stroke). Therefore researchers were required to revise their terminology, differentiating between those children who have suffered acquired neurological insults from children with language difficulties in the absence of any obvious neurological damage. In addition, the terms *aphasia* or *dysphasia* were restricted to instances in which language acquisition was normal until brain damage occurred. However for these children, difficulties with language acquisition become apparent from the onset of language behaviour.

For children whose language difficulties result from a neurological insult the term "children with acquired aphasia" is used. A distinct term is sometimes used for children with language difficulties associated with the onset of a convulsive disorder, i.e. Landau-Kleffner syndrome (Landau and Kleffner, 1957).

Since the 1960's the following terms have appeared in the literature: "infantile speech" (Menyuk, 1964), "aphasoid" (Lowe and Campbell, 1965), "delayed speech" (Lovell *et al.*, 1968), "deviant language" (Leonard, 1972), "language disorder" (Rees, 1973), "delayed language disorder" (Weiner, 1974), "developmental language disorder" (Aram and Nation, 1975), "developmental language impairment" (Wolfus *et al.*,1980), "specific language

deficit" (Stark and Tallal, 1981), and "language impairment" (Johnston and Ramstad, 1983).

The research focus and academic discipline of the researcher influences the use of terminology. Investigators focused on associated cognitive and educational development, for example, have adopted the terms "language learning disabled" and "language learning impaired" (Tallal *et al.*, 1989b). These terms are an important reminder that although language learning may be a key problem, a more general learning disability may also exist.

The current literature on children with developmental language difficulties refer to either Specific Language Impairment (e.g. Leonard, 1998, Van der Lely, 1994; Conti-Ramsden and Windfuhr, 2002), or to Specific Developmental Language Disorder (Lees and Urwin, 1991; Rinaldi, 2000). Both terms are used where the language difficulty is not acquired and where the etiology is not clearly identified. In this work, when referring to the cross-linguistic data, the term *Specific Language Impairment (SLI)* will be used and when referring to the Egyptian Arabic Data the term *Egyptian Arabic –Developmental Language Impairment (EA-DLI)* will be used.

1.2 The prevalence of SLI

The prevalence of SLI in the U.S.A. is believed to be about 7% (Leonard, 1998 and Tomblin *et al.*, 1997). Webster and McConnell (1987) estimated that two or three children in every classroom in England were affected by language problems. Speech and language therapists are finding this prevalence is reflected in the increasing number of school-age children either referred to, or still needing, speech and language therapy (Ripley *et al.*, 2001). The report from the Nuffield Project 1999 (Conti-Ramsden and Botting, 1999a) indicated an incidence of speech and language impairment of about 5% in Year 2. There is a higher incidence during the early years but "natural recovery" takes place at this time (Ripley *et al.*, 2001). Recent studies have shown that for a subset of children language difficulties often persist well into

adolescence (e.g. Rinaldi, 2000).

SLI appears to be more prevalent in males than females, and recent research suggests that in some cases there is strong genetic disposition (e.g. Gopnik and Crago, 1991; van der Lely and Stollwerck, 1996) – children with SLI are more likely than other children to have maternal or paternal family members with a history of language learning problems. A recent consideration has been the extent to which genetics affects language abilities and the overlap between genetic effects on nonverbal cognitive abilities (Plomin, 2002). Examining 10,000 pairs of twins, Plomin (2002) found that language problems for many children involve general cognitive problems and that genetic factors are responsible for this overlap. He therefore argued that research on language impairment should consider General Language Impairment (GLI), which includes cognitive impairment, in addition to Specific Language Impairment that excludes cognitive impairment. There is no normative data available on the prevalence of developmental language impairment in Egypt, but it can be assumed that the prevalence of Egyptian DLI will be similar to previous studies, i.e. approximately 5-7%.

1.3 Problems and differences with the current criteria used to diagnose and assess Specific Language Impairment

Criteria for the identification of SLI vary greatly among clinicians and researchers. No generally accepted method for the identification SLI exists although the need for consistent SLI criteria has been repeatedly stressed (e.g. Leonard, 1998; Lahey, 1990; Stark and Tallal, 1981).

Slow lexical acquisition and a delay in word combinations are typically used as the most reliable symptoms on which to make a diagnosis of language impairment (e.g. Bortolini *et al.*, 2002; Le Normand *et al.*, 1993; Merino, 1983; Restrepo, 1995; Grimm, 1993; Leonard, 1998). However, distinguishing SLI from other developmental disabilities where language difficulties co occur with cognitive, behavioural or mild physical disabilities can be difficult. For this reason, researchers and clinicians will typically use a combination of exclusionary and

discrepancy criteria.

It is generally agreed that some features of disordered language may be displayed at some stage in normal language development. These non-adult target forms must be distinguished from a predominant language delay. When the language features of SLI children are compared with age matched or language matched controls, both groups will typically produce utterances which contain non-adult target forms (Hansson and Leonard, 2003; Jakubowicz, 2003). These "normally occurring developmental errors" appear more frequently in SLI children, depending on the language typology examined (Leonard *et al.*, 1978). For example, when considering early word combinations, there is a considerable similarity between SLI children and language matched controls (Leonard *et al.*, 1978). Studies involving the use of argument structure (Lee, 1976) found SLI preschoolers and younger normally developing children similar in their use of argument structure, but the discrepancy of the impaired features and the frequency of their occurrence distinguished the two groups.

When examining older SLI children, differences in the frequency of errors are observed. Fletcher and Garman (1988) compared the use of adverbials in the spontaneous speech of SLI children aged between 7-9 years to normally developing children aged 3, 5, and 7 years. They found the SLI group resembled the 5-year-old control group in the structure and location of their adverbials when the context provided sufficient cues. Without sufficient cues, however, the SLI group only used the temporal adverbial 25% of the time compared with the five-year-old group who used it 75% of the time.

1.4 Differentiating between language delay and language impairment

The word delay suggests that the child will eventually be successful in acquiring language. Bishop and Edmundson (1987a and 1987b) showed that this was true for the majority of the children they studied, but there was still a group with persistent difficulties. In a later study,

Bishop (1994a; 1994b) found that 40% of speech and language problems identified at four years of age are resolved by half way through the fifth year. This "natural recovery" rate (Bishop, 1994a; Bishop, 1994b), appears to flatten after about six years, so that 33% at five years and only 10% by seven years will improve without intervention.

Similarly, where children continue to have a substantial discrepancy between aspects of their language and other skills, they cannot be considered to be developing equivalently to a normal younger child. This provides a strong argument for early intervention. Although the child's difficulties may resolve before the age of 7 years no clear predictions have successfully been devised to identify children who will not spontaneously recover.

The confusion about the incidence of SLI reflects not only the lack of standardized diagnostic criteria, but also the range of difficulties which may manifest as part of SLI. An expressive problem will be more readily detected by those interacting with the child than, for example, a more subtle receptive difficulty. The latter may go undetected within the education system well into the early school years (Ripley *et al.*, 2001; Rinaldi, 2000). The characteristics of language impairment observed in children with SLI are specific and although observed in normally developing children's language they are produced at higher frequencies in SLI children (e.g. Leonard, 1998). These features have often been referred to as clinical linguistic markers (e.g. Bishop, 1994a; Bishop 1994b; van der Lely, 1994).

One of the difficulties of assessing pre-school children under 5 years for language impairment, is that their skills will be developing in parallel with their disorder; since complete cognitive development is not acquired until after 7 years (McCall *et al.*, 1972). This complicates the clinical profile as the clinician must decide which aspects of the child's language impairment reflect normal developmental features and which, if any, are indicative of disorder. When, then, can a conclusive diagnosis of SLI be given? Some researchers argue that SLI cannot be diagnosed until after the age of seven (e.g. van der Lely, 1994); this will

also be discussed in this work for several reasons. First, children entering school are in the process of developing their language skills. However, grammatical and phonological immaturities will persist and be apparent in the child's speech and language (Ripley *et al.*, 2001). For example, phonological immaturities such as reduced consonant blends may be observed. Expressively, immaturities in syntax and morphology may also be observed, including over-regularization errors with irregular past Tenses, plurals and comparatives, e.g. "feet" may be produced as "foots".

Second, the diagnostic criteria, prior to the age of 7 years, is often reliant on both subjective and objective guidelines and is affected by the choice of the formal assessment used. Definitions prepared by the DSMIII-R guidelines are often used as an objective nosology to identify children fitting an SLI profile. Stark and Tallal (1981) proposed objective criteria in terms of discrepancies between "Mental age" and "Language age." Bishop (1989) noted that the statistical abnormality of a discrepancy between language age and mental age could vary dramatically from one test to another. To avoid this problem, Bishop proposed an alternative definition in which the child is regarded as having a specific language impairment if performance is significantly impaired on "any one of a range of language tests measuring different aspects of language" (Bishop 1989). The difficulty with this definition is that it is vague regarding which aspects of language are affected. In addition it does not specify how linguistic and cognitive functioning can be differentiated, and how language tests and non-linguistic tests should be compared.

As previously mentioned, SLI has traditionally been defined by exclusion. SLI is diagnosed "*where there is a failure of normal language development that cannot be explained in terms of mental or physical handicap, hearing loss, emotional disorder or environmental deprivation*" (Bishop, 1992, p.3). This definition also has limitations and does not consider age of diagnosis or cognitive abilities. This definition would not differentiate children with delayed language, i.e. "Late talkers"

(Evans *et al.*, 2003) from those with SLI. It would also not differentiate children with a mild cognitive impairment from those with no cognitive impairment.

The American Speech-Language-Hearing Association (ASHA) proposed the following working definition:

A language disorder is the abnormal acquisition, comprehension or expression of spoken or written language. The disorder may involve all, one or some of the phonologic, morphologic, semantic, syntactic, or pragmatic components of the linguistic system. Individuals with language disorders frequently have problems in sentence processing or in abstracting information meaningfully for storage and retrieval from short and long-term memory. (ASHA, 1980, pp.317-18)

According to this definition, the impairment can be in language comprehension, expression or both. Children who have language impairments (disorders) may have difficulty in processing linguistic information, organising and storing it or retrieving it from memory. Therefore the definition of SLI includes, on one end of the spectrum, the child who does not understand spoken language and who is able to produce only short, largely unintelligible utterances, and on the other end the child who chatters profusely in long and clearly articulated utterances, but who seldom responds appropriately to conversation. It also includes children who understand most of what is said to them, but are unable to form any but the simplest utterances, as well as those who are able to talk clearly in single words, but become increasingly unintelligible as the length of their utterances increases. In addition, a profile of a SLI child's learning abilities may reveal a mismatch between their phonological development in relation to their semantic or syntactic skills. The speed of auditory verbal processing and word finding might also be slow. The table below taken from Leonard (1998) summarizes the areas considered prior to a child receiving a diagnosis of SLI and includes non-language exclusionary criteria.

Table 1-1 Criteria for SLI (Leonard, 1998, Children with Specific Language Impairment, pg 10)

Factor	Criterion
Language Ability	Language scores of –1.25 standard deviations or lower; at risk for social devalue.
Nonverbal IQ	Performance IQ of 85 or higher.
Hearing	Pass a hearing screening test at conventional levels.
Otitis media with effusion	No recent episodes
Neurological dysfunction	No evidence of seizure disorders, cerebral palsy, brain lesions; not under medication for control of seizures.
Oral structure	No structural anomalies
Oral motor function	Pass screening using developmentally appropriate items
Physical and social interactions	No symptoms of impaired reciprocal social interaction or restriction of activities.

1.5 Assessing the child's language abilities in the absence of standardised assessment tools

Standardised assessment tools have several important advantages for both clinicians and researchers. They are straightforward to administer and results can be used to support a diagnosis of SLI. They identify specific linguistic deficits that may not be apparent in spontaneous language and they can be compared with other test scores, e.g. non-verbal tests versus language tests, and the child's performance can be compared with peers. The scores also assist the clinician in planning an intervention program and when retests are done changes in profile can be measured and persistent difficulties identified.

However, there are several problems with the availability and use of standardized tests. Although there are several assessment tools available in English (e.g. TROG–Bishop 1989), few have been developed for other languages. For the child under 5 years, standardised

tests may not provide a true indication of the child's abilities due to immature attention skills and difficulty with compliance in a formal examination format. Standardised psychometric discrepancy criteria are less sensitive to language impairment in children under 5 years (Dunn *et al.*, 1996). Thus, other methods of identification and analysis are frequently employed by researchers and clinicians based on language performance in a naturalistic context (Dunn *et al.*, 1996).

Calculating the child's *mean length of utterance* (MLU) in terms of morphemes and structured error analysis is the most commonly adopted spontaneous language measure, based on spontaneous speech samples. MLU is considered a gross, but accurate, index of grammatical development in English up to a ceiling of about 4-5 morphemes. It is a gross index because it provides no information about the form or the structure of the child's utterances. It is considered a reasonably accurate index because as the child acquires new grammatical structures, such as verb Tense markers, modal verbs, and determiners, the length of the utterances, and therefore the MLU increases (de Villiers and de Villiers, 1973). Although there are disadvantages to using MLU, researchers frequently use measures based on MLU. For example, Miller and Chapman (1981) presented data on the relationship between chronological age and MLU and suggested that their data may be used, with caution, to determine if a child's MLU is significantly below chronological age expectations.

The use of MLU as a predictive measure was criticised by Lund and Dunchan (1988) who argued that variability across children and conditions are too great to allow an accurate picture of which forms or structures should appear in a given MLU stage. However, used in conjunction with measures of grammatical structure, MLU does provide a basis for predicting what a child should produce and is thus a useful gauge of a child's grammatical level (Dunn *et al.*, 1996).

Dunn *et al.*, (1996), examined the validity of quantitative measures of MLU, syntax and

pragmatics, derived from spontaneous language samples, as criteria for discriminating clinically diagnosed SLI pre-schoolers from normally developing pre-schoolers. The spontaneous language data indicated that SLI children produced a significantly higher percentage of errors in spontaneous speech than normal children, whether they met psychometric discrepancy criteria or not. They further concluded that a combination of MLU, percent structural errors, and chronological age was the optimal subset of variables for predicting a clinical diagnosis of SLI. This is an important consideration when examining languages such as Arabic, where standardised language assessments are not available.

Aram *et al.* (1993) attempted to identify standardised test criteria that would increase the congruence between children classified as SLI by clinicians and those classified by other investigators. A variety of operational definitions of discrepancy criteria were applied to a group of 252 pre-school-age children, all of whom were clinically diagnosed as SLI. Of the measures used, they found a child's actual MLU, derived from a spontaneous language sample, was the most sensitive measurement, capturing 80% of the clinically defined children. The results of Aram *et al.*'s (1993) study provide further empirical evidence for the limitations of psychometrically derived discrepancy criteria in identifying SLI.

The successful use of MLU to identify SLI children suggests that measures derived from spontaneous language in naturalistic contexts may be closer to the clinical process used for identifying children with SLI than that used for standardised testing.

1.6 IQ as a criterion

SLI is typically diagnosed by exclusion and/or inclusion (e.g. Bishop, 1994a; Bishop 1994b; Leonard, 1998). One of the most crucial criteria in the diagnosis of SLI is a non-verbal intelligence score that is within age-appropriate levels (Leonard, 1998). Cognitive performance is one component of an exclusionary approach to defining SLI (Tallal *et al.*,1988) – as a SLI diagnosis is appropriate only when the language delay cannot be

attributed to a physical, emotional, or cognitive deficit. Cognitive performance is typically defined by standardised psychometric tools as a non-verbal performance IQ of at least 85, although Tager-Flusberg and Cooper (1999) have called for additional research to determine whether the nonverbal IQ criterion is necessary, and if so, whether 85 or some other cut-off is the most appropriate. It is indeed the mismatch (discrepancy criteria) between the verbal IQ and non-verbal performance IQ that indicates the presence or absence of SLI. In contrast, children with delays in both cognitive development and language development are considered to be categorically different (Cole *et al*, 1995), and are given a different label , e.g. General Language Impairment (Plomin, 2002). However, how much of a discrepancy leads to the diagnosis of SLI? And if the non-verbal performance IQ is lower than average but there is still a significant discrepancy between the performance and verbal IQ, could this still be indicative of SLI?

For older children above the age of 6-7 years, who are able to attend to formal assessment batteries, it is possible to compute an IQ score. Computing an IQ score for pre-school children under 4;00 years is more problematic. It is reported that pre-school tests have moderate validity in predicting intelligence test performance (Bayley, 1970; Lewis, 1973; McCall *et al.*, 1972). Few researchers have addressed this problem, although clinicians will typically diagnose SLI using both informal cognitive measures and spontaneous language samples. To address this problem Cole *et al.* (1995), examined two commonly applied methods of differentially diagnosing children as being SLI or developmental lag language impaired (DLLI) for stability of diagnosis over a one to two year period. They looked at 48 children aged between 3-7 years. The first method used the DSM III-R guidelines (1987) and the associated exclusionary criteria– an absolute cut-off level for cognitive performance in conjunction with other exclusionary criteria (i.e. Leonard's criteria, 1998). The second method included the same absolute cut off for cognitive ability and also required minimum relative

difference between general cognitive performance and language performance.

Their results indicated significant differences in classification between the two methods of defining SLI. Notably, the diagnosis of the children based on these methods of classification changed throughout the one to two year period. The researchers questioned the usefulness of SLI classification because of the low stability of the classification using either method. Moreover, the children's profiles changed in both directions, e.g. some of the children changed from SLI to DLLI profiles, indicating a drop in IQ, other children changed from DLLI to SLI, whilst others changed back and forth between the two categories at each testing. They concluded that the pattern of change suggested instability of measurement, rather than a result of maturation or development. They did, however, find that test instability was more likely among the younger children (3 -4 years), while greater stability was found among the older children with delayed language (6 -7 years). This provides further evidence of the possible inaccuracies of standardised assessment tools and of diagnosing SLI before the age of 7 years.

Even where the effects of intervention could account for a change in classification, the changes raise concerns from both research and clinical perspectives. Although it can be expected that children receiving intervention should and do make progress, the classification should remain the same as the SLI classification is supposed to identify a distinct population group with a disorder stemming from unique causal factors (Tallal *et al.*, 1988). These findings support the results of Aram *et al.*(1993), as discussed before, where a comparison of clinical and research identification of SLI children was examined. The results of the Aram *et al.*'s (1993) and Cole *et al's* (1995) studies provide further empirical evidence of the limitations of psychometrically derived discrepancy criteria for the identification of SLI children. Therefore, although IQ is an important criterion in differentiating SLI from other developmental disabilities, an IQ test in the pre-school years will not be as reliable as when the child is

over the age of 6-7 years.

A further limitation of psychometrically defined results is the variability of the assessments. A different approach to defining SLI is proposed by Cole *et al.* (1995),

"...another quite different approach would be to define SLI by identifiable characteristics instead of ruling out what is not an SLI profile" (Cole et al., 1995, p120).

Rather than dividing children into two extremely broad groups on the basis of IQ scores, it may be appropriate to consider the framework suggested by Kamhi (1992) for identifying learning-disabled children and to define SLI using an inclusionary definition. This entails identifying the specific set of conditions that characterise the language or processing abilities of SLI children, regardless of IQ.

1.7 The sub-groups of Specific Language Impairment

Given the complexity of the disorder, and the criteria used for diagnosis, it is obvious that the population of SLI children is not a homogeneous one. Moreover, it is now believed that SLI consists of many syndromes with different underlying deficits. The sub-groups of SLI children are categorised by the different linguistic characteristics that they persistently present with. An early study conducted by Aram and Nation (1975) sought to identify sub-groups of SLI children on the basis of language profiles derived from language tests. Forty-seven children aged between three to six years were used in this study. The children were given a series of tests to examine their comprehension— formulation and repetition tasks dealing with semantics, syntax, and phonology. Aram and Nation (1975) identified six different patterns of impairments based on an analysis of the children's performance in the different areas. The different patterns revealed either impairments across all areas, or different combinations of impairments with other areas unaffected or stronger. For example, for one group comprehension was better than production, for another group phonology was impaired with

less problems in syntactic production and another group had a strong ability for repetition, but moderate problems on all other language areas.

The classification system used by Rapin and Allen (1983, 1988) is based more on clinical judgement. There are strengths and weaknesses to using such a classification system. Rapin and Allen (1983, 1988) identified three different sub-groups: children with a *phonologic-syntactic deficit*, who display mild comprehension problems but severe expressive problems in the areas of morpho-syntax and production; children with *lexical-semantic deficit syndrome*, who present with severe word finding difficulties affecting their abilities to formulate sentences; and children with *verbal auditory agnosia* who have severe comprehension difficulties and limited expressive abilities. The classification system does not include any age or cognitive criteria and the descriptions are based on English and therefore may not be appropriate for languages that are typologically different. It is difficult to differentiate between these three sub-groups in the absence of formal tests or elicitation tasks. Thus for young children under the age of 5;00 years it would be more challenging to categorise them into one of these sub-groups.

Bishop and Adams (1989) identified a group of children with semantic-pragmatic SLI. Other researchers have identified children with primarily phonological SLI (Haynes, 1992), and those with primarily expressive and or receptive SLI (Haynes, 1992, van der Lely, 1992, van der Lely & Dewart, 1986, van der Lely and Harris, 1990) and a primarily grammatical deficit G-SLI (van der Lely, 2002). These, and many more sub-groups appear on the continuum of language impairment. Although there is some commonality, children with SLI will have different patterns of impairment and thus, no child will have the exact same profile.

1.8 The linguistic characteristics of SLI

There is an ongoing dialogue about which features of language differentiate children with and without SLI (Hansson and Leonard, 2003; Leonard *et al.*, 2000; Jakubowicz, 2003). When considering the language features, it is important to acknowledge the variability between

sub-groups, and that language features present in one group examined may not be present in another group.

Given this, language features examined in one language may not therefore be present in another language depending on the typological differences between the languages. Therefore, identifying linguistic clinical markers is by no means a clear-cut task. However, it has been argued that there are clinical markers of language impairment (Rice and Wexler, 1996) regardless of the language typology or the sub-group examined. This would support that SLI is a disorder with a shared underlying aetiology. It would also support similarities regarding cross-linguistic language acquisition accounts, such as over-regularisation errors (e.g. Bowerman, 1982b) and that the underlying language disturbance may manifest similar and different linguistic features.

The majority of work in SLI has been conducted in English. Over the past 10 years researchers have acknowledged the need to examine SLI in other languages. These have mostly been Germanic and Romance languages, while the only Semitic language examined for SLI is Hebrew. Researchers have identified grammatical morphemes problematic for children acquiring English, but studies from Romance and Semitic languages reveal profiles of grammatical use that are quite different (e.g. Dromi *et al.*, 1999 and Bedore and Leonard, 2002). English is not a morphologically rich language and languages which are morphologically rich and highly inflected provide interesting test cases.

The features of English will first be discussed and this will be followed by the cross-linguistic findings from the Romance, Germanic and Semitic languages examined for SLI.

1.8.1 English Specific Language Impairment

Descriptions of linguistic impairments of English speaking SLI children are evident early on. The most salient characteristics are slow emergence of first words, word combinations and

grammatical morphemes when compared to age matched controls. Limited lexicons and problems with lexical acquisition are often observed. Mastery of grammatical morphemes is delayed and often never fully achieved. Noun morphology is less problematic than verb morphology and additions of morphemes are occasionally observed (Leonard, 1998).

In English, these include the grammatical morphemes used to mark verb Tense, agreement and plurals. Indeed, difficulty with grammatical morphology is considered a hallmark characteristic of SLI (Bedore and Leonard, 1998 and Rice, 1998).

Another characteristic is a delay in the ability to expand sentence constituents, as indicated by a shorter mean length of utterance (MLU). The MLU of 5-year-old SLI children, for example, is about the same as that of 3-year-old normally developing children, about 3.5 morphemes (Rice *et al.*, 1990, 1992). In addition, pronoun difficulties have been noted where either the wrong case is selected but the correct gender is maintained or the wrong gender is selected.

In English, difficulty with grammatical morphemes is considered a clinical marker for SLI (van der Lely, 2002).

1.8.2 Slow lexical acquisition

Slow lexical acquisition is a universal feature seen across the spectrum of children with SLI (Leonard, 1998; Kelly, 1997). Unlike children with Autistic Spectrum Disorders, children with SLI demonstrate a need to communicate verbally. Frustration stemming from the unsatisfied desire and need to communicate often results in behaviour problems.

In a study conducted by Trauner *et al.*, (1995), parental reports were used to identify when SLI children acquired their first words. In a group of 71 children, the average age for the acquisition of first words was 23 months compared with an average age of 11 months for normally developing children.

Other studies report that the acquisition of first words may be within the expected period of development (e.g. Leonard *et al.*, 1982), but that the problem becomes apparent when word combinations are expected. In the early stages of SLI, the types of lexical items used by SLI children may match those of younger children. However, when the SLI children begin to use multi-word utterances, their language abilities do not correlate with the language of normally developing younger children (Kelly, 1997).

Studies conducted on the lexical types used by pre-school SLI children reveal that nouns (names of object, animals and people) are more frequently produced than verbs and adjectives (Conti-Ramsden and Windfuhr, 2002; Leonard *et al.*, 1982). When multi-word utterances consisting of a wide range of lexical items are expected, the children with SLI begin to have difficulties. In a study on the use of verbs by pre-school SLI children, Fletcher and Peters (1984) found that one of the variables that discriminates children with SLI from their normally developing age matched controls was verb type frequencies; a higher frequency of verbs was produced by the age matched controls.

Gavin et al (1993) sought to identify characteristics of developing grammar that may be symptomatic of SLI. If statistical evidence could be established which suggests a distinctive profile of language impairment in pre-school children, such data could then be used in clinical assessment by providing quantitative support for the diagnosis of language impairment using spontaneous language. Language samples from 47 children, 24-50 months of age, described in a previous study (Klee *et al.*, 1989), were analysed using the *LARSP* framework (Language Assessment, Remediation and Screening Procedure; Crystal *et al.*, 1976).

The LARSP is a clinical assessment procedure that provides a grammatical analysis (i.e. syntax and morphology) of individual language samples. The procedure yields a frequency count of some 200 grammatical structures and "errors" occurring in a sample of language. In their study, Gavin *et al.* (1993) found that SLI children differed from typically developing

children in several important ways. Their language production had more single-word utterances, more errors and omissions in the verb phrase and underdevelopment of the noun phrase. An earlier study, Fletcher and Peters (1984) also found verb related variables to be predictive of language impairment. In addition, Gavin *et al.* (1993) found that a preponderance of single-word utterances (Nouns and Verbs) and a low occurrence of three-element Noun Phrases typified the conversational language of impaired children.

1.8.3 Verb use

Verb use and Tense has repeatedly been reported as an area of difficulty in SLI children. For children with SLI it is not only the lack of verbs, but the limited range of verbs that is problematic. Watkins *et al.*, (1993) found that pre-school SLI children, when compared with both MLU and age matched controls, produced a more limited variety of verbs (Conti-Ramsden and Jones, 1997). They also tended to overuse verbs commonly used by both control groups.

These findings were confirmed by Rice and Bode (1993) who examined the verb lexicons of three pre-school boys with SLI. Their database consisted of a corpus of 5486 spontaneous utterances collected over a three-month period. They found that the children relied on a set of *General All Purpose verbs* (GAP) that were used to fulfil a variety of functions. In addition, they found that the children made occasional substitution errors suggesting semantic mis-markings and problems with stem retrieval. The study, however, was disadvantaged by the lack of a control group and the authors acknowledged that they were unable to address the possibility that GAP verbs are used by all pre-schoolers, and not necessarily a compensatory strategy used by children with SLI to counteract a limited or deficient verb lexicon.

Kelly (1997) examined patterns of verb use by SLI children and compared the results with two groups of children developing language normally (age matched controls and MLU matched controls). In addition, rather than using spontaneous language samples (Rice and

Bode, 1993; Watkins *et al.*, 1993), on-line experimental formats were utilised. Interestingly, Kelly (1997) found that while the SLI children did rely on GAP verbs, the normally developing children produced an even higher percentage of GAP verbs. However, the children with SLI produced more semantic errors in verb use.

Lexical learning, particularly for action words, is also an area of difficulty for SLI children. Oetting *et al.*,(1995) reported that SLI children were able to learn object names as well as the age controls, but their learning of action words lagged behind their age matched peers. Difficulty with lexical learning sometimes referred to as "word-finding" or "word-retrieval" (Rapin and Wilson, 1978; Rapin and Allen, 1987; Leonard and McGregor, 1994 and Leonard, 1998) is one of the language features that is seen beyond the pre-school years and even into adulthood. The child has age appropriate understanding of vocabulary, but is unable to express such knowledge, appearing to 'grope' for the words. The child often has an understanding of the word that they are unable to 'find'. There is usually some difficulty forming connected utterances and when unable to name accurately, non-words close to the target word are used. These are called *paraphasias* and they are three main types: *semantic paraphasias* where the item is related in meaning to the target (e.g. *apple* replaces *orange*), *phonemic paraphasias* in which the item is related in sound to the intended target (*praffic* replaces *traffic*) and *neologisms* (literally non-sense words) in which it is not possible to discern the target. In addition, the child may employ other strategies to overcome the word-finding problem like using a gestural replacement or a general word or term like "thing". These errors would be expected regardless of the language typology, though one type of error may dominate. Arabic is an interesting test case. Given the non-concatenative structure of the language, different error patterns may result due to word retrieval difficulties.

"Word-finding", as the term suggests, means that the child has difficulty locating the required lexical item. Another reason may be that the child may not have sufficient lexical,

phonological or semantic information about the word to find it. Words are stored in the memory with their semantic and phonological associations. For example, the word "apple" is a noun, it is something we eat, it is a fruit, it has one syllable and phonologically it is represented as a string of four sounds. If there are sufficient associations stored about the word, it is far easier to retrieve it. Therefore it is quite plausible that action words will be more problematic due to the additional semantic and syntactic associations required for the word to be stored correctly. If the child has difficulty deducing such relationships it will not only affect their choice of verbs but how the verbs function within the utterance and thus semantic and syntactic errors may occur.

At the single or two-word stage these difficulties may not be apparent, but as the SLI child begins to produce multi-word utterances, difficulties with the semantics, syntax and the use of verbs will become more obvious, given that the semantic structure of verbs contains many conceptual roles (Kelly, 1997).

1.8.4 Semantic and syntactic bootstrapping: omission and use of argument structures

Recent theories of language acquisition have focused on the ways that meaning relationships are encoded in grammatical structure. A sentence describes relationships between properties, things, places and actions. The verb is vital for expressing such relationships. Verb definitions are composed of a small set of basic semantic categories (thing, event, state, place, path, property and manner) that form a scaffolding of grammatically relevant meaning to which specific pieces of conceptual information are added (Pinker, 1989). To be grammatical, a sentence must contain the obligatory arguments specified by the verb's argument structure. It follows that if a child has not learned adequate verb definitions, then ungrammatical utterances will result.

According to Pinker (1989) normal young children make overgeneralization errors for precisely this reason. This has also been supported by cross-linguistic studies conducted on

over-generalization errors (e.g. Bowerman, 1982). However, knowledge of verb semantics is not sufficient for grammatical language. The child must also learn how to map argument structures onto grammatical functions. Pinker (1989) argues that normal children do not have problems learning these linking rules, which he suggests are innate. If SLI children lack the innate component of grammar they might not have knowledge of linking rules, but in other respects be cognitively normal. As a result the child may have adequate representations of verbs, but be unable to work out how to express the underlying argument structure grammatically. This does not explain lexical learning discrepancies exhibited by SLI children between nouns and verbs, nor does it explain grammatically based morphological omissions, since Pinker's theory assumes the SLI children have adequate verb representations.

This hypothesis posits that grammatical errors made by SLI children would differ from normal developmental errors. According to Pinker, under specified representations of verb meaning are the main cause of overgeneralization errors in normal young children, and the progression to adult sentence constructions develops as verb meanings become more finely tuned. Pinker suggests that this hypothesis could be tested by comparing the different ways that children learn word meanings. He proposed that the child first deduces information about argument structure from a conceptual and perceptual analysis of the context in which the word is used. Pinker argues that children use contextual information to deduce the meaning of words and that this is the first step the child takes to acquiring grammar. This is termed "Semantic Bootstrapping". If SLI children can learn verb meanings and argument structure from context, then they should perform normally on tasks designed to test semantic bootstrapping. If SLI is a predominantly morpho-syntactic deficit we should not expect problems with semantic bootstrapping.

The reverse of semantic bootstrapping is syntactic bootstrapping. Gleitman *et al.* (1985) noted that if the visual context was an important cue to meaning and structure, then congenitally

blind children would have difficulty in language acquisition. They reported a case study demonstrating this need not be so. To explain how a blind child can learn how to use verbs like "*look*" and "*see*" they proposed that, once some grammatical knowledge is available the child may perform a syntactic analysis on an input sentence containing an unfamiliar word, and deduce the meaning of the word from its syntactic characteristics. In effect, the child can use linking rules in reverse to work out argument structure on the basis of syntactic structure, i.e. syntactic bootstrapping. If SLI children have difficulty in using these linking rules, then they would find it hard to learn language this way.

An earlier study by Leonard *et al.* (1982) contrasted vocabulary learning in 14 SLI children and 14 normal controls. The children were exposed to novel words depicting objects or actions in a play session. For example, the investigator would say "Here's the *gourd*" (Gourd=object word) or "Watch the baby *kneel*" (Kneel=action word). Each word was produced five times in each of the 10 sessions, and the child's comprehension was tested at the end of each session with the command "Give me the (novel object word)" or "Make the baby (novel action word)". Comprehension and expression of the words was then tested in the final session. Leonard *et al.* (1982) were surprised to find, overall, close similarities between the SLI and control children in comprehension and production of the novel words. They argued that the SLI children were able to learn these novel words because they were presented in an inflectionally bare context and thus, the main factor determining the learning of these words was the child's ability to perform conceptual analysis of the object or action from which a semantic representation could be formed, i.e. semantic bootstrapping. In other situations where the novel words are presented in a range of grammatical contexts, syntactic bootstrapping assumes importance and slower lexical acquisition would be anticipated.

Van der Lely and Harris (1990) carried out a study designed to compare semantic and syntactic bootstrapping. Six children with SLI were compared with 17 younger, language

age matched children, age matched controls were not used. In the semantic bootstrapping task, the child was shown toys performing novel actions, accompanied by novel words, e.g. A jumps up and down on the back of B and the experimenter says "This is *woozing*". The child's ability to infer grammatical structural relations was then tested by asking the child (a) to describe the behaviour of new toys carrying out the same actions; and (b) act out sentences such as "the horse *woozes* the lion" or "the lion is *woozed* by the horse". In contrast, for the syntactic bootstrapping task, no contextual cues or semantic information were provided. The child was asked to make up a meaning for a new word, and to show this to the experimenter by acting out what he or she thought was meant by sentences such as "The lorry *yols* the car". Responses were scored in terms of the semantic relationships between the toys. Van der Lely and Harris (1990) found that the SLI children did not differ from their language matched controls on the semantic bootstrapping task, but they were significantly impaired on the syntactic boot strapping task. It would have been interesting to have compared age matched data on these tasks. Van der Lely and Harris's (1990) data was used to support a predominantly morpho-syntactic deficit in children with SLI.

These results (Van der Lely and Harris, 1990) indicate that SLI children can form a semantic representation of verb argument structure on the basis of contextual information, but are unable to deduce thematic roles from syntactic functions. Using these results, Van der Lely and Harris (1990) concluded that SLI children can use linking rules, but only in one direction-- linking from a cognitive semantic representation to a grammatical structure, but not the other way. Therefore, the fundamental deficit in SLI would appear to be grammatical rather than semantic. This primary grammatical deficit, however, will lead to semantic deficits because the child is unable to use syntactic bootstrapping to deduce word meanings. Following from this, morphological features related to grammar, such as subject verb agreement for number and person would therefore be more problematic. For languages such as Arabic and Hebrew (morphologically rich), such findings would predict Tense, which is

semantic, not to be problematic but that subject verb agreement for number, person and gender would be a problem due to the children's primarily grammatical deficit.

Van der Lely and Harris's (1990) findings are further supported by Gleitman and Gleitman (1992), who found that the meaning of many verbs can not be learned simply by exposure to events and the verbs that describe them. The child needs access to the syntactic frame in which the verbs appear to deduce the meaning of the verb and how it affects other words, i.e. the argument structure of verbs.

The occurrence of omission of verb arguments by SLI children varies. This variability can perhaps be attributed to the age of the children studied, i.e. pre-school versus school-age, and the manner in which the data was elicited, i.e. spontaneous language samples or structured tasks. In a study on the spontaneous speech of pre-school children, Rice and Bode (1993) found few examples of omitted arguments, and object omissions were more frequent than subject omissions. In contrast, Roberts *et al.*, (1994) compared 3;00 year old SLI children to age matched controls. They found that 85% of the SLI children's utterances lacked an obligatory argument or the main verb itself, compared with 60% omissions by the controls. Grela and Leonard (1997) also examined the use of arguments by the same age group using language matched controls (MLU controls). They questioned whether the omission of the arguments depended upon the complexity of the verb, i.e. the number of obligatory arguments required by the verb, or whether the omissions were due to whether the verbs were intransitive or transitive, affecting the thematic roles assigned to the subjects. When considering subject omission it is interesting to examine this cross-linguistically; languages such as Arabic and Italian are pro-drop languages where the subject is not obligatory. In Arabic, however, person markers on the verb are obligatory and it would be predicted that while subject omissions are not problematic, person marking would be problematic and person markers would either be omitted or produced with agreement errors.

Grela and Leonard (1997) found that for both the SLI children and MLU controls, the number of verb arguments did not affect the children's production of subject arguments in Italian. However, they did find that the SLI children produced fewer subject arguments with unaccusative verbs than did the MLU controls, but not with the unergative verbs.

When observing English school age SLI children, King and Fletcher (1993) found that difficulty with argument structure minimizes with age– such errors occurred less than 3% of the time and were comparable to MLU controls. The control children's errors were limited to omissions of the object or location argument for the verb *put*, however the SLI children made argument errors for a wider range of verbs. Therefore argument structure may not be the only problem. The type of verb and how many arguments the verb requires, i.e. the thematic roles, or semantics of the verb, may also present difficulties.

Thus, in conclusion the omission of verb arguments is part of the normal developmental process, and is not, in itself, a clinical marker for SLI. However, children with SLI do make such omissions with noticeably greater frequency. When contrasting the data on use of argument structure, we can conclude that argument errors can occur in the form of omission of arguments and in the form of restricted use of the same verb with different argument structures, e.g. *The baby washed the doll* and *The baby was washed by her father*, which together support syntactic and not semantic deficits in children with SLI.

1.8.5 The role of adverbials

Fletcher and Garman (1988) examined the expressive use of adverbials used to denote time, location and manner of action in the spontaneous speech of SLI children aged 7 to 9 years. The control group of normally developing children were aged 3-, 5- and 7-years old. They found that the SLI group mostly resembled the 5-year-old control group in their use of adverbials that expressed time. A significant difference between the two groups was when the context did not provide cues that specified reference time, the 3-year-olds used a temporal

adverbial 75% of the time and the SLI group used the temporal adverbial only 25% of the time. Fletcher and Garman (1988) did not make age distinctions when analysing their data– their overall findings were based on collapsed results of all the SLI children. Had they analysed their data differently different patterns may have emerged. We would expect the younger SLI group to have more problems than the older group since there was a 2 year difference between the youngest and oldest SLI child. In addition, it would have been interesting to examine the relationship between expressive and receptive use of adverbials. An earlier study by Wren (1980) found that the expressive use of adverbials was one of the key elements distinguishing a group of SLI children from age controls. Johnston and Kamhi (1984) also compared adverbial use among SLI children with MLU matched controls and also found less adverbial use by SLI children than the MLU control group.

Van der Lely (1994) supports the capability of SLI children to use a new verb with appropriate argument structure if they observe the event that the verb describes. This is partly how normally developing children acquire verb arguments and it is the method of remediation used with children with SLI (Rinaldi, 2000). Once the child has observed the event, the arguments more easily undergo syntactic categorisation–*agents* are usually subjects, *themes* are usually objects and *place* (goals) are usually prepositional phrases. Van der Lely (1994) found that the school aged SLI children performed as well as a younger control group matched according to language test scores. However, when tested in the absence of visual information, and therefore reliant on syntactic information, the children's results were quite different. For this task, the children heard a new word in a sentence and had to act out relationships among a set of objects in a way that reflected the meaning of the new word. There was a significant difference between the SLI and control children's performance. However, there was no difference if the SLI children saw the verb acted out. Thus, unlike the control group, the SLI children can not rely solely on the auditory information gained from

syntactic processing, they also need visual support.

According to Van der Lely (1994) it is much more difficult for children with SLI to select an argument structure from a syntactic frame because of the numerous possibilities that that frame may suggest. The child needs to have a more detailed representation of the syntactic frame, that is, one that specifies all the arguments within it. Only then can the information be used to process the meaning of the verb with its necessary arguments. Other researchers have supported Van der Lely's findings and attributed the ineffective use of syntactic information to limited processing abilities (Leonard, 1998; O'Hara and Johnston, 1997).

1.9 A morpho-syntactic deficit: current accounts and hypotheses

Difficulty with the use of morphology and syntax, or *morpho-syntactic* deficit, is one of the few language features observed across the spectrum of the SLI population (e.g. Clahsen *et al.*, 1997; Johnston and Kamhi, 1984; Leonard *et al.*, 1992). Researchers have tried, unsuccessfully, to separate findings according to *syntactic structure* and *grammatical morphology*, because of the necessary relationship between the two.

Syntactic structure is used to describe the structural relationship between constituents; amongst other things, it dictates word order, the movement of constituents and substitution through pronominalization. Grammatical morphology is related to the closed-class morphemes of the language reflected in inflectional morphology, derivational morphology and function words. Problems with grammatical morphology affect syntax and vice versa—a child will never have only impaired morphology or impaired syntax.

1.9.1 Mastery of syntax

Brown's pioneering work, *A First Language: The early stages (1973)*, demonstrated that children's acquisition of syntactic structures and morphology is not as much a function of their chronological development, as a function of the children's mean length of utterance

(MLU). In a longitudinal study of three children, Adam, Eve and Sarah, Brown found that utterance length and the mastery of grammatical forms varied greatly with age. The children acquired the morphemes at different rates but were remarkably similar in one very important way– the order in which morphological endings and function words were acquired. Although Brown's study included only three subjects, his findings were replicated by deVilliers and deVilliers (1978), who studied a larger number of children.

The normal development of early grammatical morphemes begins at approximately 2-2 ½ years of age (Brown's Stage II, Brown 1973). Children begin filling out their short, expressive sentences by incorporating one or more of 14 grammatical morphemes within obligatory contexts. Where morphological use is obligatory, its absence means it has not been acquired– raising concern in a child whose linguistic stage indicates that mastery should have been obtained. Obligatory contexts are those places within a sentence where an adult speaker would use the morpheme.

By noting the number of obligatory contexts for a morpheme, and the number of times the morpheme was used correctly in those contexts, the percentage of correct use for the morpheme within that language sample can be calculated. Brown (1973) used 90% correct use as his criterion for acquisition of the 14 morphemes in normally developing young children. Researchers refer to a ranking of these morphemes, according to percentage of correct use in obligatory contexts, to compare language impaired with normally developing children.

In English, deviations from adult grammar in terms of substitutions and omissions of obligatory structures, and the use of only a limited range of syntactic structures in spontaneous speech, are features of SLI. Although research into limited syntactic structures is inconclusive, a common observation is the omissions of obligatory structures. Omissions can be explained in terms of limited syntax. However, it seems plausible, from the above

research, that these omissions are also a result of the children's difficulty with the use of verb arguments, as a result of morpho-syntactic difficulties.

Regarding limited syntax, Lee (1966) compared the spontaneous speech of a boy with SLI aged 4;07 and a normally developing child. He found that the SLI child produced different types of sentence structures, characterised by omissions and a restricted range of syntactic constructions. Similar findings have been made by Leonard (1972) where again omissions were more prevalent, and the normally expected morphemes were infrequently used by the SLI children. The main omissions were indefinite pronouns, conjunctions and *Wh-* words. Morehead and Ingram (1970, 1973) however, found that when they compared SLI children with MLU matched children the two groups were similar in the syntactic rules used in spontaneous speech. They did find that the SLI children did not use major syntactic categories in different contexts compared with the MLU group. In a later study, Leonard *et al.*, (1988) confirmed the findings of Morehead and Ingram (1970, 1973) reporting that major syntactic categories were present in the spontaneous speech of children with SLI. Using the criteria of Valian (1986) they found that the SLI pre-schoolers met the distributional criteria for all the syntactic categories examined.

There are several reasons why syntactic difficulty was not detected. First, Morehead and Ingram's (1970, 1973) MLU matched control group was aged between 20 months to just under 3 years, whereas the SLI group were between 5-8 years. Had the researchers also used an aged matched control group, the differences would have been greater because most syntactic structures, including the passive, develop by 6 years. In addition, children under the age of 3 years use a restricted range of syntactic structures, therefore to claim that the SLI group were similar in the syntactic rules produced during spontaneous speech implies that their use of syntactic rules is restricted. In addition, the SLI group examined by Leonard *et al.* (1988) were much younger, and the criteria of syntactic use were much broader than the

criteria used by Morehead and Ingram (1970, 1973). It is therefore difficult to conclude that the findings from these studies are comparable. Had the researchers used the same criteria, or more detailed criteria, e.g. the LARSP, it is plausible that the results would have been different.

1.9.2 Receptive language difficulties

Children with SLI also have receptive language difficulties particularly their understanding of different syntactic structures as tested by the Test of Reception of Grammar (Bishop, 1979). It is also possible that SLI children can understand different syntactic structures but are unable to expressively make use of them. Bishop (1979, 1982) has provided detailed data with regards to this by comparing expressively and receptively impaired school age children with both age and language matched controls. She found the performance of SLI children generally poorer than the age controls on all aspects of grammar generally, and to the language matched controls; and specifically the understanding of the passive, e.g. *The boy was chased by the dog.* The SLI children performed like the younger language matched controls on sentences requiring an understanding of word order and prepositional phrases. This can be explained by the employment of a word order strategy where events can be predicted.

A similar study was conducted by Paul and Fisher (1985) who examined the understanding of word order in a younger group of SLI children (mean age 46 months). The children were presented with reversible active and passive sentences for both probable and improbable events. The children had more difficulty with the understanding of passive sentences and performed better on sentences reflecting probable events. The children employed either a word order strategy (Bever, 1970), or a probable event strategy (Chapman, 1978). Paul and Fisher (1985) concluded that the children had difficulty understanding sentences with improbable events because they had reached a point at which a word order strategy replaces a probable event strategy. This is an important conclusion in that the children may, in fact,

have difficulty understanding different thematic roles and how words relate to each other. Comprehension difficulties where a word order strategy did not apply have also been supported by van der Lely and Harris (1990) and van der Lely (1996). Syntactic structure alone is not sufficient for these children to be able to assign roles, such as agent and theme or theme and goal, to enable them to understand sentences such as passives.

1.9.3 Mastery of grammatical morphemes

Following Brown's work (1973) researchers examined the use of grammatical morphology. Steckol and Leonard (1979) compared children with SLI with younger MLU controls on their use of several grammatical morphemes and found higher percentages of use by MLU controls. Longitudinal studies are rare but extremely useful when tracking the use of grammatical morphemes as they develop over time. Albertini (1980) followed pre-schoolers over a six-month period. At the beginning of the study, SLI children's MLUs ranged from 1.5 to 2.1 morphemes. The morphemes tracked were the progressive *–ing*, plural *-s*, *in*, *on* and possessive *-s*. At the end of the six-month period, the SLI children had only acquired the morphemes *in* and *on*. The control group produced the plural *-s* 87% of the time compared with SLI group who used it only 10% of the time. The controls used the possessive *-s* 63% of the time whereas the SLI children used it only 3%. These differences are significant, however it is important to note the expected pattern would be to see control group's MLU increase after 6 months, and given that SLI children show slow lexical acquisition in 6 months, few changes would be expected. Given the longer utterances produced by the control group, it is assumed that they will produce more of the tracked morphemes. In addition, if grammatical morphemes are a clinical marker for SLI, these difficulties will not be overcome over such a short period of time (i.e. 6 months). In addition to the normal range of acquisition is a variable range, e.g. the possessive *-s* is acquired between 26-40 months and the plural *–s* between 24-33 months. Had the children been examined over a longer period of time (12-18 months), patterns of grammatical acquisition for the SLI children may have emerged. This

supports the need for longitudinal studies as has been undertaken by this work on EA.

Across the SLI sub-groups, difficulty with grammatical morphology, lack of mastery at expected developmental stages and limited use leading to omissions of obligatory morphemes, are the most prevalent language features. Leonard *et al.* (1992) observed higher percentages of use in obligatory contexts by MLU controls for four of the morphemes they examined (plural *–s*, *-ed*, 3rd person singular inflections and copula *be* forms). In addition to these morphemes Rice *et al.*(1995) found significant differences for the auxiliary *be* and *do* forms.

1.9.4 Tense: the Optional Infinitive Hypothesis and the Surface Account

Tense has been examined in the English SLI literature and has recently been examined in other languages such as Hebrew, Italian, Swedish and German (*e.g.* Grimm, 1993; Clahsen, 1991 and Grimm and Weinert, 1990; Hansson *et al.*, 2000; Hansson and Leonard, 2003; Leonard *et al.*, 2000; Dromi *et al.*, 1999, 1993; Leonard and Dromi, 1994; and Leonard, 1998).

Rice and Wexler, (1996) examined a set of morphemes that mark Tense as possible clinical markers. This included *-s* third person singular, *-ed* regular Past, *be* and *do*. They argued that this set of morphemes is likely to appear optionally in the grammar of SLI children and at a lower rate than is evident in younger controls. The clinical symptoms in Rice and Wexler's (1996) SLI group were omissions of surface forms (i.e. morphological forms: past *–ed* and *–s* third person singular). When considering Past Tense use by SLI children, regular Past inflections are used less in obligatory contexts, however, their use of irregular Past Tense is similar to younger MLU matched controls (Rice and Wexler, 1995b; and Oetting and Horohov, 1997). These findings were used by Rice and Wexler (1996) to form the *Optional Infinitive Hypothesis*. They found that children with SLI, either English or German speaking, do not have problems establishing appropriate agreement relations between subjects and verbs but rather have difficulty with Tense morphology in finite verbs. According to these

authors children acquiring English go through a stage which they call the *optional infinitive stage*— during which finite and non-finite inflections are used sometimes correctly and sometimes incorrectly. They found that this is a stage seen in normal development and ends around the age of 4;00 years, but lasts much longer in children with SLI (Rice *et al.*, 1998). They used findings in German to support their theory, but other researchers examining German report findings that conflict with Rice and her colleagues. For example, Clahsen *et al.* (1997) found that German children with SLI have difficulty with person and number features controlled by the subject in subject-verb configurations but have no problem with Tense marking. Hamann *et al.* (1998) also reported that Tense marking was not affected in German SLI children.

Alternative processing accounts have been proposed to what the underlying cause is of this predominantly grammatical deficit. Leonard and his colleagues (Leonard, 1989, 1992, 1998; Leonard *et al.*, 1992) have argued that it is not the optionality of use of obligatory morphemes that is problematic but the duration of these morphemes (physical properties) and the processing required. This is referred to as the Surface Account. According to Leonard *et al.* (1989, 1992 & 1998) grammatical morphemes that are perceived as unstressed syllables without vowel lengthening are difficult for SLI children because the children have limited (reduced) processing capacities. Although these two explanations for the underlying cause of these grammatical deficits may have benefited the research tradition in SLI, they are limited as they are limited to issues in English and can not account for language specific differences regarding verb morphology across languages. The Extended Optional Infinitive Account and the Competence model have both attempted to account for the same errors within the same language, i.e. Past Tense *–ed*, and differences have been reported (e.g. Rice *et al.*, 1998; Clahsen *et al.*, 1997).

Consequently, an account that will encapsulate errors for languages that are typologically

different will be a challenge, and has yet to appear in the literature examining SLI. A less frequently reported feature of SLI is the use of grammatical morphemes in inappropriate contexts (additions), where bound morphemes are attached to the wrong lexical item or where, in the case of the auxiliary or copula, the incorrect person agreement is used, e.g. *was* is replaced with *were* (Ingram, 1972b and Gopnik, 1990b). Errors where the grammatical morphemes are produced in inappropriate contexts is used as evidence to support operative use of grammar e.g. over-regularization errors. The degree to which over-regularizations are seen in the speech of SLI children varies. Rice *et al.*,(1995) found them only rarely. In a study conducted by Marchman *et al.* (1995) over-regularization of verbs made up 35% of the errors.

1.9.5 Verb-morphology: Tense and agreement errors

Evidence from both group and individual studies show that grammatical morphology is problematic for SLI children and that verb-morphology is more affected than noun-morphology (Leonard *et al.*, 1992; Crystal *et al.*, 1976; Eyer and Leonard, 1995). It must be remembered that English has relatively little noun or verb morphology compared with other inflectionally richer languages. Although this may be true for English it may not be true for languages that are morphologically richer, e.g. Arabic and Hebrew.

As evidenced by the above mentioned studies, the most consistently observed feature differentiating English speaking children with SLI from control groups is the use of finite verb forms, i.e. those inflected for person and number and copula and auxiliary forms requiring agreement. Such features have been used to differentiate pre-school English speaking children with SLI from children who are simply language delayed (Fletcher and Peters, 1984). Gavin *et al.* (1993) found the variable that contributed most to distinguishing between pre-schoolers with SLI and age matched controls was the high frequency of verb phrase errors, such as omissions of the copula and auxiliary *be* form. In a longitudinal study, Rice and Wexler (1995) followed a group of SLI children aged 5 to 6 years and an MLU control group aged 3 to 4 years. At each observation point they found that the MLU

control group used the regular Past and 3rd person singular inflections, copula and auxiliary *be* forms, and auxiliary *do* forms more frequently than the SLI group. By age four, the control group were approaching mastery levels (90% correct use in obligatory contexts), whereas 50% of the SLI group showed no change from five to six years of age.

Several studies, some mentioned previously, have identified differences between children with SLI and MLU controls on their use of articles and noun plurals (Albertini, 1980; Leonard *et al*, 1992; Leonard *et al*, 1997). Unlike problems with verb inflections, which appear immediately, difficulty with noun plural inflections seems slower to develop. In normal language development, the noun plural inflection in English is one of the earliest morphemes acquired. For SLI children, the noun plural inflection is generally acquired prior to the development of finite verb inflections.

The potential of noun plural inflection as a clinical marker for SLI remains controversial. Rice and Oetting (1993) compared the use of noun plural *-s* and 3rd person singular *-s* by SLI children and MLU controls. The control group showed significantly higher percentages for the 3rd person singular *-s* and for the noun plural *-s*. However use of the noun plural *-s* was also comparably high for the SLI group (83% use for SLI group and 93% for the MLU controls). When the researchers examined the data further they found that the SLI children were more likely to omit the plural *-s* if a quantifier preceded the noun. Thus if the EA-DLI children have a lexical alternative to expressing plurality they may use this instead.

1.9.6 Pronouns

Children with SLI are slower in acquiring and correctly using certain pronominal forms (Leonard, 1988). In English, pronouns are expressed as free-standing morphemes whereas in other languages, e.g. Italian, Hebrew and Arabic pronouns are bound to nouns and verbs. Children with SLI have difficulty with both indefinite pronouns, i.e. *someone* and personal pronouns such as *I, we, he, she, it*, and *they*. Several researchers have reported instances where

the accusative case pronoun is substituted for the nominative case pronouns, e.g. *Her* eating candy (Loeb and Leonard, 1988; Leonard, 1982a; and Menyuk, 1964). Trouble with the accusative case pronoun is attributed to difficulty with verb morphology agreement, such as 3rd person singular inflections and omissions of the auxiliary *be* forms (Loeb and Leonard, 1991). Interestingly, these difficulties are not only observed in the spontaneous speech of the SLI children but also in repetition tasks, e.g. the recalling sentences sub-test in the CELF-IIIR, where either the wrong pronoun is selected or the pronoun is omitted altogether.

Few researchers have noted difficulty with gender pronoun confusion, however, difficulty with one gender pronoun more than the other has been noted. Moore (1995) reported that case errors involving the 3rd person feminine pronoun (e.g. her sleeping) were more common than with the masculine form.

A counter argument for this may be that the child uses one pronoun as a default especially if they do not understand the functional use of the pronoun given their morpho-syntactic difficulties. The child's selected use of pronoun may also be affected by the child's sex and the form they hear the most. An additional, alternative phonological explanation has been used to explain this difference in pronoun use in English. Ogiela (1995) found that the pattern of substitution errors is a function of the degree to which the nominative, accusative, and genitive forms of the same person and number shared the same phonetic material. She found that the children with SLI were more likely to produce *her* in contexts requiring *she* than to produce *him* for *he* (Ogiela, 1995). For English this would support Leonard's Surface account (e.g. Leonard, 1989), however it would not support a language where pronouns can also be inclitics, e.g. Arabic. Earlier studies have also noted that it is not just that the child substitutes one case for the other but that their errors also extend to gender errors where the pronoun *she* is substituted for *him* and *he*, whereas the reverse was not observed (Rispoli, 1994 and Webster and Ingram).

1.10 Studying Specific Language Impairment in other languages

There are several theoretical reasons why SLI should be studied across languages. The first is that one language can have properties useful for theoretical hypotheses based on another language, which may not have been considered on the basis of one language, e.g. English data alone. The second reason is to establish universal characteristics of SLI from those that are specific to the language typology several languages need to be examined from different language families, e.g. Romance, Germanic, and Semitic. In addition to identifying universal and language specific features, studying language impairment cross-linguistically will also lead to an understanding of the underlying cause for the deficit.

In English, difficulty with grammatical morphemes is considered a clinical marker for SLI. English is not, however, morphologically rich. Languages such as Hebrew, Italian and Arabic which are morphologically rich and highly inflected provide interesting test cases for SLI. Researchers have successfully identified grammatical morphemes problematic for children acquiring English, but studies from other languages reveal profiles of grammatical use that are quite different. Some of these have been detailed above (e.g. Clahsen *et al.*, 1997; Hamann *et al.*, 1998). This section will review studies of SLI in **Italian** (Bortolini *et al.*, 2002; Bottari *et al.*, 2001), **French** (Le Normand *et al.*, 1993; Gerard, 1991; Le Normand and Chevrie-Muller, 1991; and Van Hout, 1989), **Spanish** (Merino, 1983; Restrepo,1995), **German** (Clahsen *et al.*, 1997; Grimm, 1993; Grimm and Weinert, 1990), **Dutch** (Beers, 1992), **Swedish** (Hansson *et al.*, 2000; Hansson and Leonard, 2003) and **Hebrew** (Leonard, 1998; Leonard *et al.*, 2000; Dromi *et al.*, 1999, 1993; Leonard and Dromi, 1994).

1.10.1 The Romance, Germanic and Semitic languages

For each of the different languages examined there are morpho-syntactic clinical markers that seem to be associated with SLI. A detailed description of the linguistic characteristics of the languages will be given. Examples were chosen of languages that share features with the

linguistic typology of the Arabic language to help identify linguistic features that may be prevalent in the speech of the EA-DLI children.

Cross-linguistically children with SLI share many features. The shared features include (1) Slow lexical development and delay in the emergence or word combinations. (2) Both expressive and receptive problems exist although the expressive problems seem more prevalent. (3) Omissions of obligatory elements in the sentence and variability in elements omitted. (4) Grammatical morphemes give the greatest difficulty to children with SLI cross-linguistically but differ in several respects depending on the morpho-syntax of the language typology (French: Plaza and Le Normand, 1996, Normand *et al.*, 1993; German: Grimm, 1993 and Clahsen, 1991; Dutch: Beers, 1992; Hebrew: Leonard *et al.*, 2000, Dromi *et al.*, 1999, 1993, Leonard and Dromi, 1994).

1.10.2 The Romance languages

In **Italian** three grammatical morphemes serve as clinical markers for the Italian-SLI: (1) omissions of function words, (2) omissions of direct-object clitics and (3) difficulty with the use of the 3rd person plural inflection (Bortolini *et al.*, 2002; Cipriani *et al.*, 1991). The Italian-SLI children were less impaired in their use of prepositions than with their use of articles and clitics. In addition, children with severe deficits were also observed to not only omit function words, but also to occasionally omit main verbs and other open-class words (Bottari *et al.*, 2001). Given the Italian SLI findings, object and pronoun clitics may be problematic for the EA-DLI children.

For the **Spanish** SLI children, difficulty with noun plural inflections and third person plural verb inflections has been reported. Omissions of grammatical morphemes and productions of incorrectly marked morphemes were more frequent in the speech of Spanish-SLI children (Restrepo, 1995) than their age matched and language matched controls. The most common types of error were agreement errors where articles failed to agree with the noun in gender

and verb inflections sometimes failed to agree with the number of the subject. Given the Spanish SLI findings, it is likely that subject verb agreement inflections will be problematic for the EA-DLI children.

A study of Puerto Rican S-SLI children by Anderson (2001) examined their use of inflectional morphology with regards to verb agreement. The children were taught a subject-verb agreement suffix that established the subject's gender. Both comprehension and production of the target form were assessed. Both the SLI group and control group were aged between 3;08 and 6;09 years. Her results indicated differences across the SLI group and the control group for both the comprehension and production of the inflectional morpheme. Significantly, the results suggest that inflectional morphology is problematic even for normal children when learning a morphologically rich language.

This is an important consideration because for languages like Arabic and Hebrew that are highly inflected, morphological errors will be observed in children acquiring the language normally. It is anticipated that these errors will not be as numerous and persistent as would be expected with SLI children.

In contrast to their cross-linguistic peers the **French** SLI children used articles a higher percentage of the time when compared with Italian-SLI, English-SLI and Dutch-SLI children aged between 4;00 and 6;00 (Le Normand *et al*, 1993 and Beers, 1992). In addition, Nominative case pronouns were less likely to be used than MLU controls. The greatest difficulty seems to be with the third person masculine singular form *il* (he) (Plaza and Le Normand, 1996). The definite article in Arabic is a bound morpheme and does not agree for gender, the process is phonological assimilation. It is therefore unlikely that articles will be problematic for the EA-DLI children as the process for use is not morphological but phonological.

1.10.3 Germanic languages

German is an interesting test case for SLI because, in contrast to the Romance languages, it relies heavily on grammatical case. It also makes significant use of inflections that have a wide range of allomorphs (Leonard, 1998). Verbs are inflected for number, person and gender, and articles are marked for number. The semantic area is often a relative strength (Grimm, 1993; Grimm and Weinert, 1990). Although phonology is sometimes weak, the use of syntax and grammatical morphology are the most problematic, in particular in their use of grammatical inflections requiring agreement (Grimm, 1993 and Clahsen, 1991).

Problems with verb morphology, word order and agreement relations were observed in Clahsen's studies (1989, 1991). Articles were either absent or they assumed the incorrect agreement for gender and number. With regards to case markings, articles were often marked with the wrong case, and if both an article and an adjective appeared in a noun phrase, the case marking was only used on one of these items.

In a study of verb inflections, Bartke (1994) examined the speech of school-age German speaking SLI children compared with MLU controls. She found that the SLI group produced more verb placement errors and used verb selected verb inflections less accurately. The German-SLI children's difficulty with verb-morphology does not seem to affect their use of participles. Clahsen and Rothweiler (1992) examined the use of participles in the spontaneous speech of a group of SLI children aged between 3;01 to 7;11 years using a MLU group aged between 1;06 to 3;09 years as controls. The two groups used participles similarly. The prefixes and suffixes used to mark the participle were omitted to the same degree in both groups.

Grammatical and syntactic difficulties appear to impact the German-SLI children's' pragmatic skills, e.g. conversational turn-taking and re-telling stories (Weinert *et al,* 1989), which are similar to reports in English (Leinonen and Letts, 1997; Fey and Leonard, 1983).

When English-SLI children are compared with German-SLI children it was found that the latter group had less difficulty with their use of grammatical morphology (Lindner and Johnston, 1992 and S. Roberts, 1995)–contrary to what would be expected. Despite the German-SLI children's use of grammatical morphology being an area of difficulty, they had fewer problems when compared cross-linguistically. Therefore the extent to which grammatical morphology will pose a problem depends upon the nature of the language being acquired. Following this it would therefore be predicted that EA-DLI children will use grammatical morphology, but errors specific to the language typology of Arabic will prevail.

Dutch speaking SLI children often exhibit limitations in phonology, morpho-syntax, pragmatics and semantics (Beers, 1992). Morpho-syntactic deficits include word order errors, agreement errors, and omission of articles.

Bol and de Jong (1992) found similar use of the auxiliary verbs by SLI children and MLU controls, although they found that several of the SLI children omitted aspect auxiliaries—in contrast to the English data where difficulty with auxiliaries was a consistent characteristic of English-SLI children. According to Bol and de Jong (1992), the reason for this cross-linguistic disparity is that Dutch and English auxiliaries function differently due to the typological differences between the two languages. The same difference is observed in German. Although significant, auxiliary use is problematic for SLI children when compared with age matched controls. We can therefore conclude, as has been gleaned from the English data, that SLI children produce the same errors of younger age matched controls, but that when these errors are expected to resolve they persist.

Verb morphology has also been examined for **German, Swedish** and **Danish**. For the German SLI children difficulty has been reported with the use of grammatical inflections requiring agreement (Grimm, 1993 and Clahsen, 1991). Problems with verb morphology, word order and agreement relations have also been observed (Clahsen, 1989; 1991). In a

study of verb inflections, Bartke (1994) found that the German-SLI group produced more verb placement errors and used verb inflections less accurately. The German-SLI children's difficulty with verb-morphology does not seem to affect their use of participles in spontaneous speech (Clahsen and Rothweiler, 1992). For the Dutch speaking SLI a conspicuous difference was that the Dutch-SLI children were more likely to use verbs requiring fewer arguments, such as intransitives, and verbs with a single argument. A study conducted by Hansson and Bruce (2002) explored verb use in Swedish-SLI. The Swedish-SLI children had difficulty producing verbs and they were less likely to select the correct verb than language matched controls. Regarding the Arabic data it is likely that agreement for gender, number and person will be problematic, as observed in the German-SLI data. However, it is unlikely that Participles will be problematic, since Participles in Arabic are only marked for gender and number and not for person.

1.10.4 Semitic languages

The Semitic languages are structurally very different to the Germanic and Romance languages and differences are found in use of Tense, Aspect, Mood and some areas of syntax. Hebrew is the only Semitic language to have been studied for SLI. Results from Hebrew SLI research are especially relevant to this research because comparisons can be drawn between Hebrew-SLI and Egyptian Arabic DLI.

Many of the cross-linguistic features reported for SLI in the Germanic and Romance languages are also observed in Hebrew-SLI. Children with SLI acquiring Hebrew show similar characteristics with regards to slow lexical development and late word combinations. Comprehension is usually superior to production and phonology and morphosyntax are most often the weakest areas (Leonard, 1998). A number of studies have been conducted by the same group of researchers examining the acquisition of verb morphology by children with H-SLI (Leonard *et al.*, 2000; Dromi *et al.*, 1999, 1993; Leonard and Dromi, 1994). The general

trend of difficulty with verb inflections has continued throughout their body of literature, however the type of verb inflections seen to be problematic and the hypothesised reasons for these have changed.

A number of studies have been conducted examining the acquisition of verb morphology by children with Hebrew-SLI (Leonard *et al.*, 2000, Dromi *et al.*, 1999, 1993, Leonard and Dromi 1994). An initial study conducted by Dromi *et al.* (1999) demonstrated that the Hebrew-SLI children's primary difficulty was with the use of agreement inflections within Past Tense. The Hebrew-SLI children made considerable use of inflectionally simpler forms, which are referred to as the "basic" forms (Berman, 1997). A follow up study conducted by Leonard *et al.* (2000) examined the Hebrew-SLI children's use of Past Tense verb morphology in further detail. Using verbs selected from each of the five verb patterns, they examined whether items requiring basic forms were in fact produced with the basic form of the appropriate Tense and whether items requiring Infinitives were produced correctly as Infinitives. Mean percentage productions were examined for the Present, Past and Infinitive forms. Contrary to Dromi *et al.*'s (1999) initial findings, Leonard *et al.* (2000), found that with one exception— pattern 3 verb forms, the children with Hebrew SLI performed at the same level as the MLU controls in their performance for Present and Past Tense basic forms as well as Infinitives. The children did however produce more "stripped forms", which are characteristic of the early stages of Hebrew child language development (Berman and Armon-Lotem, 1997). The Hebrew-SLI children were found to be similar to their MLU controls in their use of infinitives and basic forms to mark Present and Past Tense. Arabic does not have Infinitives, and whereas the Present Tense in Hebrew is expressed with Participles, in Arabic the Present Tense is marked with an inflectional system of prefixes. Therefore, it is also predicted that both the EA-DLI children and the controls will use simpler forms of the verb e.g. "stripped forms" (Berman and Armon-Lotem, 1997) where verb inflections marking Tense and Aspect are required. However it is unlikely that Tense will be problematic for the EA-DLI

children.

1.11 Summary

Descriptions of the linguistic characteristics of SLI have been discussed for the Romance, Germanic and Semitic languages in an attempt to identify potential linguistic markers that may be problematic for Egyptian Arabic developmentally language impaired children. There are similarities seen across the languages examined for SLI as well as differences depending on the typological language differences, and differences are observed between languages that are similar. It is therefore expected that there will be shared language characteristics between the languages examined for SLI and for EA-DLI, but also differences.

The large corpus of cross-linguistic data provides researchers with a rich source of information to gain insight to the nature and underlying cause of SLI. In an attempt to explain the similarities and differences across the SLI groups and across the languages several hypotheses have been suggested which attempt to account for the morpho-syntactic deficit observed across the SLI population. These hypotheses can be classified broadly as either competence- or performance-based. The Competence-based models are more recently referred to in the literature as the *agreement-deficit hypothesis* which assumes that grammatical deficits are the result of missing features or selective impairments in the child's internal linguistic representations--that is they have difficulty acquiring formal features of language (Clahsen *et al.*, 1997; Clahsen, 1989; and van der Lely & Harris, 1990). Performance-based models, often referred to as the *Surface Account*, typically assumes that grammatical deficits in SLI are secondary to processing limitations and that it is the children's limited processing capacity impacting their use of inflectional morphology (e.g. Leonard, 1998 and Leonard *et al*, 1992). If SLI is a performance deficit, then the pattern of grammatical errors would vary with changes in processing demands. Thus, if the linguistic deficits observed for SLI are the result of processing limitations then potential errors will be greatest during spontaneous speech

where processing demands are highest (Evans, 1996). However, if the deficit is one of competence then it will be apparent even in less demanding contexts. Arabic is different to the languages that have been used to support these theories, but given the system of verb inflectional morphology in Arabic it is expected that the Arabic data will support the competence based models (Clahsen *et al*, 1997; Clahsen,1989; and van der Lely & Harris, 1990).

1.12 Objectives and aims of research

The first aim of this study is to identify and describe the linguistic characteristics of Egyptian Arabic Developmental Language Impairment (EA-DLI) and to compare these with the normal development of Egyptian Arabic (EA). Cross-linguistic research into SLI supports specific language features depending on the language typology examined. The second aim is to compare Egyptian Arabic Developmental Language Impairment (EA-DLI) with Language Impairment examined for other languages (SLI), and to identify linguistic characteristics that are shared and those that are specific to the language typology examined, i.e. Egyptian Arabic. The questions that will be addressed are:

1. What are the linguistic features of Egyptian Arabic Developmental Language Impairment?

2. What are the similarities and differences in error patterns between children acquiring Egyptian Arabic language normally and those with impaired language?

3. What are the similarities and differences between Egyptian Arabic Developmental Language Impairment and other languages researched for specific language impairment (SLI)?

1.12.1 Linguistic differences between Arabic and languages examined for SLI

The study of Egyptian Arabic developmental language impairment will be on grammatical morphology, as it is an interesting language to examine for SLI due to its complex system

of inflectional morphology for verbs, nouns and adjectives. Some of the differences between Arabic and other languages examined for SLI include the following— In Arabic there are no Infinitives and verbs are not only marked for Tense but also for subject verb agreement for number, gender and person. In addition, Arabic is a polysyllabic language where assimilation occurs within and between words and vowel lengths change according to inflections, e.g. the definite article. The copular in Arabic is not obligatory, therefore whereas in English or French its absence would constitute an error pattern this would not hold for Arabic. Therefore again, typological language differences must be considered when examining the possible linguistic errors in Arabic language impairment.

For SLI children, the noun plural inflection is generally acquired prior to the development of finite verb inflections. In Arabic, however, noun plurals are one of later morphological structures to be acquired (Ravid and Farrah, 1999; Omar, 1973). Phonological explanations have been used to explain difficulties in pronoun use in English. Ogiela (1995) found that the pattern of substitution errors is a function of the degree to which pronouns nominative, accusative, and genitive forms of the same person and number shared the same phonetic material. She found that the children with SLI were more likely to produce *her* in contexts requiring *she* than to produce *him* for *he* (Ogiela, 1995). For English this would support Leonard's Surface account (e.g. Leonard, 1989), however it would not support a language such as Arabic where pronouns can also be inclitics. These linguistic differences will affect interpretations of theories that account for grammatical deficits in SLI, since the features used to support these theories are not present in Arabic.

Several accounts and hypotheses have been formulated to account for the grammatical deficits observed in children with SLI. These will be discussed with the view of how the Arabic language may or may not support these accounts.

From a theoretical perspective, the study of SLI provides insight into linguistic and

language acquisition theories. However, linguistic features observed in one language do not hold for other similar languages. Even within language families differences are reported in the errors observed in children with SLI. For example for the Germanic languages differences have been reported between German and Dutch (Bol and de Jong, 1992). The only Semitic language to have been examined for SLI is Hebrew and although Arabic and Hebrew share many features there are important linguistic differences. For example, there are Infinitives in Hebrew but not in Arabic. The Present Tense in Hebrew is expressed using Participles with agreement only for gender and number; in Arabic however, it is expressed using aspectual markers with agreement for number, gender and person.

If SLI is defined as a morphosyntactic deficit, differences would be predicted regarding the expressions of grammatical relations between lexical items. Obviously the language specific forms that these morphosyntactic forms take will vary between highly inflected and less inflected languages.

There are differences between the Indo-European Languages studied for SLI and Arabic and some of these have been mentioned above. Arabic is an interesting test case for SLI because of these linguistic differences. These differences are summarised below and will be discussed in more detail in the next chapter.

(a) Arabic has rich inflectional morphology.

(b) There are no copulas in the present Tense.

(c) There are clitic pronouns for objects and clitic strings.

(d) There is a split discontinuous negative.

(e) Verbs are marked for Tense/Aspect, number, gender and person.

1.13 Assessment tools for Arabic

As mentioned previously there are no sensitive language tools that have been developed to truly assess the presence of a language disorder in Arabic. In addition, data on the normal development of Arabic is sparse. It is vital that an understanding of normal development is established to be able to differentiate normal developmental errors from those errors that can be considered part of a profile of SLI. Therefore the need for studying the normal development of Arabic has been an integral part of this work.

One of the only assessments available to paediatric therapists working with Arabic speaking children is *The Arabic Language Test* (Mostafa, 1994). This test is aimed to examine expressive and receptive linguistic skills in Egyptian Arabic speaking children. There are several methodological, theoretical, and linguistic variables which were not considered by Mostafa (1994), and therefore, affect the validity of the Arabic Language Test. Firstly, the assessment protocols and sub-tests examined are based on the language development of English speaking children and on English grammar. She includes grammatical categories which although relevant in English are not part of the Arabic linguistic system, e.g. Sub-test 16: "comparatives and superlatives", and Sub-test 17: "the passive voice sentence". She only includes free pronouns and does not include clitic strings or bound clitics. She does not test noun adjective agreement, but examines adjectives as they would be acquired in English speaking children. She does not make Arabic Tense/Aspect distinctions and uses the English Tense categories. When assessing the plural she does not make distinctions between regular, irregular plurals and the dual. There are several other methodological inconsistencies. Firstly this assessment is to be used with pre-school children and utilises black and white pictures. Research conducted on young children with language impairment does not support formal assessment tools using pictures (Dunn *et al.*, 1996) and specifically not black and white pictures (Rice and Wexler, 1996). Second, the age range for the Arabic Language Test is between 2-8 years. There are morphological structures that appear earlier in English than

Arabic, for example plurals in Arabic are not acquired until after 7 years (Omar, 1973). Therefore, what would appear to be a delay in English would be part of the normal developmental process in Arabic. In summary, the Arabic Language Test does not consider the language specific aspects of the Arabic grammar or the age range of the children, and is not culturally sensitive.

We have already seen from the languages studied that features that can be considered as clinical markers in one language may not hold for another. This has therefore led to the need to develop language specific and culturally sensitive testing materials for this study. Although the main focus of this work is to discuss how SLI manifests in Arabic and to identify potential clinical markers which can be used to assist in a diagnosis of SLI, the designing of assessment tools has been a secondary development.

1.14 Potential linguistic "clinical markers" which may be symptomatic of Egyptian Arabic developmentally language impaired children

It is anticipated that EA-DLI children will show both differences and similarities in their language features when compared with the languages examined cross-linguistically for SLI. In addition, it is also expected that there will be differences and similarities between the EA-DLI children and the children acquiring Egyptian Arabic normally. The linguistic areas of interest are summarised below in Table 1.2:

Table 1. 2 The Linguistic areas of interest

1	When compared with the normally developing EA children the developmentally language impaired children will be slower in their lexical development and later in their emergence of word combinations. As a result their MPU values will be lower and slower to develop than their controls.

2	The EA developmentally language impaired children's percentage of errors will be greater than their controls and will fluctuate. The controls' percentage of errors will drop over time.
3	A functional analysis of language will show that the developmentally language impaired children will respond to fewer questions that require abstract verbal reasoning (Intraverbals) and they will produce more disordered and learnt repetitive phrases (Others).
4	When compared with the normally developing children the developmentally language impaired children will omit more obligatory elements in their utterances including inflectional morphology and lexical items.
5	When compared with the normally developing children the developmentally language impaired children will produce fewer verb types and tokens. In addition verbs will be produced with errors of agreement for number, person and gender; but Tense and Aspectual marking will be less problematic. GAP verbs will be used by the younger controls and the EA-DLI children.
6	The control children will name more objects and actions than the language impaired children as tested by the Winslow nouns and verb tasks. It was further hypothesised that both the control children and the language impaired children would name more nouns than verbs.
7	The developmentally language impaired children will omit

	and/or produce lower percentages of bound and free pronoun clitics, negative particles, prepositions and articles.
8	When using negative particles the language impaired children and the younger control children will begin by using the lexical negative particles and later use the discontinuous negative particles.
9	The developmentally language impaired children will produce fewer regular, irregular plurals and dual forms than their controls. Over-regularization errors will be present in both groups.

2. A MICRO-GRAMMAR OF THE ARABIC LANGUAGE AND RELATED STUDIES

The first aim of this chapter will be to define the language being studied, Spoken Egyptian Arabic (EA). A brief introductory outline of morphological and syntactic patterns of the language will be given in relation to normal developmental patterns and cross-linguistic features reported for SLI. This will be followed by a summary of the studies conducted into normal Arabic language development and Acquired Arabic language impairment in adults (Agrammatism).

2.1 The Arabic Language: classification of the language varieties of Arabic

In the late 1990s, the Arabs numbered over 260 million, which is approximately 5 percent of the world's population. Arabic is the sole or official language of twenty independent Middle Eastern and African States (Holes, 1995).

Due to influences from the media, tertiary education and religion, there has always been inter-dialectal contact between different Arab populations. Arabs would agree that although the varieties and forms of spoken Arabic may be diverse due to geographical, political and educational differences, it is, however, possible for fellow Arabs to understand one another. In order to understand the language form being studied we need to first classify the Arabic vernaculars.

The Arab world covers a vast geographical area and consequently there are thousands of spoken dialects of modern Arabic that do not preserve Proto-Semitic features in such

abundance. There is a wide divergence between *Modern Standard Arabic* and *Modern Dialect Arabic*, thus leading to an Arabic *diglossia* (Ferguson, 1959). The term diglossia is used to describe a situation where two distinct forms of the same language are used by members of the same community. One form is usually acquired before formal education and the other is acquired through education. The two forms are appropriate to different contexts and functions

Modern Standard Arabic (MSA) is used in reading, writing, and high register speech, e.g. public speeches, and is a descendant of *Classical Arabic*. The language of conversation is referred to as *Dialectal Arabic* (DA) or *Spoken Arabic* (SA). In this work the latter term will used. Arabs will often refer to the spoken varieties as "slang", despite being the chosen language for all their daily interactions. However, if they encounter a language situation requiring greater formality, MSA possibly becomes their language of choice. In every part of the world where Arabic is spoken this diglossia exists. That is two forms of Arabic exist side by side, the language which is spoken regularly, e.g. Egyptian Spoken Arabic (EA) and which children learn as their first language (Omar, 1973) and then the modern standard form (MSA), derived from Classical Arabic which is learnt at school and heard on the radio and television. The spoken form is not usually represented in the written form and it is the MSA which can be used both as a spoken and written form of the language. MSA is the same throughout the Arab world, while there are wide differences between the various spoken dialects.

2.2 Egyptian Spoken Arabic

The language being studied is Egyptian Spoken Arabic (EA). 55 million Egyptians use spoken Egyptian Arabic (EA). Outside of Egypt, EA is the most widely understood of the Arabic vernaculars.

MSA continues to be viewed by Egyptians as the superior and most prestigious of the varieties of Arabic spoken. Egyptian Arabic speakers will generally refer to EA as the

"slang" form (/ al-ʕa:mmiyya/). Many language barriers are crossed by speakers of EA, depending upon whom they are addressing, the formality of the place and the medium of communication. Speakers will shift through the spectrum of MSA to EA. Hence, it is difficult to provide a definitive characterisation of the vernacular (Eid, 1990). However, given the nature of the project and the criteria required for subject selection it can be assumed that although the children are exposed to a range of vernaculars, they will be exposed to the same range, which together form the contemporary language studied, i.e. Spoken Egyptian Arabic.

2.3 Micro-grammar: morphology and syntax of Egyptian Arabic

In this section descriptions of Arabic morphology and syntax will be provided to assist in the understanding of the linguistic features seen in the EA-DLI children's language. This is by no means a full description of the grammar of spoken Egyptian Arabic. Special emphasis will be given to the most salient grammatical features that are predicted to be problematic in EA-DLI (for a more detailed analysis of spoken Egyptian grammar please refer to Mitchell and El-Hassan, 1994; Holes, 1995; and Brustad, 2000). As mentioned in the previous chapter Arabic is structurally very different to many of the Indo-European languages studied for SLI, therefore it is important to highlight the differences, specific to spoken EA. In the following section we will describe the core features of the language, necessarily abstracting away from the polydialectalism which is a feature of the adult form.

Most of the books written on Arabic grammar (Fleisch, 1968; Badawi and Hinds, 1986) have focused on the morphology of the language and few linguists focus on the syntax. There is a vast amount of literature describing the grammar of Classical Arabic and Modern Standard Arabic, however, no complete reference grammar has yet been written for spoken Egyptian Arabic (Eid, 1990; Eid and Holes, 1993). To understand the errors of children with EA-DLI it is important to have an understanding of what are the patterns of production of non-language impaired children acquiring the language and indeed the effect that language

specific features may then have on EA-DLI.

2.3.1 Transcription conventions

Spoken Egyptian Arabic is not standardly written in the Arabic script; therefore utterances will be represented in their phonetic form using the IPA symbols. This will make it easier to then compare children's language with the adult form and will avoid the confusion of having to use the Arabic script. When examples of the language impaired children's utterances are given they will be represented using the corresponding phonetic symbols. The root will not be highlighted. The first line will be the phonetic transcription of what was said in Arabic. The second line will be a gloss showing relevant grammatical features in the order in which they are said in Arabic with the case, number and gender information. The third line, in italics, will be an idiomatic English translation. Bound morphemes will be separated using the symbol - between the morpheme boundaries. If a target production is also being illustrated the same pattern of presentation will be used. Utterances will be between /../and if the utterance has an error it will be marked with a *.

2.3.2 The phonology of Egyptian Arabic

Table 2.1 shows the standard Arabic orthographic symbols for consonants, the corresponding IPA phonetic symbols used for transcription and a description for the place and manner of articulation. Arabic short vowels are orthographically represented using diacritics. The vowels are included at the end of the chart in Table 2.2. The reflex of MSA /ʤ/, the Arabic letter "ج" is pronounced by Cairene speakers as /g/ and by Egyptians from upper Egypt as /ʤ/. Most if not all Arabic sounds can be velarised. One set of velarised sounds are phonemically distinctive: these sounds are often referred to by linguists as "emphatics" and are /T/,/D/,/S/ and /ð/ (Mitchell, 1990). However, to give a more accurate description of the manner and place of articulation the term "velarised" has been used. In terms of phonotactics, Arabic phonology does not allow for initial clusters,

clusters in Arabic are either medial or final. Assimilation is a process in EA. This is where a sound process takes place by which features of one element change to match those of another that precedes or follows. For example, in the production of the definite article /əl-/ when the initial consonant following the article is an alveolar or palato-alveolar sound the process of assimilation takes place- /əl-Taba?/ → /ət-Taba?/ (the-plate).

The uvular plosive /q/ appears in classical Arabic, however in spoken Cairene EA it only occurs in certain words, e.g. /əl-qa:hira/ "Cairo". Normally in spoken EA the /q/ becomes /?/, however its usage is dependent on the usage of register and the individual speaker. For example, "pen" in Classical Arabic, /qallam/, becomes /?alam/ in Cairene spoken EA. Sounds which are not part of the phonology of the language, i.e. /v/ and /p/ and /tʃ/, do appear in borrowed words. For example, /pisi:n/ "swimming pool" (from French) and /televizyu:n/ "television".

Table 2. 1 The Arabic script with the corresponding IPA symbols

Arabic script	**IPA symbol**	**Manner and Place of articulation**	**Arabic script**	**IPA symbol**	**Manner and Place of articulation**
ء (أ)	ʔ (ʔ)	Glottal stop	ض	D	Velarised voiced dental plosive
ب	b	Voiced bilabial plosive	ط	T	Velarised voiceless dental plosive
ت	t	Voiceless alveolar plosive	ظ	ð	Velarised voiced palato-alveolar fricative
ث	θ	Voiceless dental fricative	ع	ʕ	Voiced pharyngeal fricative
ج	g (ʤ)	Voiced velar plosive	غ	ɣ	Voiced Velar fricative
ح	ħ	Voiceless pharyngeal fricative	ف	f	Voiceless bilabial fricative
خ	x	Voiceless Velar fricative	ق	q	Voiceless uvular plosive
د	d	Voiced alveolar plosive	ك	k	Voiceless velar plosive
ذ	ð	Voiced labio-dental fricative	ل	l	Voiced lateral approximant
ر	r	Dental trill	م	m	Bilabial nasal
ز	z	Voiced alveolar fricative	ن	n	Alveolar nasal
س	s	Voiceless alveolar fricative	و	w	Voiced labio-velar continuant
ش	ʃ	Voiceless palato-alveolar fricative	ي	j	Voiced palatal continuant
ص	S	Velarized voiceless alveolar fricative	ه	h	Voiceless glottal fricative

2.3.3 The Vowels

There are eight vowels, which can be divided according to length. They are referred to as short vowels and long vowels.

Table 2. 2 The vowels in Egyptian Arabic (N.B. The symbol /:/ is used to mark lengthening of the vowel).

The short Vowels	The long Vowels	
/i/ close front	/i:/	/u:/
/a/ front open	/e:/	/o:/
/u/ back rounded	/a:/	[/ə/ schwa]

A number of phonological and morpho-phonological processes take place. One of these is the assimilation of the definite article, described in section 2.3.2. When the definite article /el-/ is prefixed to a word beginning with an alveolar, the /l/ of the definite article is assimilated to the alveolar consonant, which is geminated. In informal conversational speech this process is extended to words beginning with /k/ and /g/, e.g. the word for "book" /el-kita:b/ becomes /əkkita:b/ and the initial vowel becomes a /ə/.

2.4 Arabic Morphology

In this section the labels used to describe morphological features of the children's speech, such as their use of verb morphology (Tense and Aspect), will be explained. The Arabic verb system is highly complex (McCarthy, 1981). There is no standardised method for describing morphological features of spoken Egyptian Arabic. Various labels are used to describe Tense and Aspectual markers and mood; this becomes very complex and confusing when trying to understand and analyse the language of children acquiring spoken Egyptian Arabic. The same

Tense categories are often given different labels; some linguists use the labels Past and Non-past (Mitchell and El-Hassan, 1994) whilst others use more traditional labels such as the Perfective and Imperfective (Holes, 1995).

A notable distinction between Arabic and the Indo-European languages is that Arabic morphology is of the type known as non-concatenative. The Prosodic Theory of Non-concatenative Morphology developed by McCarthy (1981) was originally based on the principles of Autosegmental Phonology proposed by Goldsmith (1976) for African tone languages. By applying Goldsmith's multi-linear approach to Semitic languages, McCarthy was able to formulate a theory of a discontinuous morpheme arranged in a three dimensional space.

As with any Semitic language all words- verbs and many nouns and adjectives- consist of a combination of *root* and *pattern*. Although a controversial subject, most researchers in Arabic Linguistics hold the view that the root is composed of two or three discontinuous radicals (Boudelaa and Marslen-Wilson, 2001).The *root* holds the basic semantic information and the word *pattern* carries syntactic and sometimes semantic information. The root on its own is not itself a word, (i.e. K-T-B or L-B-S), it is only by the insertion of patterns of vowels that actual words are formed. Lexical sets are therefore formed which are both structurally and semantically related to the root. Therefore by infixation, prefixation and suffixation a large range of lexical items can be generated. Throughout this section when referring to the morphological pattern, the root as an abstraction will be represented using capital letters (e.g. RWH, KTB, *etc*). For example, the root L-B-S relates to the concept "*wear* (clothes)" and it appears in the following word forms among others, the root consonants being highlighted:

Table 2. 3 Examples of the root using the **LBS** wear

1. /ma.-**libis**-ʃ gazmitu/ He did not wear his shoes	2. /**libis** gazmitu/ He wore his shoes	3. /**liba:s**/ Underwear	4. /**mala:bis**/ Clothes

When comparing the examples above we can see that nouns are derived from the same root by the affixation of vowels and consonants.

2.4.1 The verb phrase (VP)

A verb phrase (VP) must contain a verb and one verb is a sufficient constituent of the VP. Arabic has "verb-less" sentences, which have a "deleted" copula (Mitchell and El-Hassan, 1994). Other contemporary linguists refer to such sentences as "nominal" (Holes, 1995) and this is the term that will be used to refer to sentences which contain no verb. In the example, /el-wallad fil bi:t/ (*definite article-Noun)* the-boy *(Prep.)* in *(Noun)* house*)*, "The boy is in the house", there is no copular verb.

In many contexts the use of the subject pronoun is also optional. It is important to therefore consider these language specific features. One feature that may be problematic in one language will not hold for another as has previously been discussed. For example, in English children with SLI frequently omit the copula (Conti-Ramsden and Hesketh, 2003), but its absence in Arabic would not be a significant marker of a language impairment.

Word order is more flexible in Egyptian Arabic than in English. The basic order is Subject-Verb-Object (SVO), although a number of other orderings of the major sentence constituents are found. Egyptian Arabic displays characteristic properties of a Verb-Object (VO) language. Unaccusative verbs such as /wiʔiʕ/ (fell) can have an inverted subject. For example, /wiʔʕit eʃ-ʃagara/ (*Perfec.*fell *Def.Art.* the- tree), "The tree fell". Inversion is generally an optional order and in the above example it would be also be possible to say, /eʃ-ʃagara wiʔʕit /; (Def.Art.the-tree *Perfec.*fell), "The tree fell"; which would be the most used variety.

2.4.2 Verb Particles

Verbal particles include the modal and aspectual particles (e.g. /ʔa:jiz/want, /la:zim/need),

the negative particles (e.g. /ma-ʃ/, /miʃ/) and particles of command or request (e.g. /jalla ne-ruħ/ "let's go"). Complements of verb (verb arguments) are structural elements which if absent render the sentence incomplete or ungrammatical. Complements are of several kinds and include, predicative complements. According to Mitchell and El-Hassan(1994) the predicative complements can be further sub-divided in accordance with grammatical type and include (a) adjectival, (b) nominal, (c) verbal and (d) prepositional phrasal, in sentences containing copular verbs

Adjuncts in Egyptian Arabic are distinguished from complements and fall into an adverbial sub-class, which are generally omissible without rendering the sentence incomplete. Adjuncts correspond to the adverbial divisions of time, place, manner, purpose and cause, etc.

2.4.3 Tense in Egyptian Arabic

An explanation of Arabic Tense and the Tense labels used will be discussed in relation to how verbal analysis will be conducted for both the language impaired and normally developing children. The theoretical framework adopted for this section is that of Holes (1995) and Mitchell and El-Hassan (1994). For a more comprehensive description of Modality, Mood and Aspect in Spoken Arabic see Mitchell and El-Hassan (1994)

Germanic and Romance Tense distinctions cannot be applied for Arabic. Arabic has two main verbal paradigm Tenses, which refer only subtly to temporal distinctions. As explained by Mitchell and El-Hassan, (1994):

"They are two sets of finite forms whose paradigms are congruent in terms of the categories of person, gender, and number and also congruent with the system of personal pronouns. Tense is, in fact, more closely based on person than on any other category."

(Mitchell and El-Hassan, 1994 Ch.2, pg. 13)

The *Perfect* and *Imperfect* are the labels most commonly applied to the Tenses, however within the framework of Arabic grammar some grammarians prefer to use as Tense-labels the terms "Past" and "Non-Past", past being used to describe actions which have been realised and Non-Past for other Tense to indicate both the morphological contrast between the two and the reference to a non-realised action. Tense labels adapted from Mitchell and El-Hassan (1994) will be used to describe the pattern of verb use by the EA-DLI children.

2.4.4 Perfect (Past) and Imperfect (non-Past) verb Inflections

As mentioned Verbs in EA agree with their subjects, and carry affixes expressing *person* (first, second, third), *number* (singular and plural) and *gender* (masculine and feminine), in addition to the affixation for verb information, e.g. Tense. The two primary verbal paradigms in EA are the Perfect and Imperfect and are described below.

Whilst the Perfect is characterised by the addition of suffixes encoding categories for person, number and gender, the Imperfect is characterised mostly by prefixes and some suffixes. There are various forms of the Imperfective and its use varies according to the context. A system of proclitics, *bi-*, *ha-* and zero are used in spoken EA to mark continuative (progressive), habitual and future action.

Using the root sequence **l-b-s**, associated with the concept "wear" (clothes), the verbal paradigms for the Perfect and Imperfect are listed below:

Table 2. 4 The Perfect and Imperfect verb forms for the root sequence l-b-s

The Perfect verb form		The Imperfect verb form	
libɪs-t	I wore	ʔa-**lbɪs**	I wear/ am wearing
libɪs –t	You (masc.sg) wore	ti-**lbɪs**	You wear (masc.sg)/are wearing
libɪs-ti	You (fem.sg) wore	ti-**lbɪs-i**	You wear(fem.sg)/are wearing

libɪs	He wore	ji- **lbɪs**	He wears/ is wearing
libɪs –ɪt	She wore	ti- **lbɪs**	She wears/ is wearing
libɪs –na	We wore	ni-lbis	We wear/ are wearing
libɪs –tu	You (pl) wore	ti- **lbɪs-u:**	You wear/ are wearing
libɪs –u	They wore	ji- **lbɪs-u:**	They wear

As can be seen from the table above, the 3rd *person masculine singular* form, /**libis**/ is the closest to the root, in that it carries no affixes. The Imperative form is /ʔilbis/. It is also important to note that the bare form of the Imperfect, /lbis/, in spoken EA constitutes an un-pronounceable non-word, whereas in the Perfect form the 3rd Masculine Singular is the form with the least affixation. It is therefore possible that when the language impaired children attempt to use the Imperfect form of the verb they will not produce a non-word or an un-pronounceable form but they will use a simplified form which may appear to result in a Tense substitution. Figure 4.1 over leaf illustrates this. The root KTB, denoting the notion *to write*, has been represented in the Imperative, Perfective and Imperfective. The example in the Imperfective, illustrates how morphemes can be added and strung to produce sentences, as in the example given, They-are writing-it-for-me.

(a) Verb root:	**KTB** (write)						
(b) Stem	(i) /**katab**/ (3rdMasculine Singular) Perfective-stem *He wrote* (ii) /ʔ**iktib**/ (3rd Masculine Singular) Imperative *Write* (iii) /**ktib**/ Imperfective-stem (highlighted below) /bi-yi-ktib-u-h-l-i/ *They are wrtiting it for me*						
(c) Affixes	/bi - yi -**ktib** - u - h - l - i/ 1 2 3 4 5 6 7						
Seven morphemes	1. Aspect (Habitual/progressive)	2. 3rd Sing. Inflectional marker	3. Imperfective Stem	4. Plural suffix (they)	5. 3rdSingMasc-Clitic pronoun	6. Clitic dative Prep.	7. 1Sing.Clitic

Figure 4. 1 An analysis of the morphemes that can be affixed and suffixed

2.4.5 Regular and Irregular Past Tense in Egyptian Arabic

Irregular forms of Past Tense in Egyptian Arabic are relatively few, and fall into subsets that are largely predictable. There are three main irregular forms—

(a) The 'hollow' forms in which the root contains a long vowel as the middle radical. The long vowel of the imperfective is shortened in the past/perfective as in /ʔa:l/ *said*, /ʃa:f/ *saw*, /ra:H/ *went*.

(b) 'Weak' or 'defective' forms, e.g. /miʃi/ (he left), /ɣili/ (it boiled), (i.e. roots which end in a semivowel). These feature a lengthening of the final vowel when certain Past/Perfective suffixes are attached, e.g. /miʃi:t/ (I left). Plus, with the singular feminine ending, they acquire a /j:/ as in /miʃ-j-it/ (2ndFem.Sing.left) and /ɣiljit/ (Fem.it-boiled).

(c) 'Doubled' verbs, e.g. /radd/ (answer/reply), /ħabb/ (love), with a doubled final radical, acquire a vowel when (some of) the perfective suffixes are placed, e.g. /ħabbe:t/ (3rd Fem. Sing. loved), /radde:ti/ (had you(Fem) replied(and /radde:na/ (we replied).

There are some irregular Past Tense forms such as /kal/ (ate), and /xad/ (took) which correspond to verbs which in MSA have an initial hamza (ʔ) in the Perfective/Past. These feature a long vowel after the prefix in the Imperfective, for example /ja:kul/ eat, /ja:xud/take, but otherwise behave like other verbs in the Perfective/Past, e.g. /xatt/ (I took) and /xadu/ (they took).

The 3rd Person, singular masculine form of the Past (Perfective) is usually taken, in Arabic

linguistics, as the 'stem' form, or citation form for the verb: e.g./ katab /*wrote*,/ wiʔiʕ/ *fell*,/ ʃa:f/ *saw*,/ miʃI/ *left*,/ xuluS/ *finished*. The Present/Imperfective features change the syllable structure. The vowel between first and second consonants is dropped, plus a change of 'theme' vowel: e.g. /katab/ 3rd Masc.Sing.wrote; /yiktib/ 3rd Masc.Sing.writes; sha:f 3rd Masc.Sing.saw.

2.4.6 Habitual Aspect and the Progressive Aspect in Egyptian Arabic

As mentioned, the Imperfect is generally characterised by prefixes, in addition to two prefixes which may be attached to the Imperfect form: /ha-/ which denotes futurity and /bi-/ which denotes the Progressive or Habitual Aspect. The Imperfect Tense has the least affixation and it is often referred to as the *Bare Imperfect* (i.e. it does not have the aspectual marker /bi-/).

Table 2. 5 Examples of future and progressive markers

Example of future Tense	Example of progressive Tense
"huwwa *bi*-ji-**lbis** hidumu"	/heja *ha*-ti-**lbis** hidum-ha/
He is-putting-(wearing) his-clothes	*She will-wear clothes-her*
He is putting his clothes on	She will wear her clothes

The prefix *bi-* signifies either progressive (continuative) or habitual aspect, the difference being determined by context and it is not always used. In the example below , /bi-ji-**ktib**/ as in "write" can either mean 'he writes' as in he writes, for a living or 'he is writing' - at this moment, or around this time.

Context 1: 'He writes' for a living.

Speaker A: /yishtaɣal e: ?/ He-works what *What does he do for a living?*	Speaker B: /bi-ji-ktib maqala:t/ (hab.asp.)-he-writes articles *He writes articles*

Context 2: 'he is writing' - at this moment, or around this time:

Speaker A: / biya'mel e:/ He-doing what *What is he doing?*	Speaker B: / bi-yiktib fi maktabu / (3rdMasc.sing prog)-he-writing in study *He is writing in his study*

2.4.7 The Future

The Future action marker is /ha- /or /ħa-/. It is followed by the gender/person marker (-ji- or –ti-) as in /ha-ji-ktib/ (he-will-write), /ha-ti-imʃi/ (she-will-walk/leave) jimshi and/ ha-ji-ixsil-u/ (they –(*masc*)-will-wash).

2.4.8 The Participle and the Passive

There are two Participle forms that are referred to as the *active* and the *passive*. The Participles are morphologically like adjectives and do not inflect for Tense/Aspect, or for person. However they do share many of the characteristics of verbs and can be regarded in some functions as members of the class of verbs. For example, the Participle /maksu:ra/ means 'broken' (has been broken), as well as being a Participle it can also function as an adjective.

Unlike English, Arabic has a morphological passive. The object is promoted to become subject of the passive verb, while the original subject is deleted. The agreement morphology on the verb changes accordingly, to agree with the new subject, which assumes nominative

case.

Using the same root KSR, the passive can be formed as in /itkasarit/. This is the 'passive'/reflexive of /kasar/ break, and means something like '(it) got broken' (by somebody). For example:

Participle: /el-koba:ja maksu:ra/ (The cup is broken)

The passive: /el-koba:ja itkasarit/ (The cup has been broken)

2.5 Noun and Adjective morphology

The majority of nouns in EA are related to a tri-literal root. Inflection in the noun is restricted to gender and number. There are two genders, masculine (Masc.) and feminine (Fem.). Feminine nouns usually end in *–a,* and the adjectives follow the noun they modify and must agree with them in number and gender. There is no case marking for nouns (save for pronouns). The examples below are for a feminine noun-adjective combination, a masculine noun-adjective combination and an irregular feminine noun-adjective combination.

Table 2. 6 Examples of masculine and feminine adjectives and nouns

Feminine noun-adjective combination	Masculine noun-adjective combination
/gazm-**a** kibir-**a**/	/kursi kibir/
shoe (fem.sing.) big (fem)	*chair (masc.sing.) big (masc)*
big shoe	big chair

Table 2. 7 Irregular (feminine) noun-adjective combination: the noun does not end in /–a/ but it is feminine.

Irregular feminine noun-adjective combinations
/əl-ʔamar kibira/
the-moon (fem.sing) (is) big (fem.sing)
The moon is big

2.6 Number category: plurals

One of the unique features of Arabic is its use of number category, being *singular, dual and plural.* The dual is indicated by the suffixation of /–e:n/.

Table 2. 8 Singular, dual and plural forms

Singular	The dual	Plural
/toffa:ħa/	/tofaħte:n/	/toffa:ħ/
apple	*two-apples*	*apples*
Apple (one)	apples (two)	apples (many)

There are regular plurals and irregular plurals. The regular plurals are formed by suffixation and are distinguished from the irregular or "broken" plurals, which involve change to the vocalic template, and in some cases affixation, or both.

The regular masculine plural suffix is */–i:n/* or */–e:n/* depending upon the spoken variety, as in /mudarris*i:n* / (teachers). This suffix is found mainly with nouns and adjectives that denote human beings. The regular feminine plural suffix is */–a:t/*. In addition to forming the plurals of nouns denoting female humans, many feminine nouns that end in */–a/* take the regular feminine plural ending.

The irregular plurals are commonly referred to as *broken* plurals, and constitute the majority. They are not predictable and thus have to be learnt, as the plural form cannot be predicted from the singular form. An example of the broken plural with its single counterpart is listed below.

Table 2. 9 Singular and broken plural forms

Singular	*Broken Plural*
/kursi/ chair	/karra:si/ chairs

2.7 The Pronouns

Unlike nouns, pronouns are marked for case. They appear in two forms- the Nominative and the Accusative. Subject pronouns are generally independent and stand-alone. Pronominalised objects are enclitics on either the verb, the preposition governing the object, or participles. The set of object clitics corresponds to the independent pronouns, and marks the same set of person, number and gender distinctions, unaccusative and dative. Clitics can be attached to the verb in strings, increasing the number of bound morphemes. Nothing can intervene between verb and clitic. In the example below the single lexical item contains five morphemes, the English gloss would be "She sent them to me", in Arabic it is /baʕat-it-hum-l-i/.

Table 2. 10 Examples of clitic strings:

/baʕat-it-hum-l-i/ *Perfective*.sent- (*3rd.Sing.Fem*)-(*clitic*) them-to(*Prep.*)-clitic *She sent them to me*

Object clitics appear in the object position following the verb and they cannot be coordinated with a lexical noun phrase. This is achieved by re-expressing the clitic with an independent pronoun, as demonstrated in the example below.

Table 2. 11 Examples of object clitics

/ʃufta-ha heyya wi binta-ha/ (1st sing.fem) saw-her her and daughter-her *I saw her and her daughter*

If the negative is being expressed, the verb-clitic combination functions as a single lexical item. Therefore the discontinuous negative is attached to the entire combination and the above example would become: /**ma**-ʃufta-ha-ʃ heyya wi binta-ha/ *I didn't see her and her daughter*, the negative particles are highlighted.

2.7.1 The demonstrative pronouns

The demonstrative pronouns are /di/ this.fem, /da/this.masc, /do:l/ those.masc and /dolat/those.fem (dolat is specifically a feminine plural variant). They are marked for gender and number of the subject or noun phrase. They are produced as free grammatical morphemes.

2.8 Articles

Like other Semitic languages, e.g.. Hebrew, Arabic differs in the way it marks definiteness. The prefix /il-/ or /əl-/ (depending upon phonetic contexts) is used to mark definite (/ha-/ in Hebrew). The definite prefix is not only (attached) affixed to common nouns, but also to otherwords that modify the noun, i.e. adjectives. It is used to express definiteness while indefiniteness is generally marked by its absence. /əl-/ never stands alone and is therefore a bound morpheme.

Table 2. 12 Example of the definite article.

Arabic transcription	/əl- kalb əl-kibir/
Gloss	Def.Art.the- dog Def.Art.the-big
Idiomatic Translation	"The big dog"

A further feature of the definite article in EA is the phonological process of assimilation, which takes place when the initial consonant following the article is an alveolar or palato-alveolar sound. For example: /əl-ʃams/ → /əʃʃams/ (the sun), whereas, /əl-qammar/ → /əl-qammar/ (the moon).

2.9 Negation

Negation in spoken Egyptian Arabic is expressed in two ways depending upon the sentence construction, i.e. nominal or verbal sentence. In the simplest case it expressed by using the free negative particle /miʃ/ before the predicate. As in /miʃ ʕa:yiz ʔakul/ (*Neg.* want (I) eat) "I don't want to eat". However, the negation of existential and possessive constructions is more complex, and involves the discontinuous negative morphemes /ma...ʃ/. These discontinuous Negative morphemes can be placed around the prepositional phrase, although it is more typically associated with verbs. For example, /ma-kalti-ʃ/ (*Neg.*-eat-*Neg*) "I didn't eat".

2.10 Features of normal language development Arabic speaking children

The literature available on the normal development of Arabic is sparse. Three studies, relevant to this work, conducted into Arabic normal language acquisition will be discussed. The first is one of the few documented and recognised studies and was conducted by

Margaret Omar (1973) published under the title of "The development of Egyptian Arabic". The second is published in Arabic and examines the development of vocabulary in EA children (Karam El-Din, 1990). The third are results of a study on Palestinian Arabic which examined the use of plural morphology acquisition (Ravid and Farrah, 1999).

2. 10.1 Development of Egyptian Arabic (Omar, 1973)

The study by Omar (1973) is the only modern work on the subject that describes the development of phonology, morphology and syntax in Egyptian Arabic speaking children. The study was conducted over a period of three months and the language of 37 children was examined (20 females and 17 males). The age range of subjects was 6 months-15 years; 4 children were between 2;08 -3;06 years, the period relevant to the present study. The children were audio recorded during spontaneous conversations and their utterances were phonetically transcribed. In addition, comprehension, imitation and grammar elicitation tests were administered to all children above the age of 2;08 years.

Although this study is informative it is unfortunate that the period of recording was for only three months, as this did not allow mapping of the morphological acquisition of structures; although normal phonological processes are described in more details. Thus is represents a cross-sectional rather than a truly longitudinal as it is sometimes represented. Omar (1973) describes the developmental process of morphological and syntactic acquisition, but little consideration is given to normal developmental errors in morphosyntax seen in EA children. When describing such developmental productions she does not make distinctions between Tense and Aspectual marking. Omar (1973) did not calculate the children's MPU values, but instead used MLU. Thus when describing the single word productions, it is not clear whether the children were using inflectional morphology or not.

Omar (1973) provides information for four of the children who were between 2;08-3;06 years. These will be discussed as this was the age of interest for this study, as this is when

the most morphological errors are likely to occur. When describing the children's normal developmental errors she provides frequency data for errors produced by the first three children, but for the fourth child she only states that the child produced "several examples non-agreement words" (Omar, 1973, page143) i.e. omissions of inflections resulting in errors, but she does not specify the number of errors or give examples of the forms produced. The example she provides is that the child omitted the 1st person feminine marker of the Imperative /-i/ in /hati/ give-1st feminine singular, which was produced by the child as /hat/ give-1st masculine singular. The table below is a summary of their ages, gender, the MLU values and the number of errors related to either omissions of inflections or errors with agreement.

Table 2. 13 Results of children from Omar (1973)

Child	Sex	Age	MPU	Number Errors
Child 1	Female	2;08	1.75	0
Child 2	Female	3;00	2.5	1
Child 3	Male	3;06	3.5-3.75	2
Child 4	Female	3;06	(not available)	several

The errors that are reported by Omar are described illustratively but she does not provide statistical values for percentages of omission or use of morphemes or function words. Omar (1973) reports, that the young children in the study (4 children) omitted "function words" and non-reference words. Some were also observed to omit definite articles, optional pronouns, obligatory pronouns, future and progressive markers of the verb, and inflections. There is no mention of whether the pronouns omitted are bound or free. Normal developmental errors reported by Omar at the age of 3;05 are: omissions of the definite article, omissions of prepositions and omissions of the progressive marker of verb. She does not distinguish between whether the progressive marker is the habitual aspect marker or the continuative

aspect marker (Omar, 1973, page 106).

In her summary Omar (1973) provides a useful table of acquisition of Arabic language structure which she formulated using her cross-sectional data. The reported periods of acquisition match data cited in later studies on Palestinian and Jordanian Arabic, e.g. Ravid and Farrah, 1999; Amayreh and Dyson, 1998.

With regards to inflectional morphology, which is the area of interest in this work, Omar (1973) reports mastery of the simple negative to be acquired at 3;00 years and the discontinuous negative by 3;06 years, which is when mastery of adjective agreement and plural nouns with numerals is also acquired. She reports beginning mastery of some irregular noun plural inflections between 5;00 to 5;06 years and overall mastery of language system is between 6;00 to 7;00 years. It is not until after the age of 7;00 years that further irregular noun plural inflections are reported to be learnt.

2.10.2 Vocabulary word lists (Karam El-Din, 1990)

Another study, although conducted over 10 years ago, has only recently been published by Karam El-Din (1990). This study looked at the vocabulary use of EA by pre-school aged children. The aim of the study was to provide a dictionary of the words most commonly used by children aged between 1:00 to 6:00 years. This study was influenced by a study carried more than 50 years ago; the results of the outcome of one of the Arab League Working Parties (ALWP) formed back in 1945. A pilot study was initially conducted by Radwan (1981). The aim of his study was to document the vocabulary used by pre-school aged children. These preliminary findings were used to form the basis of the much larger project conducted later by Karam El-Din (1990).

The aims of her project were to provide word lists for 5 age groups for pedagogical use and to describe language specific features characteristic of Egyptian spoken Arabic (Age

groups: 1-2, 2-3, 3-4, 4-5, and 5-6 years). A total of 1251 (n=1251) children were used to make up the population group (628 males and 623 females). The children were selected at random from five different Egyptian counties to ensure the samples were truly representative across different socio-economic groups. The subject selection criteria included children who had *normal intelligence* and no known learning disabilities. The criteria used to determine normal intelligence are not mentioned in the paper. It is unclear whether the children were screened with developmental check-lists or if psychological assessment batteries were used. The children were supposed to represent the complete education spectrum and thus some were from literate university graduate parents and others were from illiterate families. The ratio of children from literate versus illiterate families is not mentioned in the paper. Karam El-Din (1990) does, however, explain that the children were selected across socio-economic spheres in order to have a truly representative sample of Egyptian children, indicating the desire to obtain a broad sample with a wide range of socio-economic variation.

For recording purposes the children were divided into two groups, the first group being those aged between 1;00 and 3;00 years and the second group being those aged between 3;00 and 6;00 years. The mothers of the first group (1;00 to 3;00 years) recorded the children at home using audio recording and diary studies. In addition to this, the mothers were given question forms and requested to ask the children the questions and write down the children's responses. It is not clear how the illiterate mothers used the question sheets.

The second group of children (3;00 to 6;00 years) were recorded in different situations, including their nursery, when engaging in independent play and when playing with their peers. In addition to this either their mothers or researchers were given the same question sheet that was given to the younger group. For those parents who were requested to write down the children's responses there is no explanation provided as to how they represented the normal developmental errors produced by the children in their transcripts.

The children's responses were audio recorded and the tapes were then transcribed and analysed. Having transcribed the language samples the words were divided into five groups according to age, the groups being the 1;00-2;00 year olds, 2;00-3;00 year olds, 3;00-4;00 year olds, 4;00-5;00 year olds and finally 5;00-6;00 year olds. For a word to be included in the word list it had to be repeated more than 10% of the time by more than one child regardless of the age group the child belonged to. If a child was the only one to produce a word it was not included in the list.

The words for each group are listed according to the number of children that produced the word. For example, in group 1 "mama" is the first word listed as it was produced by 202 children. For the first two groups, the number of children that formed the groups is documented (group 1 [1;00-2;00 years] n =210 and group 2 [2;00-3;00 years] n=264). The words are numbered and by each word the number of children that used the word is also documented (216 words are listed for group 1 and for group 2, 270 words are listed).

For the three remaining groups *n* is unknown, however an additional factor is added, that is the number of times a word was repeated by the children. For example, in the group 3 where the children are aged between 3;00 to 4;00 years the word /maʃa/ *with* was produced by 222 children and it was repeated 960 times. This would be similar to using type token ratios, however it is unclear how many children repeated the word.

Finally, a list of the most commonly produced words by all the children in the group is included. This list contains 999 words and unlike the other lists the words are listed in alphabetical order, however, their frequency of occurrence is not included. The word lists were used to compare the results obtained in this study.

There is no explanation provided for the orthographic conventions used for transcriptions. There is no mention how words produced unlike the adult target forms were treated. It is

unlikely that the words listed in the first group were produced in the adult target form as normal phonological processes would be productive at this age (Omar, 1973; Amayreh and Dyson, 1998). In addition, in the first group there are regular and irregular broken plural forms listed, e.g. /gi:b/ (pocket) and /giju:b/ (pockets), which recent data on Palestinian Arabic suggests does not develop until much later (Ravid and Farrah, 1999). If the word is an Egyptian Spoken Arabic word then its MSA equivalent is written in brackets, for example, /kiti:r/ (EA) *many* and /kathir/ (CA) *many*, which is unlikely to be the form used by the children, since MSA is only taught at school beginning at the age of 6;00.

Verbs are represented in the citation form (*perfect 3rd person masculine singular*), and there is no mention of development regarding Tense and Aspectual marking. This may be because the aim of the project was to have a list of words that could then be used for children's books and curriculum development. Since this was not a linguistic study on child language development the researchers may have felt no need to include or discuss the morphological and phonological development.

When examining the words listed in the 1;00 -2;00 and 2;00-3;00 year-old groups, it would appear that the children are producing complex phonological words with accuracy. In Omar's (1973) work she clearly notes that young EA children have difficulty with the production of clusters, which in Arabic are either medial or final. Karm El-Din (1990) lists "/farxa/" as one of the words produced by children at the age of 2;00, which contains a medial cluster which would either be reduced or substituted (Omar, 1973).

Karam El-Din (1990) identified 6 characteristics which were found to be representative of the language of the pre-school aged children. These were–

1. Across the five groups nouns were seen to be produced with the greatest frequency, their production being 74.6% of the time. As the age of the child increases their use of nouns

represented a relatively smaller proportion of the total although it was still the largest word group.

2. Across the five groups verbs were produced 21.9% of the time. As the age of the children increases their use of verbs was seen to increase slightly. In group 1 (n=210), where the children were aged between 1;00 and 2;00 years, out of the 216 words listed for this group 19.4% were verbs. In group 5, which was the eldest group aged between 5;00 to 6;00 years, out of the 666 words listed in this group their use of verbs increased to 22.6%.

3. Bound morphemes such as pronouns were not included in the word list, however free morphemes and function words were included such as prepositions e.g. "fi" and "bi". Across the five groups these were produced 3.5% of the time. As the age of the child increases their use increased. In group 1 (n=210), where the children were aged between 1;00 and 2;00 years, out of the 216 words listed for this group only 2.8% were function words. In group 5, which was the eldest group aged between 5;00 to 6;00 years, out of the 666 words listed in this group their use of function words increased to 4.8%.

4. Across the five groups adjectives and abstract concepts were produced 7.7% of the time. As the age of the children increased their use of adjectives increased. In group 1, (n=210) where the children were aged between 1;00 and 2;00 years, out of the 216 words listed for this group only 1% were adjectives.

5. In group 5, which was the eldest group aged between 5;00 to 6;00 years, out of the 666 words listed in this group their use of adjectives increased to 16%.

6. As mentioned, the number of times a word was repeated was also represented. The younger the child the more their sample comprised of words repeated. Across the age groups the average repetition for a given word was 21 times.

Table 2. 14 Summary of findings from Karam El-Din (1990)

	Group 1: 1-2;00 years	Group 5: 5-6;00 years
Verb use	19.4%	22.6%
Bound morphemes (only bound clitics and pronouns not verb agreement)	2.8%	4.8%
Adjectives	1%	16%

2.10.3 Noun plurals in Palestinian Arabic (Ravid and Farrah, 1999)

This study (Ravid and Farrah, 1999) examined the use of noun plurals in Palestinian Arabic. 48 normally developing children aged between 2-6 years were asked to provide a corresponding plural form when shown a picture of a noun in the singular form. The examiners looked at three plural types —regular masculine and feminine and irregular plurals but they did not examine the dual, which is one of the distinguishing typological features of Arabic. They examined the developmental trajectory of these structures in addition to normal developmental error patterns. Their results are interesting regarding the expected developmental errors in EA-DLI children and children acquiring Arabic normally.

Their findings were also interesting regarding cross-linguistic developmental data for plural acquisition. They found the feminine plural was the first form acquired and ceilings by 3;00 years. The irregular broken plural and the masculine plural in contrast develop much later

and even though their rate of productions increased at age 5;00 years, their percentage of use remained less than the regular feminine plurals. Interestingly, the broken plurals were acquired next and the regular masculine plural was acquired last.

It must be noted that the majority of plurals in Arabic are feminine and broken plurals and the masculine forms are the least (Holes, 1995). These findings are supported by Omar (1973) who reports use of plural nouns with numerals at 3;06 years and mastery of some irregular plurals between 5;00-5;06 years, with final mastery after the age of 7;00 years.

With regards to error patterns, six different error patterns were observed. One of these was where plurality was expressed using a separate lexical item, for example the Arabic word for *many* would precede the noun. Another error pattern was over-regularization errors, the children either added masculine or feminine markers to the irregular broken plurals, or they added feminine markers to masculine words or *vice versa*. Other errors were to do with internal morphology, where one broken form was substituted for a broken stem form of another category.

2.11 Bilingual Swedish-Arabic Language Impairment

The only study that has examined pre-school language impairment in Arabic was conducted in Sweden (Hakansson *et al.,* 2003*)*. Bilingual pre-school children who spoke varieties of Arabic (e.g. Palestinian, Iraqi and Syrian Arabic) and Swedish were examined on their grammatical development, using an adult second language acquisition model; based on a processability theory (Pienemann, 1998), which is in line.

They used their results to demonstrate that bilingual children with language impairment have an almost equally low level of language development in both languages, whereas bilingual children with normal language development show a higher level of language development in

one language.

There are several methodological and theoretical considerations that were not considered in the Swedish-Arabic study and therefore affect both the outcome and the validity of their study–these issues will be discussed. Comparisons between Swedish and Arabic provide an interesting test case due to the similarities and differences in inflectional morphology.

2.11.1 The data source and subject selection

The data was taken from 10 Swedish-Arabic pre-school speaking children with language impairment (3.19-6.7 years) and 10 Swedish-Arabic children with normal language development (3.11- 6.7 years). Bilingual children with a suspected language impairment should be tested in both languages (de Montfort Supple, 1996), and this is a point made by Hakkanson *et al.*, (2003). However, although the children were tested in Swedish, nothing is reported on the method of testing used for Arabic, or by whom. They report, "All children displayed grammatical problems and were well below age expectations in *both* languages" (Hakkanson *et al.*, 2003, page 269). The grammatical references and descriptions of Arabic were inappropriately given for MSA, and not the spoken forms of the language. As mentioned earlier in this chapter MSA is similar across the Arabic speaking countries for educated speakers. The children examined actually came from 5 different Arabic language communities– 1) Iraqi, 2) Lebanese, 3) Gulf, 4) Palestinian and 5) Syrian. The majority of the children were Lebanese (n=13).

They further report that the children received a diagnosis of severe language impairment by a speech and language clinician, but there is no mention as to whether the clinician was bilingual (Arabic-Swedish) or a monolingual (Swedish) speaker. It is also unclear whether the children were indeed SLI or if they were language delayed, since little detail is given to the initial assessment. An additional criterion, which is disputed, was the number of years the

children had been exposed to Swedish. This raises the questions to whether or by what criteria they could be considered to be truly bilingual. As described, "Some of the children in the study have been exposed to Swedish for less than a year and are very limited in their production of Swedish"(Hakkanson *et al.*,2003 page 269, paragraph 2) and yet they were still selected as bilingual speakers of Arabic-Swedish.

A further concern is the number of subjects who were identified as SLI. To have found 10 children with SLI that are bilingual speakers of Swedish-Arabic in this small community is surprising, given the prevalence of SLI is thought to be between 5-7% (e.g. Tomblin *et al.* 1997).

The control data was taken from 10 bilingual Swedish-Arabic children with normal language development. The two groups of children were matched according to age, gender, time of exposure to Swedish in preschool, and the spoken variety of Arabic used by the parents. The children were all born in Sweden, but had not been exposed to Swedish from birth, and the parents of the children with language impairment had lived in Sweden between 6-16 years. Both groups attended a bilingual Arabic-Swedish preschool, where the staff is reported to have been bilingual.

The control groups and the language impaired groups were given 5 separate assessments in Swedish. They were assessed on phonology, grammar and language comprehension and Performance scales. Hearing tests were also conducted. Elicitation tasks for Arabic and Swedish were then designed to test the hypotheses. It is also unclear when presenting the test samples in which spoken variety of Arabic was used, i.e. Lebanese or Syrian. The authors hypotheses were— 1) Both groups of children will develop grammatical structures for their two languages. 2) The control group will develop one language to a high level, but the language impaired children will show an equal lower level of language development.

The language model used by the authors is an adult second language learning model; the model does not allow for error analysis or for the development of morphological structures. Instead it examines the five stages of *Hierarchy of Processing Procedures* (Pienemann and Hakansson, 1999).The aim was to test whether or not lexical morphology is processable, before morphology, marking phrasal agreement. The authors predicted that from a theoretical perspective, if the children do not have problems with lexical morphology but have problems at the phrasal level, this would provide evidence against the Surface account (e.g. Leonard, 1998), which was discussed earlier in the literature review on SLI. According to the Surface account children with language impairment have difficulties in perceiving and producing elements of reduced phonetic duration, which is due to perceptual limitations.

The findings of Hakkanson *et al.* (2003) did not support the Surface account (Leonard *et al.*, 1992). They found that the bilingual Swedish-Arabic children did not have difficulties at the lexical level but at the phrasal level. They used this as supporting evidence for the morpho-syntactic nature of language impairment.

The language processing model used in this study is an "untraditional perspective" to examining SLI (Hakkanson *et al.*, 2003, page 256), however their results are consistent with those gathered in Hebrew and Italian (Bortolini *et al.*, 2002; Dromi *et al.*, 1999), that SLI children do not show difficulties in their use of lexical morphology. Although problems with lexical morphology has been shown to be a clinical marker of other languages examined for SLI e.g. English and French (Leonard, 1998) this was not found to be the case for the Arabic-Swedish children.

2.12 Arabic Agrammatism

Agrammatic Aphasia (Agrammatism) is a language disorder that results following acute neurological damage to the left side of the brain, typically occurring in adults. The language

production in Agrammatic speech shows many features in common with children with SLI. The characteristics of Agrammatic speech include the production of short utterances showing omissions and substitutions of grammatical morphemes (free or bound), the simplification of syntactic structures, word-retrieval difficulties, difficulty with inflectional morphology, and difficulty with comprehension (e.g. Tissot *et* al., 1973; Caplan, 1987; Howard, 1985).

A great deal of cross-linguistic research has been conducted into Agrammatism (Menn et al., 1995). Researchers have examined Agrammatism in Algerian Arabic (Mimouni and Jarema, 1995) and Saudi Arabic (Safi-Stagni, 1991). The results from these studies are interesting and allow for comparisons between a developing impaired system and one that has developed but subsequently becomes impaired. The results and findings of these studies are discussed below, in relation to their linguistic findings relevant to present research.

2.12.1 Agrammatic Aphasia in Algerian Arabic (Mimouni and Jarema, 1995)

Three case studies NB (Female), RB (Male) and OH (Male) were conducted to examine how Agrammatism manifests in Algerian Arabic and to attempt to answer psycholinguistic questions concerning the organisation of the lexicon. Samples of expressive language were collected using sub-tests of assessment batteries in addition to experimentally designed elicitation tasks and small samples of spontaneous speech (Mimouni and Jarema, 1995). These included the Magrebian version of the Bilingual Aphasia Test (Paradis, 1987), which included repetition, reading aloud, dictation, copying, writing, and oral comprehension of single words and sentences.

Analysis of the spontaneous speech of the three subjects revealed grammatically disconnected utterances, which contained mainly content words; omissions of articles, prepositions and pronouns; omissions and or substitutions of inflectional affixes. With regards to verb morphology the three subjects' speech was characterised by Tense and gender substitution

as well as by verb omissions. They found that the subjects either omitted prefixes resulting in a switch to the morphologically unmarked past Tense form, or they substituted entire verb forms leading to gender and Tense substitutions. In addition, they also found that the subjects had the greatest difficulty with verb bound clitics, which they omitted. With their production of the negative marker they found that the subjects treated the discontinuous negative in the same way as the bound pronouns, which they omitted at a high rate. The subjects were never observed to produce constructions where only one of the negative markers was used, which would lead to morphologically ill-formed productions.

2.12.2 Agrammatic Aphasia in Saudi Arabic (Safi-Stagni, 1991)

As part of a larger study into Bilingual- Arabic-English Agrammatism two single case studies were conducted into Saudi Arabic; T.A and H.H both males. Sub-sections of both the Arabic and English version of the Western Aphasia Battery (Kertesz, 1982) were administered, in addition to spontaneous language samples recorded during conversation. The language samples of the patients were characterised by short phrases and an abundance of nouns relative to verbs. Errors with agreement of gender were seen frequently in both patients. The errors involved the deletion of the feminine markers but never the addition of a feminine marker. In addition, errors were seen which involved both number and gender agreement errors.

The findings on adult language impairment on Arabic provide useful findings which may be relevant to the study of EA-DLI and have been considered in the linguistic hypotheses of this study. The Algerian findings are particularly relevant due to the descriptions provided regarding verb use, the negative and definite articles.

3. METHODOLOGY

Over the years researchers have devised and developed various tools to help them in the field of child language research. Some of these will be discussed in light of the selected methods chosen for this project. Detail will be given on the subject selection criteria for the controls and the language impaired children, the data sources including specific structured tasks designed for the project, the methods of recording and the selected methods of the organisation and analysis of the data.

3.1 Subject Selection for the language impaired children

The language impaired subjects were children who were initially referred to the Learning Resource Centre (LRC), a private multi-disciplinary paediatric clinic in Cairo, Egypt. The children were originally referred to the Speech and Language Therapy department by their parents or teachers due to concerns regarding poor language development. Each child was subsequently diagnosed as exhibiting a language impairment severe enough that they would require enrolment in a language unit or that they would require intensive remedial work. Having met the criteria of a diagnosis of developmental language impairment they were further selected to take part in the study if they would be receiving services directly from the investigator and if they were monolingual speakers of Egyptian Arabic. In addition, since the study involved studying the children's language change over a 12-36 month period it was necessary to ensure that the children would continue in therapy for this period of time. Three children were selected to take part in the study—two males AEL and MHB and one female NAD. The individual selection criteria for each of the subjects are discussed in chapter 5.

The children were diagnosed partly by exclusion, a method commonly used by researchers that requires that there is no known aetiological cause for the children's language difficulties. All three subjects were required to meet the following initial criteria for SLI as set by Bishop (1994), Leonard (1998) and Stark and Tallal (1988)— no evidence of a sensori-neural hearing loss, no neurological or genetic syndrome, no physical or behavioural impairment, no phonological difficulties severe enough to impair intelligibility and (when testable) non-verbal abilities within the normal range. An additional requirement was for developmental milestones, except for language, to be achieved within the expected period of development and their ages when first seen for assessment to be less than 5 years.

For the three children selected all children passed a hearing screening which a qualified audiologist conducted. Typically, SLI is diagnosed when the non-verbal measures are within the normal range, i.e. Performance IQ >80. However, there were a number of reasons why formal testing could not be conducted on all the children to assess their non-verbal abilities when they first enrolled into this study— Firstly, the severity of their language impairment and their young age, i.e. less than 5;00 years when first seen renders formal testing difficult. Secondly, although translated Arabic versions of psychological assessments such as the Wechsler Pre-school and Primary Intelligence Scale-Revised (WPPSI-R 1989) and the Differential Ability Scale (DAS 1990b) are sometimes used in Egypt these have not been standardised on EA children, therefore the scores obtained can only be used tentatively due to the language and cultural differences. Finally, as discussed in the introduction, using IQ as an exclusionary measure for the diagnosis of SLI is not always possible nor is it always truly reflective of the young child's potential cognitive abilities (e.g. Cole *at al.*, 1995). Therefore, other cognitive informal measures such as matching, ability to complete puzzles, attention and play level were used.

For each of the three subjects details are provided in Chapter 5 for the case history and

initial assessment. When first seen the EA-DLI children selected for the project were aged from 3;01 to 4;06 years.

The table below provides a summary of the language impaired children who took part in this study.

Table 3. 1 Summary of the language impaired children who took part in the study

Name	Sex	Date of birth	Age when data collection conducted	Type of Data
AEL	Male	10/12/95	3;01 to 7;01 years	Diary-video-elicitation
MHB	Male	14/10/94	4;06 to 6;02 years	Video- elicitation
NH	Female	19/11/96	4;03 to 5;11 years	Diary-video-elicitation

3.1.1 The language criteria used for selecting the SLI subjects

As we have already discussed in the literature review, the criteria used by researchers to identify the presence of SLI vary. Most researchers identify SLI with the presence or absence of linguistic features. The method of identification frequently employed by researchers of English, Italian and French SLI (Conti-Ramsden *et al.* 2001, Bishop and Norbury 2002, Bortolini *et al.* 2002) is to use standardised language batteries. In English, for measuring vocabulary, the British Picture Vocabulary Scale may be used (BPVS; Dunn *et al,.* 1988) and for measures of receptive grammar typically either the Clinical Evaluation of Language Fundamentals Revised (CELF-R, Semel *et al.*, 1987) is used or the Test for Reception of Grammar (TROG; Bishop, 1989).

For those researchers who have studied pre-schoolers with language impairments, their criteria for identification are typically the late appearance of language acquisition milestones (e.g. Rice & Bode, 1993). These include late emergence of first words, delayed beginnings of word combinations and reduced use of grammatical morphemes, when compared to their age

matched controls and relative to their own cognitive and social skills.

3.1.2 The developmental language impairment checklist

There are no standardised assessment protocols available in Arabic, so the initial diagnosis made was based on clinical judgement and *a priori* criteria to identify language impairment. This could be used to both select the language impaired subjects and to identify and highlight key aspects of the impairment which when presented as a cluster of symptoms would be indicative of a diagnosis of DLI.

In recent years there has been a keen interest by investigators to search for "clinical markers" of SLI (Rice and Wexler 1996). This approach usually involves determining the characteristics that can be used to differentiate the language of children with SLI from their normally developing peers (Fletcher and Peters, 1984, Gavin *et al.*, 1993, Dunn et al., 1996).

Therefore in order to permit cross comparisons, select controls and measure language changes it was necessary to establish criteria which could be used to identify the presence of language impairment. Explicit criteria in the form of a developmental language impairment checklist was developed and used to identify subjects for the project. This checklist was designed to be used on children under the age of 5;00 years, where a need to identify attributing difficulties caused by the nature of the SLI is important.

3.1.3 The initial assessment procedure

The three EA-DLI children were each video recorded with the investigator and observed playing with their mother. The assessment period lasted for 120 minutes and took place in the clinic playroom at the LRC. The room was set up with five different play activities, these were: a water tray, play-dough, a train set and cars and play-mobile and a home-corner set including a cooker pretend foods and kitchenware. During this period observations were recorded by the investigator, which were used to complete the DLI checklist. The

information was then summarised to provide an overall profile of each of the children's strengths and weaknesses. For the DLI children the summary of the checklist is provided at the beginning of each of the case studies, in chapter 5. A sample DLI checklist is provided in Appendix 1.

Having completed the initial assessment and the checklist, the parents of the children selected were asked to sign a consent form for participation in this study. For each of the three EA-DLI children data collection was initiated from the first meeting. The data collection protocols and the methods of administering tasks and analysis were the same for all subjects, however there were individual methodological differences which are discussed separately in the following chapters, e.g. additional analyses for spontaneous language samples. All data was collected by the author.

3.2 The controls for the language impaired children

12 normally developing children took part in this study. There were six males and six females. The age when normal developmental errors mostly occur is between the age of 2;00 and 3;00 years. An understanding of normal developmental errors is central to this work and consequently most of the children selected and recorded were within this age range. Five of the children's language was examined longitudinally and the remaining seven were used cross-sectionally.

To be selected the children had to fulfil the following screening criteria:

1. Language development normal

2. Normal developmental milestones

3. Normal birth history

4. Normal hearing thresholds

5. No neurological or psychological or physiological disorders

6. Egyptian Arabic primary language used at home

7. Socio-economic sphere lower- middle or upper-middle class

8. Willingness to be involved in project and familiarity with examiner

9. Both parents literate

10. Parents' educational background range: High School Diploma –University graduates.

Once they had fulfilled the initial selection criteria, they were screened with the examiner whilst playing with their mothers or primary carer. The parents of the children all consented to taking part in the study.

The data collected on the normally developing children was used for two purposes. The first was to be able to describe patterns of normal development regarding the development of morphological features and the production of normal developmental errors. The available literature on Arabic language development is limited (as described in Chapter 2) and no work published in English has previously described the normal error patterns in EA. The second was to be able to compare the EA-DLI children with the controls on the spontaneous language measures designed such as MPU and percentage errors per utterance and the distribution of the functional analysis. Additionally, a comparison of the controls with the EA-DLI children on structured tasks such as the Egyptian Arabic Renfrew Action Picture Test, the Winslow Verb and Noun Pictures and the Sentence Comprehension Test were required as these tests are translations of English tests which have no standardised norms

for Arabic.

The range of language examined was from the early single word stage to the multi-word utterances produced by older children. Two of the controls, Samira and Sanna, were the siblings of the EA-DLI subject AEL. Omar and Ali were also siblings, as were Hanna and Luli (but not related to the subjects).

The cross-sectional data for the controls comprised of either a single recording or recording the child weekly over a four-week period. For the longitudinal controls the data was collected approximately every six months. The controls were not matched to each EA-DLI child, as it was important to include developmental variability.

Spontaneous language samples were collected for all the controls. The spontaneous language samples were recorded, transcribed and analysed using the same methodology as that for the EA-DLI Children. In addition, structured tasks were given to six of the controls—they were Sanna, Samira, Omar, Ali, Kenzy and Habiba. Other than Luli, who was the youngest, the children were all seen more than once.

3.2.1 Additional Control Data

Additional data from two children, Marwan (3;00 years) and Habiba (12-18 months) were used to supplement the spontaneous language corpora. This data was felt to be an important addition to understanding patterns of normal language development, in addition to being able to discriminate between error patterns observed in the language of the controls and those produced by the EA-DLI children. It was of particular importance to have data of very early language development when single words are being produced, since as mentioned earlier there are insufficient descriptions of normal early language acquisition in Arabic. In addition, when AEL was first seen he produced a limited number of single words, and there was therefore a need to compare AEL's early language patterns to that of a younger non-

language impaired child. Habiba's early language development was followed from when she was aged between 12-18 months she was also administered one of the elicitation tasks (EA-SCT). Her mother kept a written log of Habiba's productions over the 6 month period. She was trained at university in phonetic transcription, and therefore phonetically transcribed Habiba's productions during bath and meal times. She also noted the context in which Habiba had used the word , thus allowing for an anlalysis of both form and function to be made.

The second was Marwan. Marwan attended the same nursery as AEL, prior to AEL joining the Advance School. Marwan was selected as a control because he produced some interesting normal developmental errors. He was the same age as AEL, i.e. 3;00, and was in the same class. It was interesting to examine and compare the language of a normally developing child like Marwan whose MPU was greater than AEL, but who nonetheless produced normal developmental errors. His errors were phonetically transcribed onto data sheets using the same conventions adapted for the EA-DLI children. Tables 3.2 and 3.3 below are a summary of the age when data was collected, the type of data collected, their sex and age.

Table 3. 2 Summary of cross-sectional controls

Name	Sex	Age recorded	Structured tasks
Luli	Female	1;05	No
Hanna	Female	1;11	No
Ali	Male	2;05	Yes
Ismail	Male	2;08	No
Sherif	Male	3;03	No
Marwan	Male	3;00	No
Samira	Female	4;04	Yes

Table 3. 3 Summary of longitudinal controls

Name	Sex	Age recorded	Structured tasks
Omar	Male	1;07, 2;04, 3;07	Yes
Habiba	Female	1;01, 4;01	yes (diary study)
Kenzy	Female	2;01, 2;07	No
Sanna	Female	2;07, 3;01	Yes
Dudu	Male	2;03, 3;07	No

3.3 Data Sources

There were two sources of data used to inform this investigation of EA-DLI with respect to normal EA development–spontaneous language recordings and structured tasks. For both the language impaired subjects and the controls, the largest corpus was formed from recordings of the investigator with the child during naturalistic play activities. This is where spontaneous speech errors are more likely to occur (Rice and Bode, 1993). Structured tasks in the form of pictures and modified standardised assessment tools were also administered to the EA-DLI children and to 6 of the controls. The aim was to document, analyse and compare the non-adult target forms (normal developmental errors) that occur in the normally developing children and in the EA-DLI children's language.

3.3.1 The Structured Tasks

Structured tasks have advantages in that it is only through controlled elicitation tasks that certain language forms can be elicited. When required to examine a specific linguistic form it is not possible to ensure that the child will use this form during spontaneous language. For

example, if a female child is observed interacting with her mother it will be more difficult to elicit male pronouns; or a variety of verb inflections for number, gender and person. Therefore to ensure variability in the targeted forms the data-elicitation procedures were supplemented with data derived from other sources.

3.3.2 Picture Naming for Verbs and Nouns

A selection of pictures of verbs and nouns were used to assess the EA-DLI and control children's ability to name common nouns and verbs. The pictures used were the verb and noun pictures produced by the Winslow press. The pictures were selected in accordance with words commonly used by children aged between 1;00 and 5;00 years of age (Karam El-Din, 1990). The Winslow pictures were selected, as they are photographs of real items as opposed to line drawings. The large size of the pictures and their visual clarity make them easier for the children to recognise.

3.3.3. The Winslow Verb Pictures

The subjects and select controls were shown the 42 pictures of verbs and they were asked what was happening in each of the pictures. All of the verbs selected are listed in Karam El-Din's list (1990). This structured task was administered to two of the EA-DLI subjects (AEL and NAD) and five of the controls.

The question was asked using the format /əl-bint bi-ti-ʃmil ih?/ -*What is the girl doing?*. The noun was changed depending on the picture, the four options being /əl-bint/ *the-girl*, /əl-wallad/ *the-boy*, /əl-sit/ *the-woman* and /əl-ra:gil/ *the-man*. The verb agreement for gender also changed depending upon the picture e.g. /bi-yi-ʃmil ih/ (3rd person masculine singular) *doing-what* or /bi-ti-ʃmil ih/ (3rd person feminine singular) *doing-what*. The verbs selected were of men, woman, boys and girls carrying out different actions to elicit gender and person morphology. In addition they included both transitive and intransitive verbs. The verbs

had one person performing the action so no number elicitations could be made (See appendix 2 for a list of verbs).

The responses were phonetically transcribed onto a form. The table consisted of three columns, the first column was a description of the picture in English; the second column was the target response, which was orthographically represented in Arabic script; and the third column was a phonetic transcription of the child's response.

The criterion used for a correct response was that the correct lexical verb was selected. If the child selected the target verb but with an agreement error for gender or person this was marked as correct but noted later in the verb analysis section. The children were given seven seconds to respond and if they did not respond it was also marked as an error.

There were several aims to the use of this structured task. The first was to see how many different verbs could be elicited. Given that nominals are easier to acquire than verbs this task was used to demonstrate that both the controls and EA-DLI children would label less verbs than nouns. In addition, the verbs produced by the EA-DLI and the control children were further explored to establish whether there was a pattern in the verbs selected. This task was also used to test the hypothesis that the EA-DLI subjects and younger controls would use GAP verbs (Rice and Bode, 1993) or they would name the noun in the picture omitting the verb altogether. Having transcribed the responses a total number of correct productions was computed.

3.3.4 The Winslow Noun Pictures

For the nouns, 31 pictures were selected and all of the nouns are listed in Karam El-Din's list (1990) (see Appendix 3 for list of nouns). This structured task was administered to four of the controls and to two of the EA-DLI children. The responses were transcribed onto a form. The table consisted of three columns, the first column was a description of the picture in

English; the second column was the target response which was orthographically represented in Arabic script; and the third column was a phonetic transcription of the child's response. The criterion used for a correct response was that the correct lexical noun was selected. If the child selected the target noun but with a phonological error it was still marked as correct but was noted later in the analysis of normal developmental errors section. If the child's response was one that belonged to the same semantic category but did not match the picture it was marked as an error. In addition a response was marked as an error if the child produced an onomatopoeic response or if after seven seconds they did not respond. The question format was /ih da?/ (What is this-masculine?) or /ih di?/ (What is this-feminine?) depending upon the gender of the item.

There were several aims to the use of this elicitation task. The first was to compare the language impaired and the control children's abilities to name pictures of everyday objects. For normally developing children this should be a relatively easy task and they were expected to label more than 50% of the pictures. The second aim was to determine the types of normal developmental errors that may occur in such a task. The third aim was to compare the control children's productions with the EA-DLI children's productions, to enable both noun to noun and noun to verb comparisons (see Appendix 3 for a list of nouns).

3.3.5 The Renfrew Action Picture Test (RAPT- Renfrew, 4th Edition, 2001)

The first edition of this assessment was published in 1966 and its revision in 1971. In recent years, the content of the pictures has been criticised as being out of date and an expansion in the number and type of grammatical constructions was called for (Renfrew 4th edition, 1997). At the same time, the simplicity of the pictures, administration and scoring was regarded as an asset that should be retained.

In 1986, ten new pictures were developed and modifications were made. Trial runs of these modifications were made in Britain, Canada, Australia and New Zealand. In mid 1987, a

final selection of the pictures was made and based on the language samples collected certain changes were made to the scoring of the 1971 edition. In the reprinted third edition (Renfrew, 1998), the question for picture 2 was altered from the present Tense to the future Tense. Although this had no effect on the mean scores, the lower ends of the inter-quartile ranges for the three- and four-year- were reduced by one or two points (Renfrew, 2001). In the fourth edition (Renfrew, 1997), a photo-copiable scoring form was included. But no modifications were made to the pictures, grammatical constructions tested, or the mean scores.

Using 10 line drawn coloured pictures, this test is designed to assess children's spoken language in a short and simple way in terms of information provided and the grammatical structures used. The areas assessed in English:

- Words used to convey information, i.e. nouns, verbs and prepositions.
- Present, Past and Future Tenses.
- Irregular forms of plural and Past Tense.
- Passive structures

The Passive is not expressed in the same way in Arabic, therefore this was revised. Unlike English, Arabic has a morphological passive. The object is promoted to become subject of the passive verb, while the original subject is deleted. The agreement morphology on the verb changes accordingly, to agree with the new subject, which assumes nominative case. This is described in Chapter 2.

The questions in the Arabic version were asked in the Habitual and Progressive Aspect and the Past Tense. The procedure of the assessment is such that the examiner explains to the child that they are going to be shown some pictures and that they have to listen to the question and then tell the examiner the answer. The child is presented with a picture and

the examiner asks a question printed on the back of the picture. It is noted in the manual that a few children give inadequate responses to the first four pictures but, when describing later ones, their language abilities appear to be better than previously demonstrated.

The child's exact response is recorded allowing for deviations in pronunciation. When prompting is required to produce a fuller response it is given in an indirect manner indicating more information is required, and the examiner continues to hold up the card. The speed of presentation is adjusted to suit the needs of individual children.

E.g. Examiner: "What has happened to the girl?"

Child: "She's fallen down" (Record)

Examiner: "Yes She's fallen down the stairs....and ?....."

Child: "She's broken her glasses." (Record)

3.3.6 Revised Arabic Renfrew Action Picture Test

The RAPT was selected as a suitable assessment to be used with the Egyptian Arabic Language Impaired children and a select number of the controls. Modifications were required for the scoring that would render the assessment language specific to Egyptian Arabic. The ease and speed of the administration and the few pictures used (n=10), and the range of structures assessed were the reasons why the RAPT was selected as one of the assessments that could be adapted and used with Arabic speaking children; although some of the pictures may be viewed as being culturally biased.

This assessment tool has been used extensively by the examiner in the clinic setting and children were seen to respond to all the pictures. The two pictures that could be viewed as being culturally biased are pictures 2 and 4. Picture 2 is of a mother removing her daughter's boot. The Egyptian Arabic word for boot is very similar to the English word, except that the initial phoneme "b" is pre-voiced" in Arabic. However, wearing "boots" is not a common

occurrence for Egyptian children. The word "boot" does not feature on the pre-school word list produced by Karam El-Din (1990). The children who served as controls and the subjects were all children from the middle socio-economic sphere and their exposure to European type pre-schools, satellite television, and television and computer programs, means that they were all indirectly or directly exposed to non-traditional Egyptian items, songs and activities. Given this, "boot" or "shoe", were both accepted.

For picture 4 the cultural biases are subtle. The post box depicted in picture four looks the same as those found in Egypt, however the post boxes are either red as in the picture or they are blue. If people send letters they tend to be sent from the post office, so again using the post box may be considered a culturally biased concept. When the test was piloted on other language disordered children in the clinic and normally developing children, to determine its appropriateness for the project, the majority of the children had no difficulty identifying this picture. Therefore no changes were felt necessary.

In the English version of the test, the scores for information (lexical use) and grammar (syntax and morphology) are differentiated. For example, the right idea may be expressed in that the lexical items used are appropriate and specific, however, the agreement and use of Tense may be incorrect, i.e. morphological errors may be produced.

When the scoring was developed for the third English version it was standardised on 594 children in England, Scotland and Ireland, from 1987 to 1988. The testing was targeted on children in Social Class III areas. Scores obtained from children in non-English speaking homes, and those in language units, were not included in the standardisation. Equal numbers of boys and girls were tested at each age group.

Standardising the test on an Egyptian Arabic speaking population is beyond the scope of this work. For the grammar analysis the language samples produced by the children were

analysed by error analysis and the same format used for transcribing the spontaneous language samples was adopted. Although the information scores were not standardised, the same format used by Renfew (1997 4th Ed.) was implemented. The words listed for the information scores were translated into Arabic and words which were not appropriate were replaced with words which would be expected in the vocabulary of children aged between 1;00 and 6;00 years, again based on Karam El-Din Vocabulary list (1990). Of the potential 140 words that could be elicited 82.86% of the words scored are on the Vocabulary list (Karam El-Din, 1990). The test was not aimed to be used on children younger than 3;06 years. For this reason, when testing the controls only Samira, Sannna, Ali and Omar were administered the RAPT.

The words that correspond to each picture with the scoring are listed in Appendix 3.. They are coded to indicate those words that are represented in the Karam El-Din Vocabulary List (1990) according to the age when it first appears on the list.

3.3.7 Example of the information scores for the Arabic RAPT

Coding key for age when word appears on Vocabulary List

□ = 1;00-2;00 years □ = 2;00-3;00 years □ = 3;00-4;00 years
□ = 4;00-5;00 years □ = 5;00-6;00 years □ = lexical item not on word list

Each tier represents the choice of lexical items for which one point, half a point or no points are given. The maximum possible Information score is 40. The Arabic target is transcribed in phonetics and the corresponding gloss is next to it in italics.

Table 3. 1 The coding for information for the Egyptian Arabic RAPT

Picture 1: A picture of a girl hugging her teddy bear		
Question in English: What is the girl doing?		
Question in Arabic: /el-bint betʕmil ih/		
1 Point	½ Point	Nil

/maska/ *holding*, /bitiħdun/ *hugging*, /bitilʕab/ *playing* /diba/ *teddy*, /dabdub/ *teddy bear*, /duba/ *bear*	/biħib/ *love*, /bus/ *look*, /ʃajla/ *carry* /ʕarusa/ *doll*, /nunu/ *baby*, /babi/ *baby*	

(Possible Total 2)

3.3.8 The grammar scores for the Egyptian Arabic RAPT

For grammar scores the presence or absence of specific linguistic structures was calculated for each child to whom the test was administered. In addition, a comparison was made of the presence or absence of these linguistic structures during the structured task and during spontaneous speech. To calculate the grammar scores, each morphological structure examined and present was given a score of 1. The maximum possible grammar score is 40. Having calculated the total number of morphological structures produced, the percentage of production was calculated to allow for comparisons between both the language impaired children and the non-language impaired children.

The morphological coding required for Arabic needed to be revised as many structures examined for English do not hold for EA. The table below compares the English structures that can be tested on the revised EA-version of the RAPT. The morphemes examined for each picture and the corresponding scores are listed in Appendix 4.

Table 3. 2 Comparing the English and Egyptian Arabic RAPT

English RAPT	**Egyptian Arabic RAPT**
Words used to convey information, i.e. nouns, verbs and prepositions	Words used to convey information, i.e. nouns, verbs and prepositions
Present past and future Tenses.	Habitual Aspect, Progressive Aspect and Past Tense
Irregular forms of plural and past Tenses.	Regular plural, broken plural and the dual.

Passive structures	Passive structures
Conjunctions	Conjunctions
Articles definite and indefinite	Bound definite article
Verb Agreement for person and number	Verb and noun agreement for gender person and number
Pronouns	Pronoun enclitics and lexical pronouns

3.3.9 Scoring the EA RAPT

In scoring the responses, as with the English RAPT, information scores and morphological scores are distinguished. Each utterance was phonetically transcribed. A Grammar Score and Information Score were then calculated for each of the ten utterances which were totalled to yield a Total Grammar and Information Score, which were then converted into percentage of production. The total possible scores are 40 for Information and 40 for Grammar. When calculating the grammar scores specific morphological structures were assessed, therefore if a child substituted a feminine person marker for a masculine person marker in the Grammar score this was marked as an error, although for information the child may have used the target verb form. For example, in picture 7, /əl-bint əl-kibi:ra ʕamalit ih?/ *What has the big girl done?* , the target verb form is /ʃa:lit/ carried-she. If the child uses the correct verb this is marked correctly for information, however if the wrong agreement is used i.e. 3SM instead of 3SF then this marked as an error for grammar. Table 3.6 illustrates how the scoring was tabulated.

Table 3. 6 An example of the grammar scores for the Egyptian Arabic RAPT for picture 1

	Grammatical structures provided by children		
Picture number	Morphological structure elicited	Example of production	Morphological (Grammar) Score
1	/bi/ progressive Aspectual marker /-t-/ feminine marker /el/ definite article	e.g. /bi-t-ihdun/ /**el**-dibba/ *She-is- hugging the-bear*	1 1 1

3.3.10 Sentence Comprehension Test Revised Edition- Panjabi Bilingual version (Wheldall et al. SCT 1987)

The focus of this study was to examine expressive morpho-syntactic deficits in Egyptian Arabic language impairment. However, in order to screen the EA-DLI children for receptive language ability a structured task was used—The Sentence Comprehension Test (Wheldall *et al.*, SCT 1987).

This is a test designed to assess aspects of language comprehension in children with specific developmental language disorders (SLI). The child's understanding of specific grammatical structures is assessed by presenting the children with utterances of varying degrees of difficulty. The children are presented with a choice of 4 pictures and must select the picture which best represents the utterance. This provides an overall profile of how the child is functioning and highlights particular areas that are giving the child difficulty.

There a number of reasons why this test was selected and modified for Arabic speaking children. Firstly, the SCT comprises of short sub-tests (10) and this yields the assessment quick in its administration. Secondly, the pictures are black and white and reflect a contemporary multi-cultural society (Wheldall et al., 1987) and therefore the pictures were felt to be more appropriate for Egyptian Arabic speaking children as opposed to other similar

assessments such as the Test for Reception of Grammar (Bishop, 1989).

Some of the grammatical structures examined in the English version were modified. The last sub-test, which tests the passive, was excluded as the passive construction is expressed differently in Arabic and does not require a subject. The second modification was for sub-test 4 which tests the plural; for the Egyptian Arabic version the dual was used instead since the pictures only had two objects. The third modification was that the 6 test items that are not used in the English version were used to test verb-less constructions. For the EA version, therefore, the test was divided into 10 sub-tests. The first subtest has six items and the remaining nine each have 4 sub-test items. The total number of sub-tests passed out of 10 and the total number of sub-test items out of 42 was computed for the children who were administered this test.

3.4 Spontaneous language samples

The language produced by a child during natural conversation is more representative than language produced in highly structured test situations. Frequently, the conversational partner in an assessment situation is a clinician responsible for carrying out the assessment, and the setting is a diagnostic or therapy room within a school or clinic. Miller and Chapman (1981) recommended recording both mother-child and clinician-child conversations during an evaluation to ensure a more representative sample.

The EA-DLI children and the 10 controls were observed and video recorded in at least two or more environments, including their homes, the clinic play-room, nursery and school.

It can be argued that the child's language simply being under investigation would yield the data source as being experimental as opposed to naturalistic especially if the language partner is an investigator. Typically, when the elicitor is a caregiver, the data is assumed to be naturalistic. Following the initial assessment, the three language impaired subjects were recorded on five occasions with their mothers during the parent child interaction therapy

sessions. This therapy lasted a period of 6 weeks and was conducted in the clinic play-room. Thus by the end of the six weeks when recordings were conducted with the investigator the EA-DLI children had become familiar with the investigator, the clinic play room and the play materials. There were occasions when they were also recorded with their teachers, peers and siblings. However, to ensure reliability and validity of the data the majority of recordings were with the investigator during their therapy sessions.

3.5 Methods of recording

Videotape recording yields the most complete and accurate record of the verbal and non-verbal aspects of interaction as well as contextual information which is crucial for the analysis. In order to obtain a representative sample of the subjects' language production, samples of spontaneous conversations were recorded and analysed.

The subjects were video-taped during unstructured, child-led play sessions with the investigator, their parent and sometimes teacher. The spontaneous language samples were video recorded using a Sony camera with a built in microphone, and the recordings were made onto 8mm tapes. The language samples were transcribed from the play session tapes using conventions adapted from Bloom and Lahey (1978).

For the two control children who took part in the diary studies their language was phonetically transcribed on-line. Marwan (3;00 years), the child recorded in nursery, was recorded whilst interacting with peers and his teacher during class group activities. It was not possible to video record him at these times. For the second child, Habiba, her language was also phonetically transcribed on-line since at the age of recording limited language was produced.

3.6 The organisation and analysis of data

3.6.1 Transcription and Coding

The formal analysis of the data was divided into two main subroutines—the *transcription* of the data and the *coding* of the data. The method of coding was developed *a priori*, but was modified to accommodate for various morphological units that emerged in the data.

The aim of the transcription was to place the data into a single record representing both the linguistic events and the non-linguistic functional events. The transcription needed to provide sufficient information from the original records (video tapes) so that they were informative and insightful for linguistic analyses. In effect, too much information renders a transcript difficult to read and evaluate (Ochs, 1979: 44). However, much interpretation takes place at this stage and reliability and consistency of the transcription is an important factor to consider.

To allow for the greatest reliability in the analysis of the data all utterances produced by the child was transcribed. Ochs (1979: 44-5) remarked that researchers have been hindered in their research by the lack of attention paid to transcription and its standardisation. It is the errors and breakdowns of both the language impaired subjects and the controls which highlight areas of language processing and developmental transitional periods. Valuable insights may be lost if the child's unintelligible jargon or false starts are not represented. Coding of the non-verbal use of language is equally as important when dealing with child language research. Information regarding the immediate situational and behavioural context is crucial to the interpretation and analysis of the child's language. The adult's language was not transcribed and was only included to highlight ambiguous language or where the child's response was specific to the conversation. The children's language was analysed for function and structure.

3.6.2 Phonetic Transcription

Phonetic transcription was the chosen method of transcription as this yields the greatest accuracy for what the child actually produced. Orthographic transcription not only obscures certain aspects of development but it does not allow for standardisation of the data and it is difficult to represent forms which are not the same as target adult forms. The phonetic symbols used and the corresponding Arabic orthographic symbols were discussed in chapter 2.

3.6.3. The linguistic analysis and coding of language

The method of coding was adapted and modified as key morphological units emerged during data collection and transcription. The coding process is essentially an aspect of analysis whereby something emerges. If the investigator knows what is going to occur in advance then the data is coded and represented *a priori*, this becomes a deductive process. However, as the data is transcribed the coding system may change as different linguistic units occur. The aim was to label the observed morphological errors and to observe the similarities and differences and the relationships among the morphological units observed.

It was expected that non-adult target forms will be present in the language and these were subcategorised into the following categories—(1) the *normal developmental errors* (NDE), which are non adult target language forms productive in normal children. The presence of these forms demonstrate productive language and creative abilities for children acquiring language normally, (2) *Neologisms* which are productions which do not violate phonotactic rules of Egyptian Arabic, but are not target forms in the language. The target is unknown and even if the word produced may have been by phonological distortions of a target word, the target cannot be recognised from either the context or from the pattern of phonemes, and finally (3) *vocalic paraphasias*. This was used to describe productions where the root of the word was transparent, and syntactically the form took the place of a verb, but the incorrect vocal

pattern rendered the word a non- target form. This was not an articulatory error, but can be viewed as a morphological error.

The distinction drawn between the normal developmental errors and vocalic paraphasias is significant. In the case of the *normal developmental errors* the target production is transparent, and the word produced is an EA word or close to the target, however due to either errors of agreement or omission of Aspectual markers an error of morpho-syntax results. For the *vocalic paraphasias* the root is transparent, but the target word is unknown. The *neologisms* are not adult target forms although they would be phonologically pronounceable in EA. They may be used consistently in the same way that the baby words were seen to be produced by the controls, but are only understood within the syntactic, semantic and pragmatic functions of the phrase.

Having transcribed the language samples, each utterance was coded and then analysed independently. This allowed for the total number of utterances to be computed. The following analyses were conducted on all spontaneous language samples.

3.6.3.1 Morphology: mean number of morphemes per utterance (MPU)

To calculate the mean number of morphemes per utterance (MPU), the same method devised by Dromi and Bernab (1982) for Hebrew was used. This was felt to be a more accurate means of measuring linguistic maturity. The reason is that the inflectional morphology in Arabic is internal and can take suffix, infix, or prefix position, therefore not all of the conventions developed by Brown (1973), although relevant, are sensitive to the Semitic languages. When devising a measure for grammatical knowledge in children speaking Hebrew, Dromi and Berman (1982) found that due to the morphology of Hebrew (i.e. a Semitic language) an alternative means of measuring grammatical development was required. Unlike a language such as English, added morphemic complexity in Arabic and Hebrew is not expressed necessarily as added linear length.

Similar considerations were made when designing structured tasks and measurements of grammatical competence in Arabic. For example, a single word in Arabic may be comprised of more than 6 morphemes, which in a Romance or Germanic language would be expressed as string of isolated words with perhaps the same number of morphemes, but linearly longer. For example, the Arabic word /ma-katab-ha-l-u-ʃ/ *he-did-not-write-it-for-him*, contains six morphemes, while the English version, *He did not write it for him*, would be counted as 7 words and morphemes. Further, there are other times in Arabic where person and Tense markers on the verb are assumed but not overt. For example, in /nat/ *(he) jumped*, is counted as one word and one morpheme while the person and gender marker are intrinsic. Whereas in English, *He jumped*, would be counted as two words and three morphemes. Therefore, what is a useful unit of measure will vary cross-linguistically and must be defined in a language specific function. For languages such as Arabic and Hebrew, linguistic development will not be reflected in an increasing length utterance but rather by a larger number of morphemes per utterance (MPU). As further described by Dromi and Berman (1982, page 405) "*The term MPU reflects our belief that for this model, morphemes rather than length are criterial for characterizing linguistic maturity*".

For the EA-DLI children and the controls firstly their MPU for each utterance was calculated. For the longitudinal controls and the EA-DLI children the recordings were divided into blocks, (3 or 4 months) and the MPU for that period was calculated. For the cross-sectional controls the MPU was calculated per recoding.

3.6.3.2 Percentage of utterances with errors

The spontaneous language of the EA-DLI children was analysed for salient morphological errors and percentage of errors was calculated for recording periods or individual recordings, depending upon whether the data was longitudinal or cross-sectional.

Using adaptations of procedures set out by Dunn *et al.* (1996) the percent structural errors was defined as the percentage of the utterances that contained one or more structural errors in morphology or syntax. The types of errors that a child may display, according to Dunn *et al.* (1996), are that the child might:

- display an error in word order
- omit or incorrectly use a morphologic ending
- omit articles, prepositions, auxiliary verbs or contractions
- speak using telegraphic speech
- incorrectly select negatives

Modifications were made based on the cross-linguistic data available in Hebrew and the normal developmental errors observed in the EA controls. For the EA-DLI children and the longitudinal controls, the percent structural errors were calculated for each period (3-4 months). But for the cross-sectional controls the percent structural errors was calculated per recording. This allowed for comparisons between recording periods for the EA-DLI children and for comparisons between subject groups. The hypothesis was that the older the child, the more their language develops, the less their percentage of errors will be.

To calculate the percentage of utterances produced with errors, each utterance that contained one or more error was totalled. This was then calculated as a percentage of the total number of utterances produced for either the recording or period.

3.6.3.3 Lexical analysis for spontaneous use of verbs

Inflectional morphology is an area of difficulty for children with SLI, specifically for Hebrew which is a Semitic language where verbs are marked with inflections for Tense, gender,

number and person (Dromi *et al.*, 1999; Leonard *et al.*, 2000). Given that Arabic is a highly inflected language and verbs are marked for Tense, verb information was an area that needed to be examined in detail.

To assess verb errors produced by the EA-DLI children and to examine the hypothesis that errors for agreement would be more frequent than errors for Tense, a verb errors analysis was conducted on the language samples produced by the EA-DLI children. This was not necessary for the controls, as their percentage of errors was as expected quite small and secondly the control data sample sizes themselves were smaller and therefore a comparison between the groups would not be reliable.

All the verbs produced by the EA-DLI children were tabulated and analysed according to types of errors, and Aspect/Tense use. This allowed for the total number of verbs to be calculated. In addition, the verbs were analysed according to whether the errors were with (a) both Tense and agreement (b) with agreement only or (c) verb vocalic paraphasias.

Morphological productivity was calculated for the three EA-DLI children to assess lexical learning and development of verbs. The samples recorded for the cross-sectional controls were sufficient for morphological error analyses but were not sufficient to allow for the full verb analysis that was computed for the EA-DLI children (N.B. measures of morphological productivity were done on three longitudinal controls but results were not representative or meaningful as data was not enough).

3.6.3.4 Grammatical and morphological analysis

In order to explore all the subjects' use of grammatical morphemes, their utterances were analysed for the presence or absence of a set of grammatical morphemes which would be expected to be produced in obligatory contexts, and based on the cross-linguistic SLI findings

have been problematic.

By noting the number of obligatory contexts for a morpheme and the number of times the morpheme was used correctly in those contexts, the percentage of correct use for the morpheme within that language sample can be calculated. The most salient morphological errors produced by the EA-DLI children were documented and compared with those produced by the controls. The aim was to determine the morphological pattern of errors that may be specific to EA language impairment. The following morphological categories were examined.

1. Use of plurals and the dual
2. Use of negative particles
3. Use of the definite article
4. Use of prepositional concepts
5. Use of bound and free pronouns
6. Use of adjectival agreement

3.6.3.5 A Functional Analysis

Pragmatics is a topic that is given many different definitions by clinicians and researchers (Leinonin et al., 2000; Leinon and Letts, 1997; Letts and Reid, 1994; Smith & Leinonen, 1992;). Pragmatics encompasses everything that goes on externally in the course of human communication. It concerns the outward behaviours which are used in the process of sharing thoughts and feelings and also the internal knowledge and processes involved in making sense of what is happening in the world. Pragmatics deals with subjective and complex communicative experiences, it is difficult to measure, and is often excluded from the research on SLI. However, just as the language *forms* need to be analysed and defined, analysis of the *functions* of communication need to be considered when examining language development and impairment. Although clinicians have long emphasised the importance of the communication skills of children with SLI, there is little in the literature that discusses combined

morphological acquisition with functional use of language (Schaeffer, 2003; Leonard, 1998). Given that SLI is a predominantly morph-syntactic deficit, any pragmatic difficulties would be secondary to problems of linguistic form or content (Fey and Leonard, 1983).

A study of the literature of children with SLI and their pragmatic abilities reveals a variety of results. This is partly because the same term is used to encompass different language functions and that researchers use the same term to refer to different linguistic phenomena, for example, speech acts, conversational turn-taking, topic maintenance, code switching and eye-contact. The studies comparing the pragmatic abilities of children with SLI with controls reveal that either the children with SLI perform below the level of MLU controls, or no differences are found, or the children with SLI perform at higher levels (Schaeffer, 2003).

Leonard *et al.* (1982) employed an expanded set of 16 communicative functions to examine speech acts by children with SLI and younger controls at the single word utterance level. Prinz (1982) found that the requests of children with SLI were similar in type to younger normally developing children, though the latter were more likely to produce error free grammatically complete utterances. The SLI literature on speech acts (functional or intentional communication) suggests that the SLI children's use of speech acts follows the same pattern of development as their controls but lags behind (Gallagher and Craig, 1984). Speech acts are the ability to express communicative events and correctly interpret the intents of others. Some of the examples of types of speech acts include– greeting, requesting, informing, suggesting, persuading, explaining, denying, complaining and deceiving (Searle, 1969). Dore (1979) proposed a system for describing the different functions that communication can serve in the communication of pre-school children.

For the purpose of this research a functional analysis was required which would cater for the language limitations of the DLI children and would specifically define and categorise the different expressive utterances produced by the children. In addition it was important to

be able to compare the utterance functions of the controls with the EA-DLI children. The analysis used needed to account for single words and phrases with restricted MPU values, in addition to phrases where the MPU was lengthy. It was also necessary to observe the developmental pattern changes regarding the children's functional use of utterances to allow for longitudinal comparisons both across and between subjects and controls. In addition, a category was needed that would describe the children's ability to answer questions requiring abstract reasoning, and could be differentiated from their responses to simpler questions where the child is only required to label what they see. This would therefore differentiate retelling a story from a book with the pictures to a narrative in the absence of any pictures.

It was also important when selecting children for this study to differentiate between children with Autistic Spectrum Disorders, who may make good use eye-contact but are impaired in their functional use of language, from those with developmental language impairment as examined in this study. Second, when young children's language is examined, i.e. between 1-3 years, children produce short phrases and often produce single words. It was important to have a coding system which could account for the different functions that utterances serve for the EA-DLI and the control children, but at the same time one that was not over detailed which would make interpretations of data more difficult.

The functional analysis used was based on the recent Applied Behavioural Analysis literature that is used to analyse and assess the language of children with language and communication disorders (Sundberg and Partington, 1982; Sundberg, 1987; Sundberg, 1993). In addition, this analysis has recently been adopted for intervention with language and communication disordered children (Sunderg *et al.*, 1996). The investigator's clinical experience has been that this method of coding language function is an effective means of measuring language change in children with limited language out-put.

The different speech act categories defined by Sundberg and Partington (1982) that were

used were — Mands, Tacts, Echoics, Intraverbals and an additional category labelled Others was also included. Each utterance produced by the EA-DLI children and the controls was coded into one of these five categories and a percentage of functional use was calculated for the recording samples. The definitions of these categories are as follows:-

(1) *Mand*, a verbal response that is reinforced by a characteristic consequence and is under the control of motivational variables. This therefore includes requesting an item or information; (2) *Tact*, a verbal response to a non-verbal stimulus. This includes a label, a name or narrative. The important distinction is that what the chid is labelling is in front of them; (3) *Echoic*, imitation of vocal sounds or words, i.e. repeating what another person says; (4) *Intraverbal*, a verbal response controlled only by a question that does not match the response. This would include answering Wh- questions, narratives, and abstract reasoning. An additional category was added where the function of the utterance could not be determined. The category was titled as *Others*, but included Learnt Repetitive Phrases, Disordered sentences and Neologisms. It was important to have additional insight as to the types of utterances that would fall under this category as this would be important in differentiating the language of the control children from the EA-DLI children. It was hypothesised that the functional analysis of language would show that the EA-DLI children will respond to fewer questions that require abstract verbal reasoning (i.e. Intraverbals) and that they will produce more disordered sentences and Learnt Repetitive phrases. However, it was also hypothesised that both groups would show similar patterns in their use of Mands, Tacts and Echoics.

In addition, when examining the language of young children with language impairment and selecting children for this study it was necessary to exclude children with Autistic Spectrum Disorders. When used on children with Autistic Spectrum Disorders, the coding system selected would reveal a different pattern regarding functional use of utterances; where Echoics and Tacts (Mands) would be more frequently produced, but verbal Mands (requests) would be less (e.g. Partington and Sundberg, 1982; Sundberg, 1987).

3.7 Reliability and Validity of Data Analysis

The children were mostly recorded with the examiner and in the clinic play-room to allow for reliability in recording. To allow for the maximum reliability when analysing the data the following considerations were made. Firstly, everything the child produced was transcribed onto the data sheets. Second, a random transcription sample from each of the EA-DLI children's data samples was re-examined by two independent bilingual speech and language therapists to ensure consistent coding throughout the data. In addition, the random samples were reanalysed by the therapists and differences in calculations were noted and re-examined.

Chapter 4

4. RESULTS OF CONTROLS

Introduction

In this section the results of the children that served as controls for the EA-DLI children, data from infant diary studies and supplementary nursery diary studies will be presented. This chapter is divided into three sections.

In the first section (4.1) the results of the analysis of the spontaneous utterances produced by the Cross-sectional and Longitudinal Controls will be presented. This will be followed by the results of the elicitation tasks given to the Controls.

In the second section (4.2), examples from the Control data and from diary infant studies will be used to describe early word development and normal phonological errors.

In the third section (4.3), the data taken the spontaneous language samples of the controls and from diary studies will be used to describe the normal development and acquisition of morphological structures. Specific emphasis will be placed on morphological structures hypothesised to be clinical markers for EA-DLI, as described in Chapter 1.

4.1 Results of spontaneous language measures and the elicitation tasks

The language samples produced by the ten controls were analysed for form and content. The elicitation tasks were administered to allow for comparisons between the Controls and between the Controls and the EA-DLI children.

4.1.1 Analysis of the spontaneous utterances produced by the Controls

The spontaneous language measures conducted for the 10[1] controls were:

1. Calculations of Mean Morphemes per Utterance (MPU).
2. Calculations of percentage of error per sample.
3. Functional analysis of utterances.

For purposes of analysis and clarity the data was divided into results for the Cross-sectional Controls and results for the Longitudinal Controls. Following the tables of results are graphs representing the results of the spontaneous analysis.

A discussion of the results of the language impaired children compared with the Controls will be discussed in chapters 5 and 6.

Table 4. 1 Cross-sectional controls: MPU and Percentage of errors per sample

Name	Sex	Age	% errors	MPU
Luli	Female	1;05	14.28%	1.14
Hanna	Female	1;11	65.38%	2.31
Ali	Male	2;05	46.15%	1.69
Ismail	Male	2;08	33.33%	1.33
Sherif	Male	3:03	33.33%	2.05
Samira	Female	4:04	8.9%	7.5

[1] N.B The diary studies for the controls Habiba and Marwan were not included

Figure 4.1 Percentage of errors for cross-sectional controls

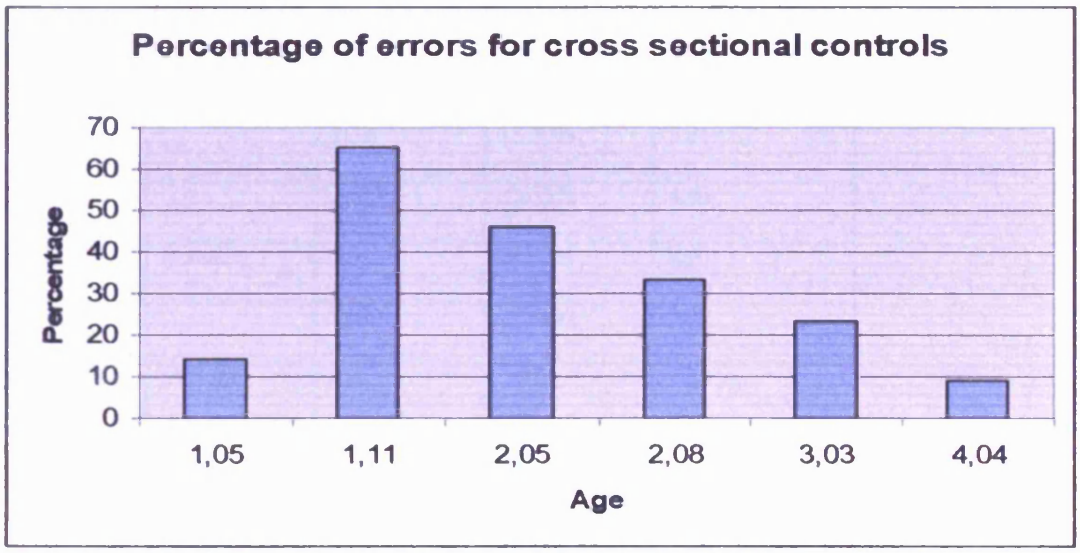


Figure 4. 2 MPU values for cross-sectional controls

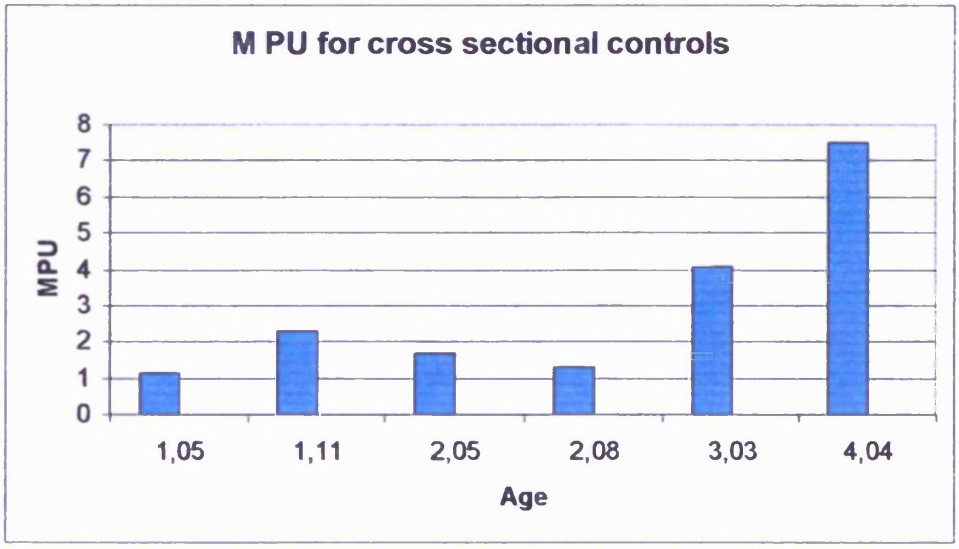


Table 4. 2 Longitudinal controls MPU and Percentage of errors per sample

Name	Sex	Age	% errors	MPU
Omar	Male	1;07	11.11%	1.22
		2;04	15.38%	2.84
		3;07	33.33%	4.40
Kenzy	Female	2;01	28.57%	2.00
		2;07	27.66%	3.04
Sanna	Female	2;07	44%	3.83
		3;01	23.3%	4.06
Dudu	Male	2;03	53%	2.56
		3;07	37.5%	3.81

Figure 4. 3 Percentage of errors for longitudinal controls

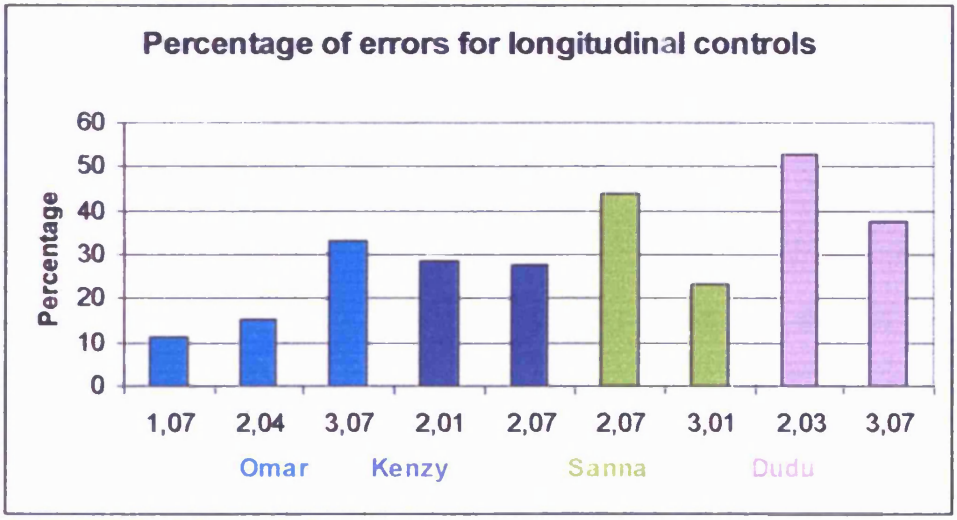
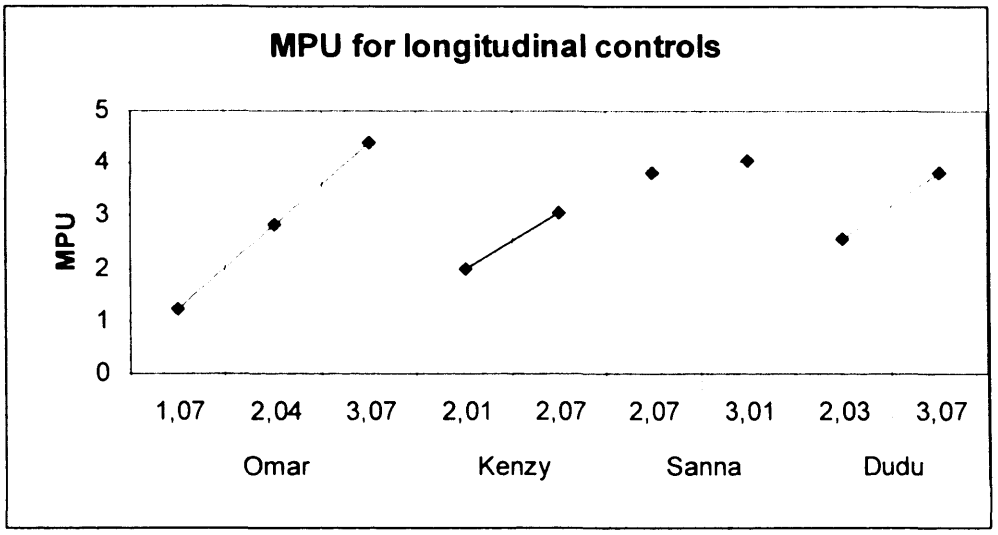


Figure 4. 4 MPU values for longitudinal controls



4.1.2 Discussion of results for MPU and percentage of errors per sample

From the above tables and figures interesting patterns emerge with regards to the percentage of errors and MPU for EA speaking children which is similar to patterns reported cross-linguistically (Dromi and Berman, 1982). Normal developmental errors are present in the language of children acquiring EA. They are not found in the target language and their presence in a child's language support knowledge of grammatical rules and early understanding of morpho-syntax (e.g. Bowerman, 1982; Fletcher and Garman, 1990). The errors were novel productions and not what the children heard in their linguistic environment. Errors were produced by all the controls, however, the pattern of errors varied.

The percentage of errors refers to percentage of utterances containing errors regardless of whether the utterance contained one or more errors. The largest rate of errors was produced by Hanna, at the age of 1;11 years where 65.38% of her utterances contained one or more errors. The least number of errors was produced by Samira when she was 4;04 years old, and were 8.9%. The range however of the children recorded from 1;05 to 1;11 was 14.28%-65.38%; between the age of 2;01 to 2;07 years the range was 15.38% -53%; and between the

age of 3;01 to 3;07 years the range was 23.33-37.5%. Only one recording was done at 4;04, when the percentage of errors dropped to 8.9%. The difference observed in the range within each age group is what would be expected as part of the normal variability seen in children acquiring language. As the children became older the range and overall percentage became less.

As illustrated by figures 4.2 and 4.3, the first pattern that emerged is that the number of utterances produced with errors increased with age and then dropped. This is clearly illustrated in the cross-sectional controls results. At 1;05 years the percentage of errors are 14.28% (Luli), at 1;11 the errors increase to 65.38% (Hanna) and from 2;05 there is a reduction in errors as the children become older. The rate at which this pattern develops varies across the controls, as illustrated by figure 3.3, for the longitudinal controls.

The increase in the number of utterances produced with errors seems to be at the stage when the children begin to combine words to produce short phrases and with this the number of errors produced per utterance also increases. It was for this reason that most of the recordings were made when the children were between two and three years as this is when the most errors are expected. The observed pattern is no different to children acquiring other languages such as English where around the age of 2;06 to 3;06 years normal developmental errors are at their most frequent and over-regularisation errors such as "He goed" are characteristically present in the child's expressive language (e.g. Bowerman,1982; Pinker, 1989; Fletcher and Garman, 1990).

Considering the longitudinal controls, a further pattern became apparent between the children's MPU and the peak of percentage errors. For each of the controls the age at which a burst of morphological use occurred seems to be related to when their percentage of errors also increased. Taking Omar as an example we see that at 2;04 years his MPU was 2.84 and his percentage of errors is 15.38%. Later at 3;07, Omar's MPU increased to 4.40 and his

percentage of errors also increased to 33.33%. Therefore for Omar his morphological burst occurred at 3;07 years. Further evidence of the general developmental pattern was seen to be produced by Sanna 2;07 years when her MPU was 3.83 her percentage of errors was 44% which is when she began to produce a wider range of morphological structures. When she was recorded less than a year later at 3;01 years her MPU was 4.06 and her percentage of errors dropped to 23.3%. Therefore for Sanna her morphological burst occurred when she was 2;07 years, a year earlier than Omar.

There is always variability amongst children acquiring language normally (e.g. Bowerman, 1982) as seen by differences in the age at which the morphological burst occurred, the percentage of errors at the time and the MPU value. When Dudu was 2;03 years his percentage of errors was 53% and his MPU was 2.56, over a year later at 3;07 years his percentage of errors dropped to 37.5% and his MPU increased to 3.81.

The range of MPU values was variable, although the pattern was similar to the reported Hebrew findings (Dromi and Berman, 1981) and those reported by Omar (1973) for EA. From the age 1;05 to 2;07 the MPU range was 1.14 -1.86; from the age of 2;01 to 3;03 it was 2.00- 2.84; and from the age of 2;07 to 3;07 it was 3.04-4.6. At 4;04 years and at 4;04 years the MPU value was 7.5.

Figures 4.3 and 4.5 illustrate the MPU values for the cross-sectional and longitudinal controls. For the cross-sectional controls we see MPU values within a limited range until the age of 2;08 years after which there is a steep incline in the values. Figure 3.4 illustrates the different rates of increase for MPU values for the four longitudinal controls. The children were recorded at different ages, therefore this must be considered when examining the results. Omar was recorded on three different occasions and his results show a steady increase for MPU with age. When first recorded at 1;07 his MPU was 1.14 it went up to 4.40 when he was

3;07 years. Sanna's rate of change was less between the two recording periods; at 2;07 her MPU was 3.83 and there was a slight change for her MPU value for the second recording which went up to 4.06.

At 2;08 Ismail's MPU was 1.33 and at 3;03 years Sherif's MPU was 2.047 whereas at 2;07 Sanna's MPU was 3.83 and at 2;07 Kenzy's MPU was 3.04. At a first glance the differences between the controls may be related to gender differences. An equal number of male and female control children were recorded and variability was seen across both sexes.

4.1.3 Comparing the Arabic and Hebrew MPU values

Over the years researchers in child language have found that the child's use of morphemes is a strong basis for measuring grammatical knowledge (Brown, 1973, de Villiers and de Villiers, 1978; and Dromi and Berman, 1981). An interesting cross-linguistic pattern emerges, when the Arabic speaking children's use of grammatical morphemes is compared with children acquiring Hebrew and English. Given that both of these languages have complex systems of bound morphology, it would be only reasonable to expect that for children acquiring Semitic languages, i.e. Hebrew and Arabic, their MPU scores would be higher compared with a language such as English. Dromi and Berman made a comparison between the MPU scores in Hebrew and MLU in English by age of subjects and number of subjects. The table below is taken from Dromi and Berman (1981) with the added results of this present study.

Table 4. 3 Comparison of MPU scores in Hebrew and Arabic and MLU in English by age of subjects and number of subjects.

Authors	Range of MLU/MPU	Range of ages	Number of subjects
Brown (1973) English	1.5-5.2 MLU	1;06-4;00	3
de Villiers & de Villiers (1978) English	1.3-4.7 MLU	1;04-3;04	21
Dromi and Berman (1981) Hebrew	1.7-5.9 MPU	2;00-3;00	38
Present Study	1.14-7.5 MPU	1;05-4;04	10

Initial consideration of these figures reveals that the higher end of the MPU range produced by the Arabic speaking children is different than that produced by the English children. If we look at the upper limit scores for the de Villiers and de Villiers (1978), we see that at the age of 3;04 the maximum MLU was 4.7, whereas for Hebrew when the children were a similar age, 3;00 years, the maximum MPU value was 5.9. Brown (1973) cited MLU values which include 4;00 years old and he reports maximum MLU values of 5.2 (n=3) compared with the EA data in this present study that also goes up to the age of 4;04 years and MPU score was 7.5. As predicted the upper and lower end scores of the MPU values support that children acquiring morphologically rich inflected languages will use inflections early on, in that the Hebrew and EA scores are similar. This study also supports the selection of MPU as a measure rather than MLU.

4.1.4 Functional analysis of utterances produced by the cross-sectional and longitudinal controls

The functional analysis of the utterances produced by the controls was to assess whether there was an emerging pattern in the types of utterances that would be used from the age

of 1;00-4;00 years in children developing Egyptian Arabic normally.

The results are represented in table 4 and 5 as a percentage of production for the five different groupings: Mands, Tacts, Echoics, Intraverbals and Others. The results of the cross-sectional and longitudinal controls are represented separately. Following each of the tables are bar charts illustrating the percentage of use for Mands, Tacts and Intraverbals.

Table 4. 4 Functional analysis of utterances produced by cross-sectional controls

Name	Sex	Age	Mands	Tacts	Echoics	IV	Other
Luli	Female	1;05	57.14%	28.57%	14.29%	0%	0%
Hanna	Female	1;11	80.77%	19.23%	0%	0%	0%
Ali	Male	2;05	76.92%	23.07%	0%	0%	0%
Ismail	Male	2;08	44.44%	37.04%	14.81%	0%	3.70%
Sherif	Male	3;03	46.96%	42.42%	7.57%	1.51%	0%
Samira	Female	4;04	50%	25%	0%	25%	0%

Figure 4.5 Mands used by the six cross-sectional controls

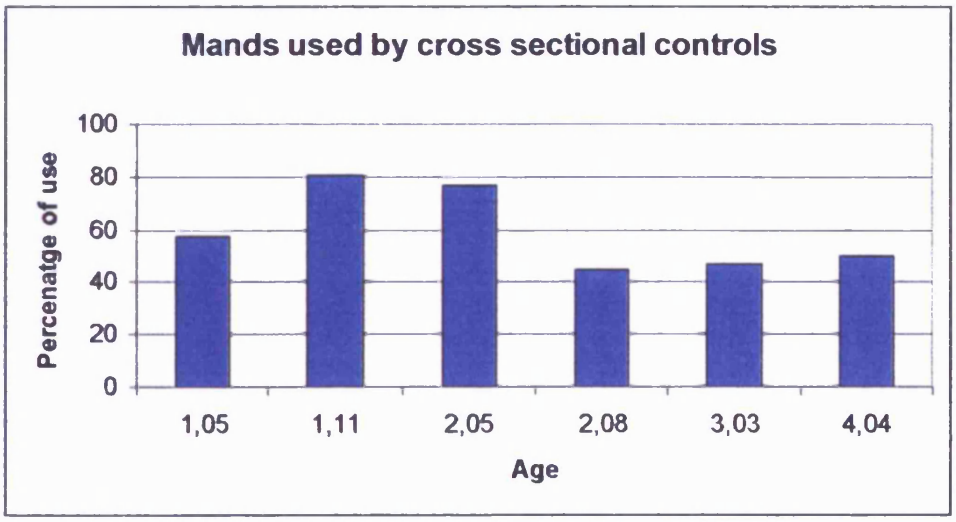


Figure 4.6 Tacts used by the six cross sectional controls

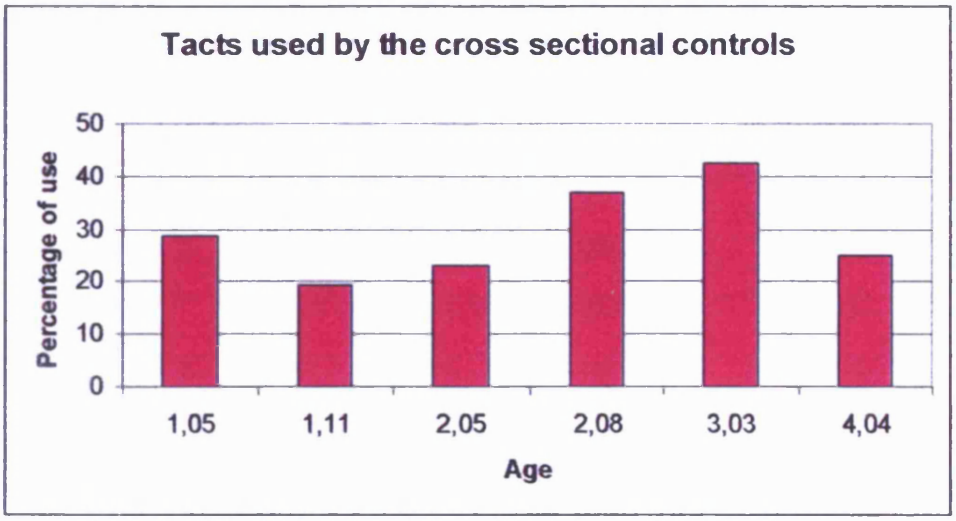


Figure 4.7 Intraverbals used by the six cross sectional controls

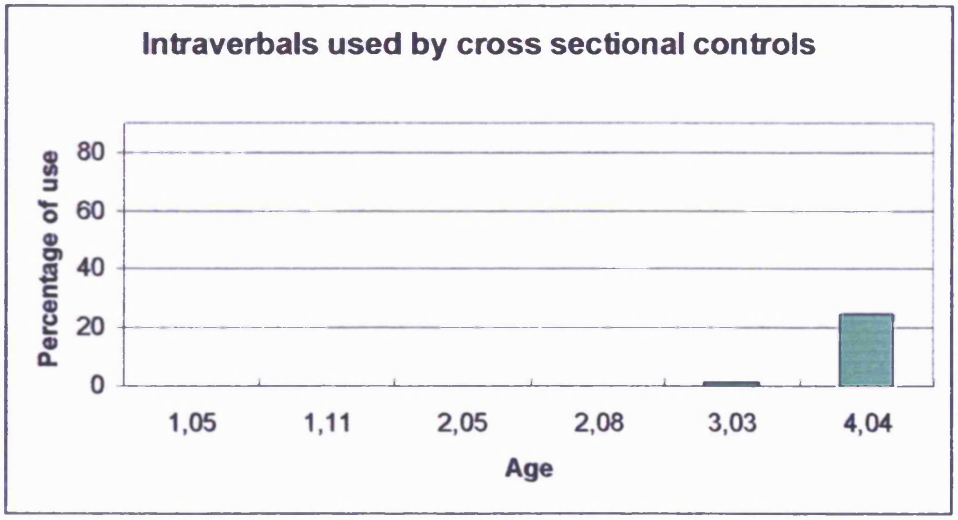


Table 4. 5 Longitudinal controls: distribution of function of utterances

Name	Sex	Age	M	T	Ec	IV	Oth
Omar	Male	1;07	44.44%	55.56%	0%	0%	0%
		2;04	50%	38.46%	0%	11.54%	0%
		3;07	20%	20%	0%	53.33%	6.67%
Kenzy	Female	2;01	42.86%	42.86%	0%	14.29%	0%
		2;07	40.42%	38.30%	0%	19.15%	2.13%
Sanna	Female	2;07	50%	44.44%	0%	5.55%	0%
		3;01	27.59%	41.38%	3.45%	27.59%	0%
Dudu	Male	2;03	37.5%	50%	0%	0%	12.5%
		3;07	34.69%	34.69%	10.20%	10.20%	10.20%

Figure 4.8 Tacts used by longitudinal controls

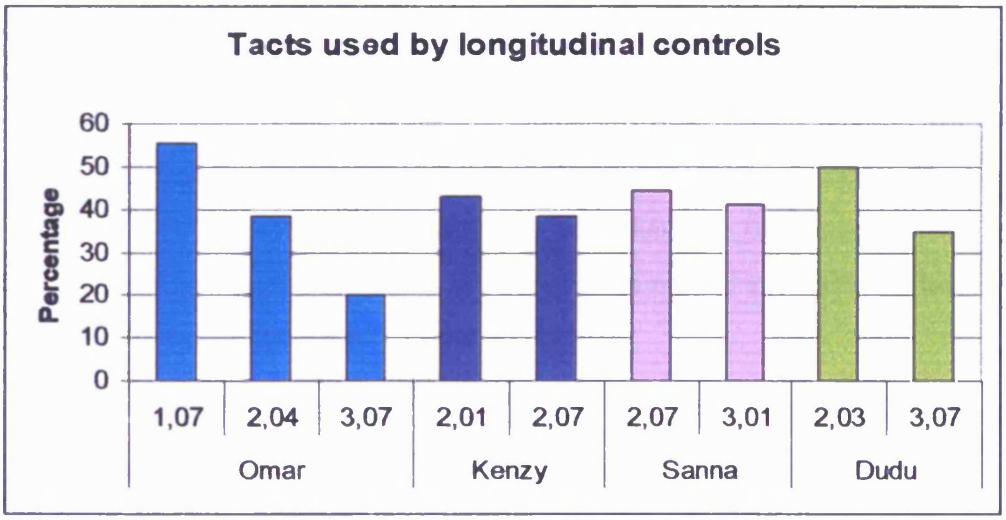
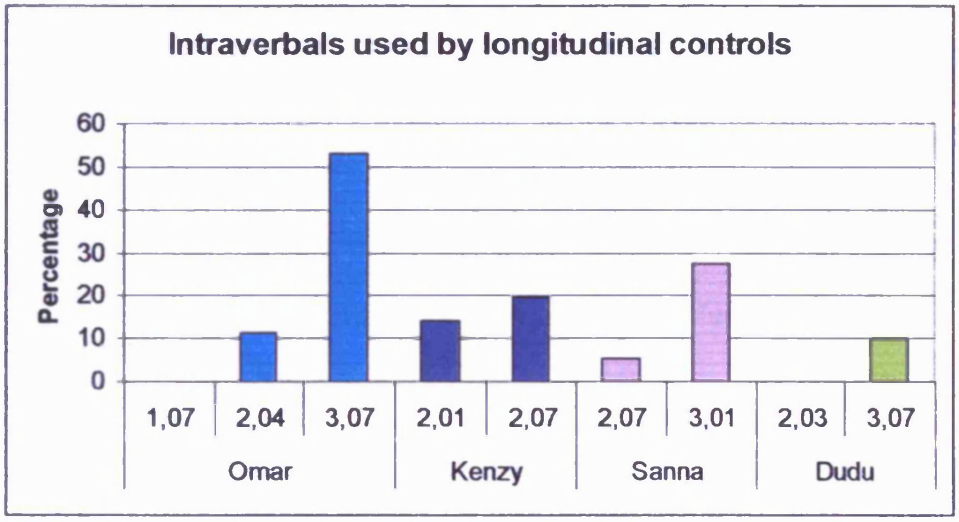


Figure 4. 9 Intraverbals used by longitudinal controls



4.1.5 Discussion of results for functional analysis of utterances

A number of patterns can be seen from the bar charts above. The most obvious pattern is that the number of Intraverbals produced by the children increases with age. The ability to provide an Intraverbal response is directly related to the child's ability to understand spoken language and to answer what is referred to in English as *Wh-* questions (where? when? what? and who?). The Arabic equivalents are /fi:n?/, /ʔimta?/, /ʔih?/ and /mi:n/. These are questions that involve abstract reasoning required for conversational skills.

For the longitudinal controls their use of Intraverbals increased with age as can be seen in figure 5 above. Omar began to produce Intraverbal responses at the age of 2;04 years. At 3;07 years Omar's production of Intraverbals were more than any other type of utterance. The same pattern is seen throughout all the longitudinal controls; again there is normal variability in when the children begin to produce Intraverbals and the percentage produced.

At 2;03 years Dudu produced no Intraverbals and at 3;07 years he started to produce them but for only 10.2% of his utterances. Sanna began to produce Intraverbals at 2;07 years (5.55%) , however at 3;01 years her percentage of production increased to 27.59%. Kenzy

used Intraverbals from a very young age and her use over the two recording periods varied.

For the cross-sectional controls Intraverbals were not produced until much later at the age of 3;03 years and at 4;04 they peaked and it was when maximum production was recorded.

The second noticeable pattern was that Mands and Tacts were used the most during the early stages of the children's language acquisition, when under the age of 3;00 years. As the children became older they began to use more Intraverbals but they continued to use Mands and Tacts. The Mands became more complex as they used Wh- question forms rather than simple requests. Their ability to produce Tacts also developed, as they were able to narrate stories using pictures. Taking Sanna as an example, at the age of 3;01 years her production of Mands and Intraverbals were equal at 27.59%, her production of Tacts was 41.38% and she produced Echoics 3.45% of the time.

As initially hypothesised the least types of utterances used were Echoics and Others. Echoing parts of an utterance after an adult is a normal developmental pattern observed across languages and is typically observed when children begin producing one and two word phrases (Brown, 1973; Foster-Cohen, 1999). The Arabic speaking children echoed words after the adult, however this was not observed in all the controls. Dudu used Echoics at the age of 3;07 and Sanna used Echoics at the age of 3;01. Both children used this type of utterance after they had produced a normal developmental error which had been corrected by the adult. The example below is part of a conversation with Dudu where he omits the verb phrase, the adult recasts his utterance inserting the omitted verb phrase which he then echoes after the adult, although he omits the Tense and person markers.

15/04/01 #4	Dudu: */maħmud Taya:ra/ Mahmoud aeroplane	Tact

	Adult: /maħmud bi-yi-suʔ Taya:ra/ Mahmoud is driving the aeroplane	Recast
15/04/01 #5	Dudu: */maħmud suʔ Taya:ra/ Mahmoud drive aeroplane	Partial Echoic

The control children rarely produced Others. The Others produced were sub-coded into three sub-categories: (1) learnt/repetitive phrases (LP/RP), (2) neologisms, (3) no referent/disordered.

Kenzy at 2;07 years, Ismail at 2;08 years and Omar at 3;07 years each produced one utterance that was coded as an Other. Dudu was the control who produced the most Others– at 2;03 years, 5 of his utterances were coded as others and at 3;07 two utterances were coded as Others; thus they decreased with age. They were: 5 neologisms, 2 learnt repetitive phrases and 1 no referent. Disordered sentences were not produced by the controls and the majority of the Others were neologisms.

For example, whilst playing with his mother in the clinic play room, Ismail at 2;08 years produced the neologism /ni:na/. In her response his mother did not understand what he wanted, she told him she did not understand and asked him whether he wanted to sleep or leave.

4.1.6 Analysis of the structured tasks administered to the Controls

In the following section analysis of the results from the structured tasks will be discussed. Not all the control children were administered the structured tasks as they were dependent on the age of the child. The controls were not matched to each subject, but compared as a group to each of the EA-DLI children. Habiba who was used as an Infant diary study was also administered the EASCT. Tables 4.6 and 4.7 below summarise the tasks and the controls

they were administered to.

Table 4. 6 Structured tasks given to the cross sectional controls

Name	Sex	Age recorded	EARAPT	EASCT	WinV	WinN
Ali	Male	2;05	yes	yes	yes	yes
Habiba	Female	4;01	no	yes	no	yes
Samira	Female	4:04	yes	yes	yes	yes

Table 4. 7 Structured tasks given to the longitudinal controls

Name	Sex	Age recorded	EARAPT	EASCT	WinV	WinN
Omar	Male	1;07, 2;04, 3;07	yes	yes	yes	yes
Kenzy	Female	2;01, 2;07	no	no	yes	yes
Sanna	Female	2;07, 3;01	yes	no	yes	yes

4.1.7 Lexical analysis for verbs: the Winslow verb pictures

Forty-two of the Winslow verb pictures were used to assess the children's use of verbs. They were administered to five of the controls to allow for a comparison of verb production between the EA-DLI children and the controls. The aim was to assess the variety of verbs that could be elicited. It was further predicted that the younger controls would initially use GAP verbs (Rice and Bode, 1993) in place of specific verbs as would the EA-DLI children.

The results of the five controls are listed in Table 4.8 below. The control children's pattern of verb use followed the expected developmental pattern and supported the findings reported in the Karam El–Din word list report (1990).

The children's use of verbs increased with age. As the children got older their ability to use a specific verb to label an action also improved. Again there is normal variability as can be seen in the difference

between Sanna and Omar's scores. At 3;00 Sanna was able to label 61.90% of the verbs whereas at 3;06 years Omar labelled only 47.62%. At 2;05, Ali did not label any of the verbs and instead labelled the objects in the picture. Kenzy who was the second youngest, at 2;07 years, labelled 9 of the 42 verbs.

Kenzy used the most GAP verbs in place of the specific verb required. This was always the feminine singular form of the verb /beteʕmil/ (she-is-doing), interestingly even when the examiner used the masculine singular form in the elicitation question, Kenzy continued to use the feminine singular form.

Table 4. 8 Results for Winslow verb pictures produced by the controls

Name	Age	Number Correct	Percentage correct
Ali	2;05	0	0
Kenzy	2;07	9/42	21.4%
Sanna	3;00	26/42	61.90%
Omar	3;06	20/42	47.62%
Samira	4;06	40/42	95.24%

4.1.8 Lexical analysis for nouns: the Winslow noun pictures

Thirty-one of the Winslow noun pictures were selected to assess the children's use of nouns. They were administered to four of the younger controls to allow for a comparison of verb versus noun production between the EA-DLI children and the controls. It was predicted that the both the control children and the EA-DLI children would name more nouns than verbs. The normally developing children were expected to label more than 50% of the pictures, since the pictures were all words cited in the Karam El-Din word list (1990). In addition normal developmental errors and the range of normal development for naming objects were compared.

One of the controls, Omar, was recorded twice, with a 12 month gap between the two recordings. This was to evaluate the rate of the normal acquisition of nouns for this one child. The results of the control children are discussed below.

Table 4. 9 Results for Winslow noun pictures produced by the controls

Name	Age	Number Correct	Percentage correct
Ali	2;05	12/31	38.70%
Kenzy	2;07	15/31	48.38%
Sanna	3;00	25/31	80.64%
Omar	2;07	17/31	54.84%
Omar	3;06	29/31	93.55%

As expected the control children were able to label many more nouns than they were verbs. Their ability to name the noun pictures increased with age. The youngest child Ali at 2;05 years named 38.70% of the pictures. Kenzy and Omar were both recorded at 2;07 years, their ability to label the pictures were similar (Omar, 54.84% and Kenzy 48.38%).At 3;06 years, Omar who was the oldest child named 93.55% of the pictures.

Ali and Kenzy both labelled less than 50% of the pictures, whilst the others all labelled more than 50% of the pictures. Ali was also the only child who did not name any of the verb pictures and Kenzy labelled only 21% of the verb pictures. For both children their reduced compliance was the reason for not naming the pictures, rather than difficulty with the task itself. During the recordings of Ali's spontaneous language samples he produced labels for objects that he had not named as part of the structured task, as did Kenzy. Such observations support the difficulties encountered when formal procedures using pictures or objects are used with young children under the age of three years.

Normal developmental errors were prevalent in the productions of the controls. These were frequently semantic errors or circumlocutions, typically seen in children with SLI with lexical retrieval difficulties, for examples see table 4.10 below. Another type of error was that the children labelled a feature of the picture such as the colour rather than the actual object in the picture. Such errors were

not expected to be produced by the controls. Due to their young age many of the productions were characterised with syllable omissions and normal phonological processes, e.g. cluster reduction. Onomatopoeic responses were also produced when naming animals and sound making objects such as a telephone.

All the children had difficulty naming the picture of a *pot*, the target word is /ħalla/. Instead it was labelled as /ʔakl/ *food*, /ʃurba/ *soup* or /ʔasfar/ *yellow* the background colour of the picture. In table 4.10 below, three different types of errors are represented. The first, a *phonological error* is where the child attempts to produce the target word but due to normal phonological processes taking place their production does not match the adult target form. The second type of error is a *semantic error*, for this the child produces a semantically related word to the target form. The third and final type of error is a *circumlocution error*. This is similar to a semantic error but not necessarily within the same semantic category. The child describes the picture or the function of the object using a phrase, without using the name of the object.

Table 4. 10 Examples of errors produced by controls when naming pictures of objects.

Name	Age	Gloss	Target	Response	Gloss	Type of error
Ali	2;05	sock	ʃura:b	a:b	sock	phonological
Ali	2;05	basket	sabbat	ʕbbat	basket	phonological
Kenzy	2;07	umbrella	ʃamseyya	bitaʕət əl-bard	For the-cold	circumlocution
Kenzy	2;07	bike	ʕaggala	leʕba	toy	semantic
Kenzy	2;07	sandwich	sandəwitʃ	mammam	food	onomatopoeic
Sanna	3;00	pot	ħalla	fi ʔakl	there is food	circumlocution
Omar	2;07	duck	baTa	wakwak	quak	onomatopoeic
Omar	2;07	table	Tarabi:za	korsi	chair	semantic
Omar	3;06	purse	kis felus	ʃanta əl-ma:ma	bag the-mum	circumlocution

4.1.9 The Egyptian Arabic Renfrew Action Picture Test

The EA-RAPT was used to elicit specific morphological and lexical items that could be compared with the controls. Using 10 line drawn coloured pictures, this test was designed to assess children's spoken language for information provided and the grammatical structures used, yielding two raw scores– one for specific lexical items (Information) and the second for bound and free morphological structures (Grammar). The maximum possible score for Information is 40 and 40 for Grammar. The results are listed in the table below. As would be expected as the children became older their scores increased.

Table 4. 11 The scores for the EA- RAPT were as follows:

Name	Age	Information	Grammar	Age	Information	Grammar
Omar	2;07	11.5	13	3;11	30.5	33.5
Ali	2;10	19	9	-	-	-
Samira	4;03	34	34	7;01	39.5	38.5

4.1.10 The Egyptian Arabic Sentence Comprehension Test

The EA-SCT was used to compare the control children's and the EA-DLI children's abilities in understanding morphological and syntactic structures. This test looks at the child's understanding of grammatical structures requiring the child to select one picture out of four, which most typifies the sentence used by the adult. For the EA version, the test was divided into 10 sub-tests. The first subtest has six items and the remaining nine each have 4 sub-test items. As the children became older their understanding of morphology and syntax increased.

Table 4. 12 Sentence Comprehension Test raw scores

Name	Age	Raw Score
Ali	4;01	23/42
Habiba	4;01	38/42
Omar	5;02	39/42

Samira	7;01	42/42

4.2 The normal development of Egyptian Arabic: babbling, early words and normal phonological errors

In this section an infant diary study, Habiba aged 1;06 and data from the younger controls will be used to describe early words and normal phonological errors.

4.2.1 Early words

The early words produced by Luli, Habiba and Hanna were interspersed with *jargon*. The jargon produced had the intonation contours and stress patterns specific to EA. The children's productions were also paired with gestures for example they were used to indicate questions or to refute an action or event. For example, Luli, at 1;05 years would turn both hands over, palms up to indicate the question *Where is ...?*. She would use a rising intonation at the end of her phrase, but would not always use the word, /fi:n/ *where?*. At 1;11 years Hanna produced the utterance /ʔaʔa ih/- target: "/ʕajza i:h/", meaning, *what do you want?*, with an accompanying hand gesture indicating *what?*

Table 4. 13 Examples of early words with their meaning

Name	Age	Early word and use
Luli	1;05 years	/na/ used for jump, walk, move /mam/ eat and food /bobi/ dog, cat, animal
Habiba	1;06	/ʔata/ give me this or show me this /anna/ grandma /dido/ granddad /bom/ fall down
Hanna	1;11	/bom/ fall /bobi/ dog /hum/ and /mam/ food and eat

Kenzy	2;01	/bu/ and /ʔumbu/ for drink, water, juice /of fa/ used for blow /ʔaɦ/ used for hot /mam mam/ used for bread, cracking egg and sandwich

The early words produced by the children bore no resemblance to adult words, but for the children and those familiar with them they had a degree of stability and were used to communicate a stable concept. Because the meaning was understood and the words were used by the adults these productions have been coded as early words and not neologisms. Many of the early words were used by more than one child, whilst others were more novel. For example /mʌm/ and /hʌm/ were used by more than one child to refer to *food-* /ʔakl/ or to request *to eat-* /ʔa:kul/.

To illustrate this stage of early word use, additional examples from the infant diary study, Habiba, will used. She was observed between the age of 1;00-1;06 years.

Habiba used the words consistently, but they bore no resemblance to the adult form. Her consistency in producing these words meant that they were understood by family members and close family friends. It was the productive consistency and functionality of her use that readily enabled the words to be understood by the adults, thus reinforcing their use by Habiba.

Table 4. 14 Early words used by Habiba

Early words	Uses
/biwibiwi/	To request or label a *cup* /koba:ya/ To request *to drink* /ʔiʃrab/ To label or request *water* /mayya/
/humi num/	To request breast milk

	To label or request food To label the supermarket
/gutta/	for *please* /min fadllik/ Give me that /hati da/

The early words uttered by children are interpreted by the adults and then reinforced and consequently repeated by the child. Therefore an early word may not resemble an adult target form but the consistency of use by the child makes it interpretable and understood by the adult. Habiba's parents and grandparents used her early words. For example, Habiba's mother was heard to say /ʔayza humi num?/ *Do you want humimum?*.

A further interesting observation of the children acquiring EA is that more than one language learning style is observed. This is similar to children acquiring other languages where they often produce whole strings of word like units that are identified by the stress contours but not all intelligible to the adults (Peters, 1983). Some children are reported to use a *gestalt* learning style where others will use a more *analytic* strategy (Peters, 1983), and others will use a combination of both in different proportions. An analytic strategy is where the child analyses the language they hear into the components, i.e. words and morphemes, producing words one at a time, and then in combination both with other words and with bound morphemes. A gestalt strategy would be when the child uses chunks of un-analysed language and they use them communicatively without understanding the meaning of the smaller units (Foster-Cohen, 1999).

Hanna at 1;11 years produced long indistinct strings of phrases where the intonation was clear, however it was only from the context and gestures that her mother was able to interpret what she meant, producing /ʔaʔa odi ʔinna/, where it was not clear whether she wanted to sit down

(Target:/ʕayza ʔoʕud hinna/) or she wanted her mother to sit down in a specific place (Target: /ʕayzaki toʕodi hinna/).

4.2.2 Phonological errors

In their early stages of language acquisition children acquiring Arabic produce a limited range of sounds and normal phonological errors are present, i.e. weak syllable deletion and syllable reduplication (Amayreh and Dyson, 1998). The development of phonology in Arabic is similar to the development of English. The acquisition of consonants was not undertaken as part of this study. The norms cited by Amayreh and Dyson (1998), in their study for the normal acquisition of Arabic consonants, were informally supported in this work.

All syllables in EA begin with a single consonant. Word stress in EA is dependent on the number of syllables in a word. For conventional purposes researchers of Arabic divide syllable types into "light" and "heavy" on the basis of the number of segments they contain. Heavy syllables occur in the pre-pause position and contain four segments; light syllables contain three or less segments. In EA, no more than one heavy syllable may occur per word, and if one occurs it is stressed. For light syllables only, stress assignment depends on the number of syllables in the word. Dudu frequently omitted unstressed syllables. The following examples were when he was 2;03 years old.

Table 4. 15 Examples of Dudu's productions at 2;03 years

Example 1	/di fa:ya/	**Example 2**	/taʕti/
Target	/di taffa:ya/	Target	/bitaʕti/
Gloss	This (is an) ashtray	Gloss	It's mine

The presence of developmental phonological processes in the data indicated that the children were using words with the understanding of the EA segmental system. Such errors were frequently

observed in the productions of the controls. The attempted word may be different from the adult target forms, however the intonation and stress were recognised by the adults.

For example, at the age of 2;05 years Ali wanted to ride on his uncle's back, the target word can therefore be recognised. He used the word /ʔattib/ in place of the target word /ʔarkib/, meaning *to ride.* During the same recording, whilst reaching for pen he produced /ʕayiz ʔattib, but the target this time was /ʕayiz ʔaktib/ *I want to write.*

At the age of 2;05 years, Ali produced many normal phonological errors. At this age the expected production of consonants in Arabic is between 43-50% (Amayreh and Dyson, 1998).

Examples of Ali's language at 2;05 years, will be used to illustrate examples of his phonological processes. The voiceless uvular fricative /x/ does not become productive until the age of 4;00-6;04. Ali substituted it with the voiceless alveolar plosive /t/. The voiceless labiodental fricative /f/ is present from the age of 2;00-3;10, the voiceless palatal fricative /ʃ/ develops later between the age of 4;00-6;04. Ali was observed to substitute the /ʃ/ with a /f/; maintaining the manner of articulation and the voicing but changing the place of articulation.

Table 4. 16 Examples of Ali's productions at 2;05 years

26/05/02#11	/ta:lu/	26/05/02#12	/fu:f/
Target Phonological Process	/xa:lu/ x → t	Target Phonological process	/ʃu:f/ ʃ→ f
Gloss	Uncle	Gloss	(I want to) see

4.3 The acquisition of morphological structures

A description of the Egyptian Arabic speaking children's early grammatical system will be presented, as part of the discussion of results. The aim was to identify and describe normal developmental errors, and to enable comparisons between the errors produced by the EA-DLI children and the non-language impaired children.

This is by no means a detailed description of normal development in Arabic as this was not the aim the work. As previously mentioned in the objectives to the research to understand impaired language one must first have an understanding of the types and range of errors observed in normal language development. The above discussion has already highlighted the presence of normal developmental errors in EA children's language. This section will be dedicated to the development of morphology in relation to the errors that occurred in the spontaneous language samples. This will assist in understanding and identifying the errors produced by the language impaired children.

The description of the errors and development of linguistic structures will be described. Insufficient data was collected to enable mapping of syntactic and morphological development, and this was not the aim. In chapter 1 clinical markers were described that may be problematic for EA-DLI children. The normal acquisition and development of these morphological structures will be described, to allow for comparisons between normal and deviant morphological acquisition. The data sources for this section are taken from the 12 longitudinal and cross-sectional controls.

The complexity of nominal and verbal morphology for EA affects language acquisition

and many of the observed errors were related to morphological errors. Therefore the typology of the language being acquired will dictate the types of errors that may occur in any given language. There are many complex distinctions that children are expected to learn and some of them are more difficult than others and to appear to be mastered later. When discussing the acquisition of verbal and nominal morphology by Hebrew children, Berman (1994) suggests that the child builds up their morphological system in a progressive fashion, piece by piece. Some parts of the system will be transparent and consistent for the child and easily learnt, whilst other parts are less predictable and can only be learnt by rote. For Hebrew children do not master the full system until the age of 7;00 years (Berman, 1994). Similar ages of acquisition for EA have been reported by Omar (1973).

A very similar pattern was seen in this study for EA. Early on the children were observed to produce verbs with inflections for Tense although gender and number agreement errors were observed. They showed errors with bound object clitics and pronouns and with their use of regular and irregular plurals for nominals. Later verb errors were not as apparent as were errors with nominal and verbal agreement for gender and number. Plurals continued to be difficult as the majority of plurals are irregular broken plurals and are learnt by rote and masculine regular plurals were rarely produced. This is an example of language specific differences. Children acquiring English will produce utterances with regular plurals from 24-33 months (Brown, 1973).

4.3.1 Morphological analysis: spontaneous use of verbs

In this section verb related errors produced during the spontaneous language recordings will be discussed and described.

Normal developmental errors were salient in the verb productions of children acquiring Arabic normally from aged between 1;05 and 4;04 years. In the earlier section the results of the Winslow naming task for verbs showed that as the children became older they named

a greater number of verbs. Their ability to label nominals precedes their ability to provide verb labels. The pattern of development for verb morphology for EA is supported by the Hebrew findings (Berman, 1993b; 1985).

There are two distinctions to the pattern of verb use. The first is that as the children become older they use a wider range of verbs (lexical types). The second is their pattern of errors related to verb morphology and verb arguments. The Analysis of their spontaneous language reflects the results of the Winslow verb pictures, however, the younger control children who named few or none of verb pictures (Ali and Kenzy) produced a greater selection of verbs in their spontaneous language. The control children produced verbs correctly from an early age and they also made correct use of Tense and Aspect markers. Verb related errors were noted for all of the children but with normal variability according to age and individual differences, as cited before. The error analysis discussed above can be used as a reference for the percentage of errors produced for each of the control children.

The pattern of verb errors produced by the children were either (1) use of a default verb form, or (2) errors with Tense and aspect markers; or (3) errors of agreement for number, gender and person, or (4) occasionally Tense substitution errors.

Other types of errors related to the verb phrase such as omissions and substitutions of bound pronouns and object clitics were also observed. vocalic paraphasias for verbs were not present in the data. The production of GAP verbs in place of a specific verb was not an obvious feature in the children's spontaneous language. This was probably due to the fact that in spontaneous speech it is easier to use an alternative verb form in place of a specific verb whereas for the Winslow verb pictures the use of GAP verbs were more obvious due to the nature of the task, requiring a specific verb form.

4.3.2 The default verb form

Children aged between 1;00-3;00 years acquiring EA are expected to use verbs approximately 20% of the time (Karam El-Din, 1990). A noticeable feature of early verb production is that the children overused a verb form resembling the Imperative, this form has been labelled the *default verb form.*

This reduced form of the target resulted when the children either omitted a segment or a syllable, or they changed to a verb pattern with a simpler syllable structure. If the stem was not pronounceable the children added an initial sound, which therefore made the form used appear as the Imperative. This type of error was seen in most of the children's productions. The children used this default verb form when they were required to use the Imperfect aspectual markers for the progressive and habitual Aspectual markers /bi-/ and /ha-/.

Research conducted into the acquisition of Kuwaiti Arabic (KA) report productions of a simple unmarked verb forms in place of the target verb forms (Aljenaie, 2003). However, contrary to the EA findings the researchers into Kuwaiti Arabic labelled these unmarked verb forms as the Imperative form. On the surface the form used by the EA and KA children resembles the Imperative. However there is another possibility that the children are not substituting the Aspectual markers with the Imperative, but it is the omission of the morphemes that leads to this simpler form being used.

The following example illustrates how the target verb form can be simplified to resemble the Imperative. This form will be labelled as the *default verb form.* Taking the verb root ʃRB (drink), the Imperfective P-stem would be /ʕiʃrab/. If a child wants to say /bi-yi-ʔiʃrab/ (*he is drinking),* but has still not mastered verbal morphology it is likely that they will omit the aspectual marker /bi-/and the 3rd person singular inflection /-yi-/; leaving the stem /ʔiʃrab/ *drink*, which is homophonous with the Imperative.

4.3.3 Examples of the default verb form

Three examples will be used to demonstrate the control children's use of the default verb form. For the first two examples, it must be noted that although the pronoun is not obligatory, the participles /ʔayiz/ want.Masc.Sing. *I-want*, is obligatory and was omitted by the two children in the examples 1 and 2 below:

Example 1: In this example, Ismail at 2;08 years was playing with his mother in the clinic play-room. He wanted to climb up onto a small climbing frame and he used the default verb form.

Ismail at 2;08 years	*/[2]ø ʔitlaʕ/ default verb form.go-up.Masc.Sing. /ʕayiz ʔatlaʕ/ go-up.1[st]Masc.Sing. *I-want (to) go up*

Example 2 In this example, Ali at 2;06 was playing with his mother at home. He wanted to draw and when asking his mother for a crayon he used the default verb form. Ali also produced a phonological error where he substituted a /k/ for a /t/.

Ali at 2;06 years	/ø ʔittib/ default verb form.write.Masc.Sing. /ʕayiz ʔaktib/ write.1[st]Masc.Sing. *I want (to) write*

Example 3: Sherif at 3;03 was recorded playing with his mother in the clinic play-room. He was playing with a jigsaw puzzle. As he was inserting a piece of the puzzle into the frame he

[2] Ø is used to denote the omission of an obligatory lexical item.

used the default verb form. The target would either have been the Imperfect Intentive marker /ha-/or the Imperfect Indicative marker /ba-/.

Sherif at 3;03 years	/ħotu kidda/ default verb form.put.Masc.Sing. like-this /ha-ħotu kidda/ Asp.Intent.put.1st.Masc.Sing-clitic-it like this *I am going to put it (in) like this* or *I am putting it (in) like this.*

4.3.4 Tense and Aspectual Use

Different Tense forms were produced by the children early on in the data. As hypothesised, Tense errors were infrequent, relative to errors of agreement for number, person and gender. Verbs in EA agree with their subjects, and carry affixes expressing *person* (first, second, third), *number* (singular and plural) and *gender* (masculine and feminine), in addition to the affixation for verb information, e.g. Tense. Examples of correct use of Aspectual and Tense markers will be used to illustrate patterns of development.

Example 1: Correct use of the Future action marker /ha-/

When Sanna was 2;07 she correctly produced the Future action marker /ha-/. The context, was that she was in the clinic play-room with her mother and brother AEL and she wanted to put her jacket on.

29/01/00#4	/ha-ʔalbisu ʕaʃan əd-dinya bard/ Asp.Fut.-wear.1stSing.-Pro.it because Def.Art.the-world cold *I am going to wear it because the weather is cold*

When the children were required to use the Perfective Tense occasional errors were observed, however they were less frequent than those for the Imperfect. There are both regular and irregular forms of the Perfective Tense in EA, the latter being less frequent. The 3rd person singular masculine form of the Perfective is usually taken in Arabic as the citation form of the verb since it is the simplest form; and for this reason the children were seen to use it correctly early on in their syntactic development.

At 3;03 years Sherif used a variety of verbs in the Perfective Past. The examples of his productions are listed below.

Examples of Sherif's productions of the Perfective at 3;03 years

28/04/01#14	/ʔanna ʔafalt əl-ʕarabeyya/ Pro.I Past.closed.1st Sing. Def.Art. the-car I closed the car door
28/04/01#8	/wiʔiʕ/ Past.fell.3rdMasc.Sing. It fell
14/05/01#2	/wiʔiʕit/ Past.fell.3rd Fem.Sing. *It fell*
28/04/01#9	/xabbat/ Past.Hit.3rdMasc.Sing *It hit (the car)*

4.3.5 Errors for gender, number and person

We have already seen that the children omitted the Aspectual markers which resulted in a simpler form, the default verb form. When the children correctly used the Imperfect they continued to produce errors for number, gender and person agreement. Number errors were less frequent than gender and person errors.

Example 1: gender error

In this example Sanna was 2;07 years. She produced the correct Tense, number and person agreement, however, the gender marker was incorrect. She used the masculine marker in place of the feminine.

29/01/00#10	*/we ʔanna ʔaʕid kwayis/ and Pro.I Imperf.sit.1stMac.Sing. good *And I (am) sitting well*
Target	/we ʔanna ʔaʕda kwayis/ and Pro.I Imperf.sit.1stFem.Sing. good *And I (am) sitting well*

4.3.6 Agreement errors with the Imperative

The Imperative is the earliest verb form used by children and was seen to be produced by the youngest control children. When using the Imperative the children used the correct target Tense form but error patterns were also observed. They either omitted or substituted person

and gender markers. It is obligatory to use an inflection marking feminine singular (-i) when addressing a single female and using the Imperative. The children were observed to either omit this inflection, resulting in an error or they used this form when addressing a male, also resulting in an error. The former occurred more frequently when needing to use the 2nd person plural.

Examples taken from Hanna at 1;11 years will be used to illustrate this. Hanna, used the feminine singular form as default, she did not use the masculine and feminine singular forms within the same recording. She used the 3rd person feminine singular form of the Imperative when addressing single males and females.

Examples of Hanna's productions of the Imperative at 1;11 years

29/12/98#4	*/busi/ Imp.look.3rdFem.Sing *look* */bus/* Imp.look.3rd.Masc.Sing *Look*
29/12/98#1	/busu/ Imp.look.3rd.Plu *look*

29/12/98#10	xudi donia/ Imp.take.3rd.Fem.Sing donia *Take Donia*

An explanation for her selected choice of morphological marker can be explained by the fact that she had initially learnt these forms by rote and had generalised their use but had not yet understood the meaning attributed to the morphological marker /-i/, as reported for Hebrew (e.g. Berman, 1982).

Contrary to Hanna, Marwan, at 3;00 years, mostly used the masculine singular Imperative forms when addressing his mother and female teachers, although he occasionally also used the target feminine singular form.

Examples of Marwan's productions of the Imperative at 3;00 years

14/10/99#7	*/ʔiftaħ/ (to mother) Imp.open.1st.Masc.Sing. Open /ʔiftaħi/ Imp.open.1st.Fem.Sing Open
14/10/99#2	*/hat/ (to mother) Imp.give.1st.Masc.Sing. Give /hati/ Imp.give.1st.Fem.Sing Give
14/10/99#4	/hatih/ (to mother) Imp.give.1st.Fem.Sing.Pro.it Open-it

Sherif at 3;03 years used both masculine and feminine singular forms when addressing

females. In the examples below he was in the clinic play-room playing with a pot of bubbles with his mother. In the first example, he wanted his mother to blow the bubbles. He correctly used the 1st person feminine singular form.

In the second example he wanted his mother to put the lid on (close) the pot of bubbles. He used 1st person masculine plural form, thus producing a gender and number error.

Examples of Sherif's productions of the Imperative at 3;00 years

14/05/01#11	/ʔinfufi/ (Phonological error /x/→/f/) Imp.blow.1st.Fem.Sing. /ʔinfuxi/ blow
14/05/01#9	*/ʔiʔfilu/ Imp.close.1st.Masc.Plu Close (the bottle) /ʔiʔfilih/ Imp.close.1st.Fem.Sing Close (the bottle)

4.3.7 A preferred form of gender

Analysis of the control children's spontaneous utterances showed that the children frequently produced a preferred form of gender, whether for verb morphology or adjective noun agreement.

In the results section of the Winslow verb pictures Kenzy used the masculine singular of the progressive verb *do*. Dudu and Hanna also produced a similar error pattern, where Hanna used the feminine form whether addressing males or females. Hanna also added feminine markers to nouns, e.g. food items, making the nouns feminine, e.g. /ruz/ *rice* was produced as /ruza/.

An explanation would be that the default form used depends on the sex of the child and their own discourse experience. Marwan was used to hearing the Imperative form related to himself in the masculine singular form therefore this was the form he used the most, whereas Hanna used to hearing the feminine singular form and this was the form that she frequently used. This explanation does not however account for children that used both forms sometimes correctly and sometimes in error, such as Sherif.

Similar observations have been reported in the Hebrew data when children are at the stage of early syntax (Dromi and Berman, 1981). The Hebrew-speaking children are reported to produce one form of gender; the girls used the feminine forms and boys used the masculine forms. Dromi and Berman (1981) explained this pattern of error either as a result of the child's own discourse experience as an addressee, or as a strategy for avoiding mistakes, since the children will then in many instances be correct. It is not clear how input influences the child's choice of the selected form in terms of gender. It is plausible that input and exposure are influences, however for other gender related errors it also seems plausible that normal developmental errors are due to omissions or substitutions of gender morphology.

In the case of the Imperative verb form the morphological marking for feminine singular is a suffix. Taking the verb */bus/* as an example, if the child is addressing a female they would have to say */bus-i/*, however if they are addressing a male they would say */bus/*. During their early stages of syntax (1;11-3;03 years) the masculine singular Imperative form was often used in place of the feminine singular Imperative form, by both the male and female controls

when they were addressing females. The only two controls who substituted the masculine singular Imperative form with the feminine singular Imperative form were Hanna and Sherif.

Since most of the children were recorded in conversation with their mother and the female investigator, the target imperative form was almost always the feminine singular form. There were times however when the children were recorded with siblings or male members of the family but the same error pattern was observed.

4.3.8 Further Morphological error analysis

In this section additional morphological markers examined are reported, including:- plurals and the dual, use of the negative, use of definite articles, use of prepositions and use of pronouns.

4.3.8.1 Plurals and the Dual

Noun plural formation is a complex system for children to learn in Arabic and researchers who have examined plural use in Arabic have found that plural development is one of the later morphological structures to be acquired (Omar, 1973; Ravid and Farrah, 1999).

Nouns in EA form their plurals either by suffixation, or by an internal change to the word. The suffixed plural is formed by the affixation of a plural suffix to the singular form, as is the dual. Plurals for masculine and feminine objects can be regular or irregular. The irregular broken plurals for masculine and feminine are rote learnt and do not follow any phonological rules. The majority of nouns in EA are the irregular broken forms (Holes, 1995).

The research conducted into Palestinian Arabic plurals, excluding the dual (Ravid and Farrah, 1999), report a developmental pattern in the acquisition of plural forms. The feminine plural precedes the development of the broken plurals and the regular masculine plural. Normal developmental errors were present in their data (Ravid and Farrah, 1999).

The Control children were observed to use regular feminine plurals, irregular broken plurals

and the dual. The developmental trajectory of plurality reported by Ravid and Farrah (1999) was therefore supported in the Egyptian Arabic data as was the presence of normal developmental errors. There were no productions of regular masculine plurals in the data. Since the majority of EA nouns are irregular and the oldest control was aged 4;04, this was expected. Irregular masculine plurals are not mastered in Palestinian Arabic until after the age of 5 years (Ravid and Farrah, 1999). Similar patterns are reported by Omar (1973), but she does not detail error patterns. These findings although different to Omar (1973) are felt to be more representative and comparable with the EA data. Omar (1973) found noun inflections for plural to be acquired by age 3 years.

For the EA data the children were observed to use plurals both correctly and with errors. Examples from Sanna's data will be used to demonstrate correct use and errors with regular and irregular feminine plurals.

Examples of Sanna's correct use of the feminine regular and irregular plurals:

Utterance code	Age	Utterance
19/05/00#6	2;11	/fi lissa balun**at**/ there still balloon.Fem.Reg.Plural *Are there still balloons?*
13/03/00#2	2;08	/lih ʔinti gayba maʕaki leʕab/ why you.Fem.Sing bring with-you toy.Fem.Irreg.Plu. *Why did you bring with you toys?*

An additional error pattern was when the children were required to use either the dual or

the plural they used a separate lexical item that expressed plurality, e.g. /kitir/ *many* or /talata/ *three* or a plural pronoun /dol/ *them*. This type of error has been reported in Palestinian Arabic (Ravid and Farrah, 1999).

When Sanna was aged 2;11 and 3;01 years, and required to use the regular feminine plural for /saħafa:t/ *pages* and the irregular broken plural for /kutub/ *books*, she used the singular forms with a preceding lexical entry /kitir/ *many*.

Examples of Sanna's productions at 2;11 and 3;01 years

23/06/00#14	3;01	*/ʕandik saħfa kiti:r/ have-you.Fem page many Target: /saħafa:t kitir/
19/05/99#zz	2;11	*/bi-t-ʃil kora:n kita:b kitir/ Asp.Prog-carry-3rd.Fem.Sing. Koran book many Target: /kutub/

A further pattern observed was that the children used a noun for number when they could have alternatively used the plural for the noun.

For example, Samira at 4;04 years used the noun /talata/ *three* with the plural pronoun /dol/ *those*, when she could have used the irregular plurals /kutub/ *books* and /kowar/ *balls*.

Example for Samira at 4;04 years

Context: She was at home playing with the investigator. They were playing with book and

balls. The investigator was attempting to informally elicit plural forms whilst playing.

Age 4;04	/mis donya miʃ dola talata/ miss donia Neg.-not those three (books) *Miss Donia are those not three (book)*
Age 4;04	/mis donya ʔanna ʕayza talata/ Miss Donia I want three (balls)

When labelling picture 10 of the EA-RAPT, the children were required to use the plural of /tofa:ha/ *apple*, which is /tofaħ/ *apples*. Samira at 4;04 years, Omar at 3;11 and Ali at 2;11 all correctly produced the plural forms of *apple*. Omar used the singular and plural forms, his utterances are below and the two forms are underlined.

EA-RAPT Picture 10:	ət-tofa:ħa wiʔʕit the-apple Perf.fell *the apple fell* heyya ʃayla ət-tofaħ she carry the-apple.Irreg.Plu. *She is carrying the apples*

Correct use of the dual was seen early on in the data. When re-telling a story to their mother Sanna at 2;11 and Samira at 4;04 years used the dual/koftete:n/ *kofta-two*. For example, Sanna at 2;11 years produced the following utterance:

15/05/00#8	/ʕamalit kofta koftente:n lih əl-ota wə kofta lih mama/ Perf.do-3rdFem.Sing kofta kofta-dual for the-cat and kofta for mum *She made kofta two for the cat and kofta for her mother*

4.3.8.2 Use of the negative

Omar (1973) reported that children acquiring EA go through a number of stages with regards to their use of the negative. Based on Omar's work (1973), it was predicted that for EA the controls and the EA-DLI children would follow a sequence of development when using the negative.

Their first expression of the negative would be using a gesture, the next stage would be to use the word "/laʔ/" *no* or the borrowed word "no", the next, would be to use the form /miʃ/*not* and the last stage would be to correctly use the discontinuous negative /m...ʃ/. Their use of the simpler negative forms would result in normal developmental errors due to the omissions of obligatory structures and morphemes. It was also hypothesised that for those control children recorded between 2;00-3;11 years errors would be common, since cross-linguistically this is when the most errors occur with the acquisition of inflectional morphology (Marcus *et al.*, 1992).

The results of the analysis of the spontaneous language samples revealed that to express negation the children go through a number of stages with an overlap between one stage and the next, thus the initial hypotheses were confirmed.

The children initially used simpler forms or forms learnt as wholes, as reported cross-linguistically (e.g. Hebrew: Dromi and Berman, 1981; Bowerman, 1982). The earliest type of negation observed was used by two of the infants studied, Luli and Habiba, when they

were aged between 12-15 months. They used gesture, e.g. shaking head or shaking a hand and occasionally paired the gesture with the word /laʔ/ *no.*

The first lexical expression of the negative recorded in the EA data was the use of /miʃ/ *not* or /laʔ/ *no*; supporting Omar (1973)'s descriptions of the acquisition of the negative. When the Control Sherif was 3;03 years he used a simple form of the negative. The word "no" is a borrowed word in EA and was used by some of the children.

Example of Sherif's use of the negative

Context: Sherif was playing with stacking cups. He wanted to express that the cup, or cups, would not fall. He produced the following utterance:

28/04/01#11	/toʔaʕ no/
Gloss	Fall *Masc.Sing* No
Target	/miʃ ha-toʔaʕ/
Translation	It's not going to fall

The other Controls and children recorded produced variations of the discontinuous negative and free negative particles. Examples produced by the Control Dudu will be used to illustrate use of discontinuous negative. The adult target production of the discontinuous negative requires both parts to be produced, e.g. /m...ʃ/. Dudu was the only Control who used one of the discontinuous negative particles without the other, thus resulting in an error pattern.

At the age of 2;03 years Dudu was innovative with his use of negatives. In some instances he used both particles and other instances he used only one. When echoing the adult he used the correct form, however when spontaneously expressing negation he used a variety of

forms. The negative particles are highlighted below. For all three of the examples, Dudu omits the negative particle /ma-/ although this is a productive sound in his language.

Examples produced by Dudu at the age of 2;03:

Example 1	Dudu: */hibi-ʃ/ Imperf.Stem.-Neg.Part. Omits negative particle /ma-/ and Aspectual marker /-ba-/ Target: /**ma**-ba-hibi- ʃ/ *I do not love*

Example 2	Dudu: */ħibuʃ/ Omits negative particle /ma-/ and Aspectual marker /-ba-/ Imperf.Pro.-Neg.Part Target: /**ma**-ba-hibu- ʃ/ Neg.Part.-Asp.Hab.Imperf.1st.Sing-Sing.Pro.-Neg.Part *I do not love it*
Example 3	*/ʔa:maf-ʃ/ Phonological process/ʕr/→/m/ and Negative Particle/ma-/ is omitted. Target: /ma-ʔaʕraf-ʃ/ *I do not know*

At 2;03 years Dudu correctly used the particle /miʃ/ *not.*

Example 4	/miʃ ʕarif ʔarrakibha/ Neg.Part. know-1stMasc.Sing fix-Masc.Sing.it *I can not fix it.*

At 3;00 the discontinuous the negative particles were productive in Marwan's language.

For example:

Example 1 Marwan at 3;00	Example 2 Marwan at 3;00
/ʔanna ma-ʕandiʃ/	/ma-ruħtiʃ/
I Neg.Part.-Imperf.have.1stsing.-Neg.Part	Neg.Part.-Past.go.1stSing.-Neg.Part.
I do not have.	*I did not go.*

4.3.8.3 Use of Definite Articles

The spontaneous language of five of the control children was examined for their use of the definite articles. Percentages were calculated for correct use and omissions in obligatory contexts. The results are represented below in the chronological sequence. The control Hanna's rate of omissions and use were the same. The other two controls who omitted articles were Sanna and Kenzy and they were both aged 2;07 years, but percentages of use were higher than percentages of omissions.

Table 4. 17 Summary of the use of the definite articles by the controls

Name	**Age**	**% of use**
Hanna	1;11	50%
Kenzy	2,01	100%
Omar	2;04	100%
Sanna	2;07	66.66%
Kenzy	2;07	75%
Sanna	3;01	100%
Samira	4;04	100%

4.3.8.4 Use of Prepositions

Use of prepositions was calculated for correct use in obligatory contexts for four of the control children. Use of prepositions depended upon age and matched cross-linguistic data (Brown, 1973), as the children became older they used more prepositions only omitting them infrequently.

Table 4. 18 Use of prepositions by the controls

Name	Age	% of use
Hanna	1;11	0%
Omar	2;04	50%
Sanna	2;07	50%
Sherif	3;03	75%

4.3.8.5 Omissions and substitutions of Pronouns

The pronoun system in Arabic is complex as pronouns can either be bound or free and they agree with nouns for number, person and gender. Pronouns were produced early on, and they were generally used correctly. Errors were present and they were related to errors of agreement for gender and person with both the bound and free pronoun clitics. Pronoun use was calculated for correct use in obligatory contexts, for six of the control children.

Table 4. 19 Use of pronouns by the controls

Name	Age	% of use
Hanna	1;11	100%
Omar	2;04	91.6%
Ali	2;05	100%
Kenzy	2;07	100%
Sanna	3;00	100%
Sherif	3;03	90.32%

The above table indicates that pronouns were used early on by the children and although omissions were infrequent, the children did produce substitution errors. Substitution errors were common with bound and free pronoun clitics. In addition, when a bound pronoun clitic was required the children occasionally produced a free pronoun. The substitution errors produced by the younger controls resembled cross-linguistic data (Brown, 1973), where young children used their names instead of /ʔanna/*I*. A language specific feature of EA was that instead of using the person marker on the verb the control children used the pronoun /ʔanna/*I*, thus resulting in an error. Since EA is pro-drop language where pronominal subjects are optional, but person markings on the verb are obligatory, this is an interesting error pattern. Examples of the control children's error productions are transcribed below:

Example 1 and 2

Name	Age	Utterance and gloss
Hanna	1;11	*/ʃoka bətaʔit ʔanna/ fork belong.3rdFem.Sing. I fork belongs-to I
Habiba	2;01	*/dudi suf ota/ dudi see cat Dudi see cat

Example 3

At 2;11 years Sanna correctly used pronouns, as well as errors of omission. In the example below she correctly uses the bound feminine pronoun /-ha/ *her*, but she also omitted the pronoun /ʔinti/*you* feminine singular, 1st person feminine marker/-i/and the 3rd singular masculine clitic pronoun/-h/.

15/05/00#9	*/ʔalitla-ha əl ø ʕamla-ø ya simsima/ she-said-to-her the done oh simsima Target: /ʔalitla-ha ələ ʕinti ʕamlatih ya simsima/ *She said to her what have you done Simsima*

Example 4

In the example below, Kenzy at 2;07 years, correctly produced the lexical pronoun /hinna/*here*, /hinnak/*there* and the bound clitic /-ha/ *her*.

02/06/01#23	/miʃ hinna hinnak ʕanda-ha/ not here there with-her *Not here over there (with) her*

4.3.8.6 Adjectives errors with gender and number agreement

The control children did use adjectives and errors of agreement for gender and number were observed. There were not many examples in the data for adjective productions. When considering future research it would be interesting to design structured tasks comparing agreement for gender and agreement for number to see whether one is more problematic, in addition to whether there is a difference between noun and verb agreement.

4.4 Summary

The data taken from the spontaneous language of 12 normally developing children (longitudinal and cross-sectional controls), including two diary studies, were used to explore normal developmental morphological errors in Egyptian Arabic. The results support other research conducted in Arabic (Ravid and Farrah, 1999; Omar, 1973). The data served as control data for language impaired subjects, to be able to differentiate between errors that are seen as part of normal linguistic acquisition and those errors that are associated with developmental language impairment.

Morphological errors are present and affect noun and verb morphology. With regards to their use of verbs, verbs were used early on and Tense and Aspectual marking was acquired early. Errors of agreement for number and gender and person were common when children reached a morphological burst. MPU bursts were seen with high percentages of errors. For early verb use the children relied on GAP verbs, but as they got older, morphological productivity increased and more verbs were produced with greater morphological variance, as indicated by the Winslow verb picture task. A further characteristic was that the children initially relied on a default verb form. This was a simpler verb form and has been reported to be present in the Hebrew data (Berman, 1982, 1985).

The children used articles, pronouns and prepositions and errors of omission were rarely

observed. With regards to pronoun use, the children used pronouns early on, but substitution errors were not uncommon

Chapter 5

5. CASE STUDIES

Introduction

Three children were examined longitudinally to investigate Language Impairment in Egyptian Arabic. The children comprised of two males, AEL and MHB and one female, NAD. Each case study will be presented separately and compared with both the longitudinal and cross-sectional controls. A comparative analysis of the results of the three LI cases will be presented at the end of this chapter.

The content of the case studies is organised as follows— the first section provides a summary of the case history information including the socio-linguistic background, family and medical background; the initial clinical presentation based on the DLI checklist, formal evaluation, the intervention received and educational provisions.

Secondly, the methodology specific to each case is described. Thirdly, the results of the spontaneous language measures and structured tasks are presented and discussed in relation to the non-language impaired controls.

All three of the children received and maintained a diagnosis of developmental language impairment over the period of study AEL (age 3;00-7;01 years), MHB (age 4;06-6;02 years) and NAD (age 4;02-5;11 years). Some of the errors produced by the three EA-DLI children were also observed to be produced by the controls, although with far greater frequency. Despite there being shared patterns of impairment between AEL, MHB and NAD each of the three children presented with a set of unique and complex linguistics characteristics that together produced different phenotypes of Egyptian Arabic language impairment.

5.1 Case Study 1 AEL

5.1.1 Introduction

The subject AEL was followed for a period of four years. This provided an opportunity to explore the developmental trajectory of his language acquisition and impairment. His family history, medical history, linguistic context and the initial clinical assessment using the DLI checklist will be provided with the fulfilment of the criteria used to establish an initial diagnosis of a DLI. The picture of cognitive, linguistic and behavioural strengths and weaknesses changed over time. He continued to have a language impairment, however his performance IQ score fell within the borderline range (i.e. less than the requirement for SLI criterion). Despite this AEL's language continued to be impaired and remained the most noticeable deficit.

Following from this, a summary of the results will be discussed in relation to the specific structured tasks and the spontaneous language samples recorded. Specific emphasis will be given to AEL's pattern of linguistic impairments that can be considered potential clinical markers of EA-DLI. Comparisons will be made with both AEL's twin sister, younger sister, as well as the other 10 controls.

5.1.2 Socio-linguistic Context

AEL (D.O.B 10/12/1995) is an Egyptian male who lives at home with his mother, father, older brother (D.O.B 06/03/1992), twin sister, Samira, and younger sister Sanna (D.O.B 18/06/1997). His parents are both university graduates and they are monolingual Arabic speakers. Their socio-economic sphere is middle class. There is no known history of physical or emotional abuse and his home environment is supportive. His siblings are healthy with no language or learning difficulties. There is however a strong family aggregation of speech and

language difficulties. His paternal grandfather is reported to have had a communication disorder and his paternal great uncle is reported to have had a learning disability with accompanying speech problems. AEL has an older second cousin from the paternal side of his family who was seen at the LRC and diagnosed with SLI.

5.1.3 Medical and Birth History

AEL was born at 40 weeks gestation, by lower caesarean section. He has a non-identical twin and his birth weight was 3.02 Kg. He had a tongue-tie that was clipped when he was 6 months. His hearing was tested when he was 2;00 years using Evoked Auditory Brainstem Response and his hearing thresholds were found to be within the normal range. He has never been hospitalised and has an unremarkable medical history. AEL has no history of otitis media with effusion and there is no evidence of a seizure disorder or any other neurological dysfunction. All developmental milestones were achieved within the normal range except in the area of language. AEL therefore fulfils the partial exclusionary criteria in the areas of hearing, psychological and neurological for a diagnosis of DLI (SLI-Leonard, 1998).

5.1.4 History of difficulties and initial assessment

When AEL was 2;11 years-old he was referred to an Educational Psychologist. His parents were concerned that when compared with his twin AEL was using just a few words (less than 5) and his compliance and ability to follow simple instructions were impaired. AEL at this time was attending an English speaking nursery which he attended from when he was 2;03-4;02 years, after which he transferred to an Arabic speaking school for children with language and communication disorders.

The assessment of the Educational Psychologist found AEL's developmental milestones to be within the normal range apart from his linguistic and communicative skills. He sat up,

crawled, walked, rode a bicycle and caught a big ball within the expected developmental range. His fine motor skills were also observed to be within the normal range. He was able to copy a circle and two horizontal parallel lines. In addition, he presented with normal hand-eye co-ordination skills and he could manipulate objects with one or both hands although laterality was not established.

The assessment results revealed a severe language and communication disorder with some Autistic Spectrum Disorder features. It was then recommended that he be assessed by a speech and language therapist and he was referred to the LRC for a differential diagnosis.

5.1.5 Clinical Description Based on Initial Assessment: verbal and non-verbal language skills

AEL was first seen by the investigator when he was 3;00 years old. Contrary to suggestions by the Educational Psychologist there was no evidence of Autism as assessed by *The Childhood Autistic Rating Scale* (CARS: Reichler and Renner, 1998). AEL obtained a total score of 28 out of 60 on the CARS, which on the CARS indicates a language disorder. A score between 15 and 30 is non-autistic, 30-36 is mildly-moderately autistic and 36-60 is severely autistic.

Due to AEL's age and the severity of his language impairment it was not possible to formally assess him using standardised assessment batteries for measuring non-verbal intelligence. The non-verbal skills that are used to assess non-verbal intelligence such as block design cards, puzzles and matching were all skills AEL was able to do informally as part of the assessment conducted by the Educational Psychologist. It was not possible to provide a performance IQ score. However, the observations made during the initial assessment period indicated that AEL's non-verbal IQ was within the normal range. He fulfilled the exclusionary IQ criteria that his non-verbal skills were more developed than his language skills.

His language abilities were assessed informally through play and observation, and this was the most affected area. To provide baseline measures AEL's spontaneous language was assessed using structured error analysis. None of the structured tasks were administered during the initial assessment period. The presence or absence of linguistic and non-linguistic features identified on the DLI check-list are summarised below:

Attention and Play skills

AEL's auditory attention and listening skills were found to be delayed. He had difficulty alternating his attention between auditory and visual tasks. He was easily distracted by his surrounding environment. AEL's attention increased when the adult followed his lead and he was able to attend to exploratory play tasks.

His play skills were delayed and affected by his reduced language skills. He demonstrated mostly exploratory play with some pretend relational play. He fed the teddy and put the teddy on the bed. His play skills at the age of 3;00 were typical of a child aged between 2;00 to 2;06 years.

Expressive and Receptive Language

At 3;00 years, AEL used five words expressively that were nouns and prepositions. They were: 1. /bubəlz/ (bubbles), 2. /guwa/ (in), 3. /twit twit/ (sound of a bird), 4. /foʔ/ (up) ; and 5. /mayya/(water). He used these single words to make requests and to label. He did not use any verbs. He used a rising intonation to indicate a request. He used facial expressions appropriately. He was able to correctly point to his own body parts and the body parts of others. On a task of word discrimination he was able to select one out of three everyday objects in an array of three. He could understand simple verbs related to himself such as eat,

jump and drink, but he did not use these expressively. For example, when he was asked "show me jumping", he would jump.

Articulatory speech skills were informally assessed and AEL was observed to produce some normal developmental speech errors in line with his age, e.g. cluster reduction. His oro-motor skills were good. AEL was able to blow, suck and execute a range of tongue movements (depression, elevation and lateral movements). There was no evidence of articulatory or verbal dyspraxia (oro-motor impairment).

5.1.6 Education and Therapy Provision

From 2;03 to 4;03 years AEL attended an English medium nursery, though his parents do not speak English. He began speech and language therapy at the LRC when he was 3;01. Although the predominant language of instruction at the nursery was English, AEL used and responded to Arabic. The teachers that spoke Arabic would communicate with AEL in Arabic. At the age of 4;03 years, a specialised class with other children was set up for AEL within a special school for children with language and communication disorders. The children were all language disordered, known to the investigator and receiving therapy at the LRC.

AEL joined the school when he was 4;03 years, where he has since continued to be educated and receive therapy. The language of instruction at the school is Arabic and the maximum number of children per class is seven with a high adult to child ratio. The ABLLS (Assessment of Basic Language and Learning Skills (Sundberg and Partington, 1998) is the core curriculum of the school in addition to academic sections of the Egyptian National Curriculum.

AEL has always received therapy in Arabic. Therapy was intensive consisting of four sessions of therapy per week with each session lasting 60 minutes. His mother was trained as a co-therapist and worked with AEL daily at home.

5.2 Methodology

The methodology applied to this case study is detailed in Chapter 3. Both spontaneous language measure analysis and specific structured tasks were administered to AEL. In addition to the methodological procedure described previously; analytical procedures specific to AEL were conducted. The reason for this was that of the three language impaired subjects, the largest corpus of data was collected for AEL and he was followed over a greater period of time. For purposes of analysis the recording samples were divided into four monthly blocks.

5.2.1 Specific analytical procedures: spontaneous language measures

In order to explore the developmental trajectory of his language acquisition and impairment the following spontaneous language measures and analysis were undertaken.

(A) Spontaneous language sample analysis

1. *Mean Morphological Units Per Utterance* (MPU) were calculated for each of the blocks of spontaneous language samples.

2. *A functional analysis* was conducted to establish the range of utterance types produced by AEL for each spontaneous language sample block.

3. *Error analysis for morphological errors.* AEL's spontaneous language was analysed for salient morphological errors and percentage of errors was calculated for each of the ten recording periods. In addition, errors were coded for whether they were neologisms, vocalic paraphasias or words produced with errors due to morphological omissions or additions.

4. *Lexical analysis for spontaneous use of verbs.* For the entire corpus all verbs produced were tabulated and analysed according to types of errors as well use of Tense and Aspectual Markers. This allowed for the total number of verbs to be calculated. In addition, the verbs were analysed according to whether the errors were with (a) Tense and agreement (b) agreement only or (c) verb vocalic paraphasias. Type token ratios were calculated to assess lexical learning and development of verb types and tokens.

5. *Grammatical and morphological analysis.* The most salient morphological errors produced by AEL were documented and compared with those produced by the controls, the aim being to determine the morphological errors that may be specific to EA language impairment. The following morphological categories were examined.

    a. Use of plurals and the dual

    b. Use of negative particles

    c. Use of the definite article

    d. Use of prepositional concepts

    e. Use of bound and free pronouns

    f. Use of adjectival agreement

(B) Structured tasks and assessments administered

The experimental procedure for each of the structured tasks is detailed in Chapter 3. Structured tasks were administered to AEL over the course of the four years. Some of these tasks were repeated to assess changes in morphological acquisition and lexical development.

1. The DLI checklist was administered once when AEL was 3;01 years.

2. The Egyptian Arabic Renfrew Action Picture test was administered twice, once when AEL was 5;05 years and a second time when he was 7;01 years.

3. The Egyptian Arabic Sentence Comprehension test was administered once when AEL was 7;01 years.

4. The Winslow Noun and Verb Pictures were administered from when AEL was 5;02 to 5;05 years.

5.3 Results

The results of AEL's pattern of language impairment will be divided into two sections, the spontaneous language analysis and structured tasks. A summary of findings will be discussed at the end of this section. Comparisons will be made between AEL, his twin sister, younger sister and the 10 other children who served as controls.

5.3.1 Results of Spontaneous language Analysis

A total of 72 spontaneous language sample video recordings were made from when AEL was 3;01 to 7;01. This comprised a total of 1015 utterances. Recordings up to 5;09 were divided into four monthly blocks and analysis was done on each block. Two further recordings were made at age 6;03 and 7;01. During the last recording AEL was also formally reassessed by a psychologist. The last recording made at 7;01 years was a sample of AEL's spontaneous language whilst playing with his twin sister. It must also be noted that during the second recording period only one recording was made in September, as AEL was travelling during the summer months. Table 5.1 below is a summary of the periods of recordings with the number of spontaneous utterances produced during this period, the percentage of errors produced and the MPU for each period.

Table 5. 1 Summary of recordings for AEL

Age	Number of utterances	Percentage with errors	MPU
3;02-3;05	20	0%	1.00
3;06-3;09	5	60%	1.36
3;10-4;01	61	60.7%	1.33
4;02-4;05	181	59.12%	2.15
4;06-4;09	301	39.86%	2.37
4;10-5;01	91	72.53%	3.62
5;02-5;05	253	44.66%	3.27
5;06-5;09	45	66.67%	3.84
6;03	30	33.33%	3.90
7;01	28	53.57%	4.33

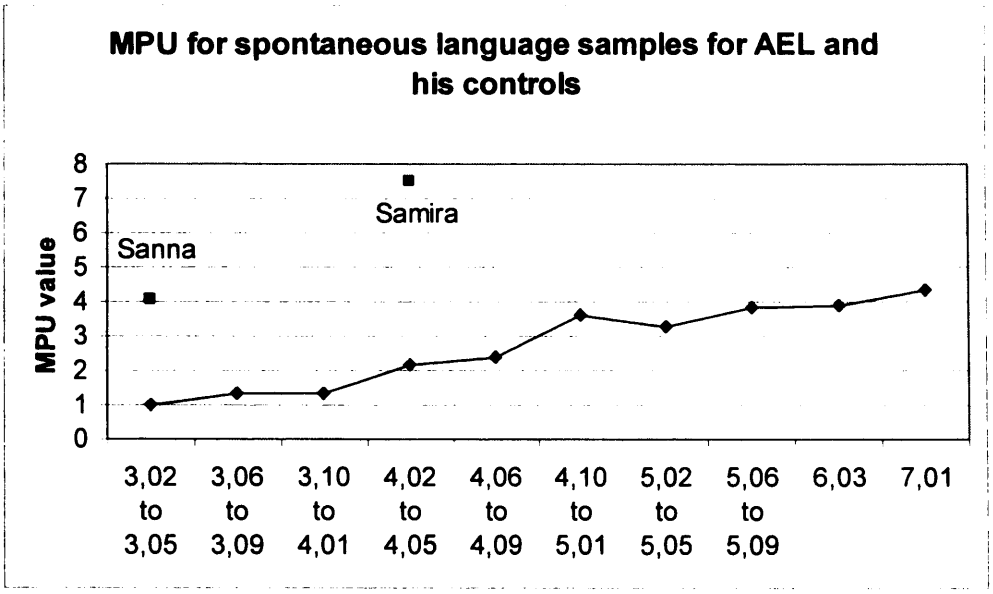
5.3.2 MPU Results

AEL's MPU increased slowly with age. Due to the morphological structure of Arabic, using MPU rather than MLU was felt to be a more accurate representation of AEL's lexical and morphological acquisition since a lexical item that does not have affixation is included as a single morpheme.

His lexical acquisition was slow, as were early word combinations. He first began to combine words when he was 3;09. It was not until he was 4;02 that his MPU reached 2.15. At the last recording when he was 7;01, his MPU reached 4.33. AEL did produce utterances with greater MPU values, however, these were infrequently produced during spontaneous conversation and were produced when he was labelling pictures during structured teaching situations. For

this reason his MPU remained low. When he did produce utterances with greater MPU values the range was from 4.00 to 8.00.

Figure 5. 1 MPU values for AEL compared with the controls Samira and Sanna



In the example below (18/09/00#3), AEL's MPU is 8.00. Where the dual would be used, i.e. /samkti:n/ (fish-two), he repeated the noun and he also made an error indicating difficulty with number concept. He was looking at two plastic fish and counted them from one to five.

There were other occasions when he produced utterances with an MPU greater than 4.00, but the majority of his utterances were restricted and for this reason his MPU scores are low.

Utterance 18/09/00 #3	*[1]/ samak we samak waḥid itnin tallata ʔarbaʕa xamsa/
Translation:	"Fish and fish one two three four five"

[1] * is used to mark an error in the utterance

Table 5.2 below, compares AEL's MPU with his twin sister Samira and his younger sister, Sanna. When AEL was aged between 4;01-4;05 his MPU was 2.15, whereas his twin sister's MPU at 4;04 years was 7.05. His younger sister's MPU at 2;07 (3.83) was the same as AEL MPU (3.90) when he was 6;01-6;05. Therefore throughout the recording periods AEL's language was characteristically restricted to short utterances.

Table 5. 2 A comparison of AEL's MPU with the controls

Age	**MPU AEL**	**Samira**	**Sanna**
2;07		-	3.83
3;02-3;05	1.00	-	4.06
4;02-4;05	2.15	7.5	-
5;02-5;05	3.07	-	-
6;03	3.90	10+	-
7;01	4.33	10+	-

5.3.3 Functional Analysis of utterances

The results of the functional analysis revealed that Mands and Tacts were the type of utterances most used. Intraverbals and Echoics were the least produced. In addition, AEL used learnt repetitive phrases (LP/RP) that were not observed in the speech of his sisters; but produced infrequently by the control Dudu. AEL used the LP/RP to attract attention and initiate conversation with peers and adults. He did not use them when playing on his own or as delayed echolalia and these were not phrases that he had originally learnt in an echoic form from the adults in his environment.

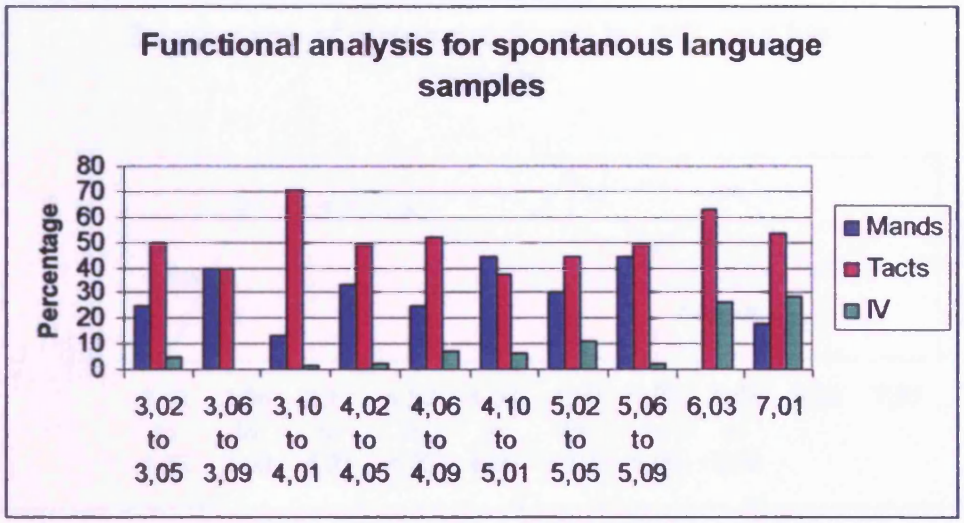
Out of the total number of utterances produced only 7.10% were Intraverbals, 29.55% were Mands (requests), 49.48% the most type produced were Tacts (labels), 6.41% were Echoics and 7.45% were Others.

The pattern used by AEL is similar to that used by the normally developing children in their early language years. When the controls were at the early stages of language acquisition they used mostly Tacts and Mands almost at an equal value and few used Intraverbals. Their use of Intraverbals varied but ranged from 53.33% to 1.51%. However, AEL began to use Intraverbals much later. Until the age of 5;06-5;09 his use of Intraverbals ranged from 1.6% to 11.07%. When AEL was 6;05 he used Intraverbals 26.67% of the time. His younger sister used Intraverbals 27.59% of the time when she was 3;01. His twin sister used Intraverbals 25% of the time when she was 4;04. Therefore his pattern of utterance functions was similar to the controls, although his percentage use was considerably less.

Table 5. 3 Summary of Functional analysis for AEL for the ten recording blocks

Age	Total # utterances	Mands	Tacts	Ec	IV	Others
1. 3;02-3;05	20	25%	50%	15%	5%	5%
2. 3;06-3;09	5	40%	40%)	0%	0%	20%
3. 3;10-4;01	61	13%	70.5%	1.6%	1.6%	13.1%
4. 4;02-4;05	181	33.15%	49.17%	8.29%	2.21%	7.18%
5. 4;06-4;09	301	24.58%	52.16%	8.97%	6.64%	7.64%
6. 4;10-5;01	91	43.96%	37.36%	6.59%	6.59%	5.49%
7. 5;02-5;05	253	30.43%	44.27%	6.32%	11.07%	7.9%
8. 5;06-5;09	45	44.4%	48.89%	0%	2.2%	4.4%
9. 6;03	30	0%	63.3%	10%	26.67%	0
10. 7;01	28	17.86%	53.57%	0%	28.57%	0%

Figure 5. 2 Functional Analysis of AEL's spontaneous utterances

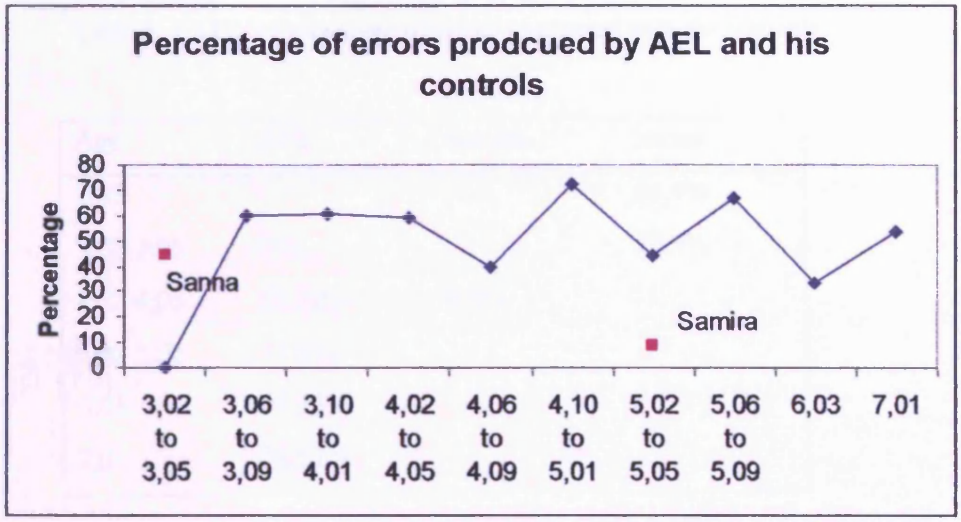


5.3.4 Percentage of utterances with errors

AEL's percentage of errors utterances with errors continued to be a diagnostic feature of his language. This percentage of errors fluctuated but ranged from 33.33% to 72.53%, unlike the controls whose percentage of errors decreased with age. His percentage of errors at the last recording was 53.57%. The only time no errors were produced was during the first recording. The language produced at this time consisted of single word labels and no verbs were produced.

What differentiates AEL from the non-language impaired children was that although his percentage of errors started low and then increased, the pattern thereafter continued to fluctuate and did not drop as seen for the controls. In addition, unlike the controls there was no direct relationship between percentage of errors produced and MPU values. At the last recording AEL's MPU was 4.33 and his percentage of errors was 53.57%. When his younger sister was 3;01 her MPU was 4.06 and her percentage of errors was 23.3%.The graph below is a visual representation of the pattern of AEL's percentage of errors. The results of the controls Sanna and Samira are also represented to allow for comparisons.

Figure 5. 3 Percentage of errors for AEL, Sanna and Samira



Comparing his errors further with his sisters we see that his younger sister's percentage of normal developmental errors at 2;07 was 44.4. % and at 3;01 it was 23.3%, whereas AEL's at a similar age was 60% (3;01-3;05).

His twin sister's errors were significantly less, as would be expected— at 4;04 Samira's percentage of errors were 8.9%, compared with AEL's 59% (4;01-4;05) and 47.8% (5;01-5;05). Therefore his utterances contained more errors and he used a reduced range of utterances compared to the controls.

Table 5. 4 AEL's Percentage of errors compared with the controls

Age	AEL	Samira	Sanna
2;07	-	-	44.4%
3;02-3;05	0%		23.3%
4;02-4;05	59.12%	8.9%	-
5;02-5;05	47.8%	-	-
6;03	33.33%	-	-
7,01	53.57%	-	-

5.3.5 Lexical analysis: spontaneous use of verbs

One of the most salient characteristics of AEL's language was his difficulty with the use of verbs. His use of verbs was slow to develop and he first began to use them when he was 3;06. When verbs were used they were characteristically produced with errors. His errors were with agreement for gender, person and number. He also often omitted obligatory verb arguments and often omitted or substituted bound verb object clitics.

Interestingly when these errors were produced AEL always maintained the root and only occasionally inserted the wrong melody or vocalic template (McCarthy,1981). This mis-insertion of the vocalic templates typically resulted in phonologically well formed words but not target words in EA, which have been labelled *vocalic paraphasias.*

AEL produced a total of 377 verbs. Of these verbs 71.62% were produced with errors and only 28.38% were produced correctly. Of the total number of errors only 1.33 % of the verbs produced were vocalic paraphasias. The vocalic paraphasias are phonologically acceptable in EA but are not part of the EA lexicon.

The majority of verb related errors produced by AEL involved either the production of the wrong Apectual Marking or Tense, or wrong gender and/or number agreement. In this case it is also possible that the word produced would be a non-adult production because of the omission or substitution of morphemes, resulting in either a vocalic paraphasia or a normal developmental error. For example if the target is /bi-t-akul/ *she-is-eating* and AEL omits the Aspectual marker /bi-/, producing /ta:kul/, this would be a productive lexical item in EA, if however he produced */wakali/, the root ʔKL is transparent, but the addition of the morphemes renders the production a non EA word and therefore a vocalic paraphasia.

The analysis of verbs was divided into the recording periods. This was to allow for an understanding of verb lexical learning and mastery and to track the changes in AEL's use of verb morphology and syntax. In addition, AEL's verbs were analysed to discriminate morphological errors that may arise due to his language impairment from those that are developmental and seen to be produced by the controls. The verbs produced with errors were divided and analysed for three variables. The first was that the wrong Tense was selected. For example, the Perfect is substituted for the Imperfect. The second was that Tense was produced correctly but number, gender, and person information were incorrect and the third was that a vocalic paraphasia was produced that resembled a verb.

As initially predicted, when AEL began producing a wider range of verbs his errors were predominantly with person, gender and number agreement and less with Tense. For example, when he was aged between 5;02 and 5;05, 31.43% of his verbs were produced with Tense errors compared with 68.57% that were produced with the correct Tense but errors with person, number and gender agreement. AEL's verb related errors are similar to those produced by the controls.

It was only during the last analysis for verbs when he was 6;03 that the number of verbs produced was greater than the number of utterances, as a result of him beginning to use more than one verb phrase per utterance.

Table 5.5 is a summary of the verbs produced by AEL with an analysis of his verb related errors. Only the first nine recording periods were used, from when AEL was 3;02 to 6;03 years. The last recording at 7;01 was not included in the analysis since AEL was recorded with his twin sister and not with the investigator.

Table 5. 5 Summary of productions and analysis of verbs for AEL's spontaneous language

Age Range	Total N of utterances	Total N of verbs produced	% and N of correct verbs		Total of N verbs produced with errors	%and N of Tense and Agreement errors		% and N of Tense correct with Agreement errors		N of vocalic paraphasias
3;02-3;05	20	0	0%	0	0	0%	0	0%	0	0
3;06-3;09	5	2	50%	1	1	100%	1	0%	0	1
3;10-4;01	61	11	0%	0	11	45.45%	5	36.36%	4	11
4;02-4;05	181	77	14.29%	11	66	33.33%	22	66.66%	43	66
4;06-4;09	301	92	14.13%	13	79	21.52%	17	78.48%	62	79
4;10-5;01	91	62	22.58%	14	48	22.92%	11	77.08%	37	48
5;02-5;05	253	104	36.29%	34	70	31.43%	21	68.57%	47	70
5;06-5;09	45	29	37.93%	11	18	16.66%	3	83.33%	15	18
6;03	30	42	54.76%	23	19	0%	0	100%	19	19

5.3.5.1 Initial verb use and verb error pattern from 3;02 to 4;01 years

Difficulty with verbs and morphological errors related to AEL's verb use were prevalent early on in his linguistic development. AEL produced no verbs during the first four month recording period, when aged between 3;02 and 3;05. Normal verb use for children aged between 1;00 and 3;00, acquiring EA, is expected to be approximately 20% (Karam El-Din, 1990).

Although AEL was able to express his basic needs, this was done using simple learnt phrases. Nouns were used in place of verbs. For example, he would say /mayya/ *water* when he wanted to drink. When he wanted the adult to blow bubbles he would say /bubəlz/ *bubbles.* He otherwise requested actions from the adults, e.g. open, carry, give me, by using gestures and other forms of non-verbal communication.

From 3;06-3;09 (second recording period) AEL produced only two verbs. One form was correct and was the Imperative and the second with an error due to an omission of the Progressive marker.

AEL's use of verbs began to increase during the third recording period when he was aged between 3;10 and 4;01. 61 utterances were transcribed during this period. He produced 11 verbs. Six of the eleven verbs were the default verb form in place of target forms requiring Tense, person and gender marking. Only one verb was produced correctly and it was when the target form was the Imperative.

One of the verbs produced was a vocalic paraphasia where the root is maintained but the incorrect melodic pattern was inserted. This was for the verb "drink" where the root is ʃRB.

His production is demonstrated below, he omitted the first person masculine participle /ʕa:jiz/ which is part of the verb phrase and means "(I)-want ".

01/11/99#8	/ʔasrib/ (Phonological process /ʃ/ →/s/)
Target	/ʕajiz ʔaʃrab/ Part.want.1st Masc.Sing Imperf.drink.1st.Sing [2]*I want to drink*

AEL omitted obligatory arguments for four of the verbs (3;02-4;01 years). The omitted subjects were free standing morphemes whereas the omitted objects were either bound in the form of an object enclitic or a noun phrase.

5.3.5.2 One year on: verbs produced from 4;02 to 4;05

This period was one year from the first recording period. He began to use a variety of Tense inflections for Past and Non-Past. This is approximately one year later compared with the controls: Sherif at 3;03 years and Sanna at 3;01 years.

AEL continued to produce omissions and substitutions. However the frequency and types of verbs produced during this period increased (77 Tokens and 33 Types). He continued to use the default verb form for either the Past or Non-Past, however he also began to produce Non-past Tense inflections marking Progressive Aspect and futurity. Tense substitution errors were less than agreement errors, as cited in Table 5.5 above (66% agreement errors and 33.33% Tense errors).

[2] There is no morpheme in EA corresponding to "to".

AEL frequently produced gender errors. It was not always possible to determine if the gender errors were omission errors or substitution errors. He frequently produced the third person masculine singular form of the verb requiring a prefix /ji/ in place of the third person singular feminine form of the verb which requires the prefix /t/, as demonstrated in the examples below.

24/04/00#1	*/bi-ji-lawwin/ Asp.Prog.colouring.3rd Masc.Sing. *He is colouring* Context: He labels a picture in a book of a girl colouring.
Target	/bi-t-lawwin / Asp.Prog.colouring.3rd.FemSing. *She is colouring*

Similar to the controls, he omitted the feminine suffix /-i/ of the Imperative as demonstrated in the example below (17/05/00#22). Even if a lexical subject is used, the inflection for feminine singular is obligatory. This error persisted as an area of difficulty for AEL.

17/05/00 #22	*/xud/ Imp.take1stMasc.Sing. *Take* (Context: Gives female adult a tissue)
Target	/xudi/ Imp.take.1st.Masc.Sing. *Take*

A preferred choice of gender has been observed to be used by the controls and was discussed in Chapter 4. For AEL he either used the masculine singular form because this was the form he heard the most or it was because he had learnt these forms as un-analysed lexical strings. However, other errors produced by AEL demonstrated that AEL's grammatical system was actively working and he was not always producing forms that were learnt as un-analysed wholes, for example errors with the discontinuous negative and over-regularization errors when producing plural nouns.

Between the age of 4;02-4;05 AEL produced 10 verbs correctly for verb information and Tense (see Table 5.5), and he correctly used the inflections marking Progressive Aspect /bi-/ and Future /ha-/ and Jussive.

He produced 34 verbs with the correct target Tense but with agreement errors, i.e. omission or substitution errors. He used the Past (n=6), Non-Past: Progressive Aspect (n=7) and the Imperative (n=21). This was an interesting finding and supported the initial prediction that should an EA-DLI child have a morpho-syntactic deficit difficulty with Aspectual inflections and Tense would be less apparent than difficulties with inflections marking person agreement and gender.

5.3.5.3 Tense substitution

AEL continued to use the default verb form in place of other target Tense forms (i.e. Past, Non-Past: Progressive and Future). 22 of the verbs produced were substitution errors of this type. Four of the verbs produced were Tense omission errors where the target was the Progressive Aspect or Past Tense. For example, he used the Imperfective /jitlaʔ/ (he-goes up) in place of the Aspectual (Future) /ha-j-itlaʔ/ (he is going to go up).

He produced two verbs using the Aspectual Future and both were produced correctly. In addition one production of a vocalic paraphasia occurred, due to incorrect insertions of the vocalic template.

Some of AEL's verb productions are listed below to demonstrate his pattern of omissions and his use of verb inflections when he was aged between4;02 and 4;05 years.

5.3.5.4 Omission/Substitution of gender person markers

In the example below (19/04/00#7), the context was that he was labelling the action of a female adult who was coughing. Hence he was required to use the inflection marking person (3rd.Sing.Fem.) morpheme/-t-/ which he substituted with the inflection /ji/(3rd.Sing.Masc.), although he did produce the Aspectual (progressive/habitual) marker.

19/04/00 #7	*/bi-ji-kuɦ/ Prog.Asp.-3SM-verb-cough
Translation	(he) is-coughing
Target	/bi-t-kuɦ/ Prog.Asp.- 3SF-verb-cough *She is coughing*

5.3.5.5 Substitution of the Non-Past Progressive Aspect with the Imperative

The two examples below are examples where AEL substituted the Progressive Aspect with the Imperative.

Example 1

In the first example below, AEL used the masculine singular Imperative in place of the Progressive Aspect form. The context was that AEL was playing with toy cars, a garage and a bridge. He was pushing the cars up and down the bridge. He omitted the Progressive Aspect marker /bi/ and he also either omitted or substituted the 3rd Person masculine singular, /-t-/, which marks the gender of the car (feminine).

17/05/00 #16	*/ʕitlaʔ el-kobri/ you-Masc.-go-up the-bridge Context: pushes car up a bridge
Translation	Go up the bridge
Target	/bi-titlaʔ el-kobri/ It is going up the bridge

Example 2

In the second example, AEL was rolling his sleeves down after washing his hands. He used the second person masculine singular form of the Imperative in place of the Progressive Aspect form, i.e. he omitted the aspectual marker /bi-/ and he also omitted the bound possessive pronoun /-i/ *my*.

24/04/00#6	*/nazzil kum/ you-Masc.-roll down sleeve Context: rolls his sleeve down
Translation	Roll down sleeve

Target	/**ba**-nazzil kummi/ Hab.Asp.-roll-down sleeve-my I am rolling down my sleeve

5.3.5.6 Omission of the subject

AEL often omitted both lexical and inflectional subjects. In the example below AEL omitted the feminine marker and he omitted the bound object clitic /-ha/ (it). His omission of the feminine marker on the verb has been illustrated in the examples above.

22/05/00 #20	*/ħot fil basket əl-basket/ you-Masc-put in the-bin Context: wants adult to throw paper in the bin.
Translation	(You-Masc.) put in bin the bin
Target	/ħoti:ha fil basket əl-basket / You-Fem. put it in the basket the basket

5.3.5.7 Agreement errors for gender and person

This was a productive type of error pattern in AEL's use of verbs and continued to be problematic up until the last analysis at 6;03. 66.66% of the verbs produced at this time (4;02-4;05) contained errors of this type (n=34).

10/05/00 #5	/sib ʔidak/ leave-Masc-Sing hand-your

Translation	"leave your hand" (Don't hold your hand)
Target	/sibi ʔidi/ leave-2nd-Sing.-Fem hand-my "leave my hand" (Don't hold my hand)

5.3.5.8 Recording Period 5 from 4;06-4;09 years

AEL produced a total 92 verbs out of a total of 301 utterances transcribed during this period (4;06-4;09). This included repeated verb types. His use of Tense became closer to the target form compared with the previous recordings. He continued to use the default verb form in place of Aspectual markers for Progressive and Future. This was a period where AEL produced a variety of verbs using the Past and Non-Past Tense. He also produced participles which he had frequently omitted in the previous recordings. 14.13% of the verbs were produced correctly. Of those with errors, 21.52 % were produced with Tense errors and 78.48% of the verbs were produced with the correct Tense but with agreement errors, supporting the pattern that Tense was less problematic than verb agreement information. In addition, he omitted verbs on 6 occasions where their presence was obligatory, examples of this are listed below (5.3.5.9 Omissions of verbs).

During this period AEL produced 18 different verbs types using the Imperative and all were produced with errors of agreement. When he used the same verb during different recordings he continued to produce it with same error pattern. For example, /lif/ *spin* (n=3) and /ʃid/(n=3) *pull* and /ʔiftaħ/(n=5) *open* were produced the same way. This was different to

the controls who although they too omitted the feminine person marker, also used it correctly within the same recording periods, and for the same verb type.

AEL produced seven verbs using the Past Tense (Perfect). Of these four were correctly produced. For example, /wiʔit/ *fell it-fem* and /ʔaʕad/ *(he-)sat.* He used a variety of Non-Past inflections when aged between 4;06-4;09, for the Indicative and Future, examples of which are listed below.

/ha-yi-ʔiʃrab/	/bi-ti-ʔixsil/	/ha-yi-ʔinzil/
Asp. Fut- 3rdSing.Masc.-drink	Asp.Prog.-3rd Sing.Fem. wash	Asp.Fut-3rdSingMasc-go down
He is going to drink	*She is washing*	*He is going to go down*

At the same age he also started to correctly use plural person markers using the Non-Past Tense:

1. /negib/ *Shall we buy (sweets)*

2. /nəʕmil/ *Shall we do (this)*

3. /nerkab/ *Shall we ride (the car)*

4. /maʃʃiyin/ *We are leaving*

AEL was observed to use the Aspectual markers for Progressive and Future whilst omitting the person marker. This would be a similar error to the omission of the feminine marker in the Imperative, however regarding the Imperative, if the suffix /-i/ is omitted, the remaining form is the masculine singular form which does not require a suffix. But for the Progressive

and Future forms a marker for masculine or feminine person is obligatory, the resulting word in therefore a non-word in EA.

07/06/00#15	*/bə-ʔinzil/ Asp.Prog-go down
Translation	Going down
Target	bə-ti-inzil Asp.Prog.-3rd.Fem.Sing- go down Going down

5.3.5.9 *Omission of verbs*

Verb related errors have been described and several examples have been given which highlight the types of omissions and substitutions that took place. There were also times where AEL omitted verbs where their use was an obligatory syntactic requirement.

In the example below he was aged 4;06 and was asked to describe a picture of a woman chopping tomatoes. AEL omitted the verb and produced the following utterance. It is unlikely that his omission of the verb was a result of him misunderstanding the question form, as he had labelled verbs for previous pictures when the same question form was used.

20/06/00#6	*/ħitta Tama:tim/
Translation	Piece (of) tomato

Target	/bi-t-ʔataʕ Tama:tim/ She is chopping tomatoes

5.3.5.10 Recording period 6 from 4;10 to 5;01

AEL produced 91 utterances during this recording period and 62 of his utterances contained a verb. 22.58% of the verbs were produced with the correct Tense and agreement, therefore more than the period before. His ratio of correct use of Tense, to errors of agreement and incorrect Tense and agreement remained the same. That is more errors were with agreement than for Tense. The trend seen in previous recordings with agreement errors had been that AEL mostly substituted the female with the male and this seemed to be his preferred gender choice. During this period the gender choice appeared more varied; errors where the person marker was male for female or female for male were produced.

For example, when describing a picture of a boy running, AEL produced the sentence, /əl-wallad bi-ti-igri/ *The boy (she) is running*, substituting the first person masculine singular form /-ji-/ with first person feminine /-ti-/.

When using the Past Tense AEL had better control over his use of morphology for person markers. He produced 5 verbs using the Past Tense, and one of these was produced with an agreement error. This again supports AEL's predominantly morpho-sytactic deficit.

Difficulty with verb agreement also affected his semantics and indirectly had an effect on his use of language. The dialogue below illustrates this. The context of these examples is that AEL was playing with toy cars, animals and ribbons. He was trying to tie the cars and animals together using the ribbon. He had difficulty and asked the adult for assistance. This also

reflects his difficulty with lexical and inflectional pronouns. He omitted the verb arguments for the verb *tie* and he produced agreement errors for person and gender.

Context	AEL	Adult
27/11/00#5 AEL is tying the ribbon to the car. The adult recasts and repairs his sentence	*/bə-terbot/ *She-is-tying,* Target: /baʔarbut/	/ʔinta bə-terbot el-ʃirit fil ʕarabeyya/ *You are tying the ribbon to the car.*
27/11/00#6 AEL asks the adult to tie the ribbon for him.	*/ʔarbuthu:lak/ *Shall-I-tie- it-for-you.* Target: /ʔirbutihali/ *tie it for me.*	Adult ties the ribbon to the car.
27/11/00#8 Asks adult to tie the sea lion to the other end of the ribbon. Adult does not understand and asks for clarification.	*/kalb əl-baħr ʔasaʕdak lawsammaħt/ sea-lion help-you please-masc. *Help me tie the sea lion*	/ʕa:yiz teʕmil ih?/ What do you want to do?
27/11/00#9	*/bə-terbot kalb əl-baħr/ *she is tying the sea-lion*	Adult ties the sea-lion to the ribbon

5.3.5.11 The third year of recording from 5;02 to 6;03

This recording period was characterised by a significant change in AEL's pattern of verb use. Firstly he produced more verbs and his percentage of correct use increased. Of the verbs produced a variety of Tense forms were correctly used for Past and Non-Past and he began to select more specific verbs as listed in table 5.6 below (Verb Tokens=92, Verb Types=35

and Morphological variance=12). In addition AEL began to use more than one verb phrase per utterance, which is reflected during the last verb analysis period. When aged 6;03 years, 30 utterances were recorded and a total of 42 verbs were produced. AEL persistently had difficulty with correct agreement and this continued to be the prominent feature marking his verb error pattern. Most of the errors of agreement were with gender and person agreement. Errors for number appeared in the data but not as frequently as the latter two.

The last analysis for verbs was when AEL was aged 6;03, and more than half of the verbs produced were free of any morphological errors (54.76%). The ratio of verbs produced with incorrect Tense versus those with correct Tense and agreement errors continued, making it more obvious that AEL's difficulty with verbs was not at the level of Tense but at the level of agreement. At age 5;06-5;09, 83.33% of errors were with agreement and 16.66% were with Tense. When aged 6;03 100% of AEL's verb errors were errors of agreement and not with Tense.

The verb pattern results highlight the importance of longitudinal case studies when examining children with language impairment. Had AEL's language only been examined cross-sectionally this pattern of errors would not have been obvious. In fact at 4;02 to 4;05 AEL produced more Tense related errors than he did for agreement. However, the data is conclusive in highlighting AEL's language impairment in relation to agreement errors for person, number and gender— as his language develops.

5.3.5.12 Verb Type Token Ratios

Type token ratios were calculated for the first nine recording periods. *Verb Tokens* had already been calculated in the previous verb analysis section (see Table 5.5 above), that is the total number of verbs produced for each of the nine samples. Two additional analyses were

computed. The first was to calculate how many *Verb Types* were produced for a given sample, in order to establish verb lexical acquisition. The Verb *Type* in EA was taken as the root of the verb. Second, to account for the morphology of EA, *Morphological variance* (MV), was calculated. Morphological variance refers to the number of forms that result following different vocalic and morphological insertions. For EA this includes Aspectual markers and morphological markers for gender, number and person information. If pronoun clitics were also bound this was included as a separate Morphological variance entry. The purpose of the Morphological variance was to evaluate AEL's ability in using morphology. The expected pattern of development would be that as age increases the values would become more equal across the columns. For example, when aged between 4;06-4;09 AEL produced 92 verb Tokens, of these there were 35 Verb Types (different roots), of the 35 Verb Types (roots) 12 verbs were produced with two or more different morphological patterns.

Table 5. 6 Summary of AEL's Type Token ratios and Morphological variance

Age	**Verb Types (roots)**	**Verb Tokens**	**Morphological variance**	**Number of utterances**
3;02-3;05	0	0	0	20
3;06-3;09	2	2	0	5
3;10-4;01	11	11	0	61
4;02-4;05	33	77	9	181
4;06-4;09	35	92	12	301
4;10-5;01	23	62	11	91
5;02-5;05	37	104	16	253
5;06-5;09	18	29	4	45
6;03	26	42	8	30

The expected pattern of development would be to see verb types and morphological variance to increase with age. The results of this analysis reveal that AEL's verb lexicon slowly increased with age. The number of verb types produced with morphological variance remained significantly low. Therefore AEL used more verbs over time (verb tokens), but most of his verbs were the same form and he rarely used different morphological or vocalic insertions on the same verb (morphological variance). For example, when aged between 5;02-5;05 he produced a total of 104 verbs. But for these verbs there were only 37 Types and for the different Types only 16 verbs were produced with different morphological forms. It must be noted that the majority of the recordings were conducted with either the investigator, with his sisters or with his mother. He was only recorded twice with male teachers. Therefore, unless commenting on his play or events outside of his play environment there are a restricted number of possible morphological markers related to number, gender and person markers.

When tallying verb productions if a verb was produced with different Tense inflections or person/gender markings this was counted as a separate entry for morphological variance, i.e. the same root was produced with different vocalic insertions or affixes for person, gender or number. For example /ʔilbis/ (you-Sing.-Masc.-wear) and /la:bis/ (he-Sing.-Masc.-wears).

5.3.5.13 Participles and the passive

Participles are morphologically less difficult than finite verbs, and although errors were observed they were not as problematic as errors with finite verbs. AEL used the Past Participles correctly for words meaning *broken.* He used both the masculine and feminine forms. For example, /ək-kassar/ *it-was-broken-masc* ; /ək-kassarit/ *it-was-broken-fem.* and /maksur/ *it-is-broken.*

5.3.6 Grammatical and Morphological Error Analysis

5.3.6.1 Plurals and the Dual

AEL had difficulty throughout the three year recording period with his use of both irregular and regular plurals and the dual. Nouns in EA form their plurals either by suffixation, or by an internal change to the word. The suffixed plural is formed by the affixation of a plural suffix to the singular form. To express plurality AEL adopted a strategy of repeating the noun rather than using the morphology for plurals. This was not observed as a default strategy employed by the non-language impaired controls, although it was observed in the other language impaired subjects. He correctly used the dual on two occasions once at 4;05 years and also at 4;09 years (example 04/06/00#12).

However this was not generalised and was not seen anywhere else in the data. Other times when he attempted to use the dual he produced a non-target related word, such as a lexical item describing quantity or using the number /ʔitnin/ *two*. Similar error patterns have been reported in the Palestinian Arabic data (Ravid and Farrah, 1999).

When he did produce the plural he produced regular plural forms, demonstrating an understanding of morphological affixation. Interestingly, on no occasion did he produce the broken plurals, which evidence from the Algerian agrammatic data (Mimouni, Kehayia and Jarema, 1996) suggests are learnt and stored as whole words and are acquired later in normally developing children. The following are examples of AEL's expressive use of plurality and the dual.

Utterance code	Age	Phonetic transcription and coding
04/06/00#12	4;05	/korte:n/ ball-two *Two balls*
07/06/00#3	4;05	*/xaT xaT/ line line *Two Lines*
19/06/00#23	4;06	*/ʔatr ʔatr/ train train *Two trains*
20/06/00	4;06	*/di suxna di suxna/ this hot this hot Two hot (cups)
02/10/00#3	4;09	/ʃaggar we ʃaggar ʃaggarten/ (correct use of dual) trees and trees trees-two *A tree and a tree two trees*
19/03/01#27	5;03	*/ʔarbaʕ ʃabakti:n/ four net-Plu four nets Target : ʃababi:k *Windows* .

19/03/01#29	5;03	*/miʃ bajza da maksur we da maksur (T: maksurin) not damaged this(-is) broken and this(-is)broken Target: /miʃ bajzin dol maksurin/ *They are not damaged they are broken*
03/05/01#29	5;04	/sabaʕ ʕarabejjat / correct use of regular plural seven cars

5.3.6.2 Use of the negative: the discontinuous negative

AEL had difficulty expressing the negative when the discontinuous negative form /m..ʃ/, was required. He over-used the words "/miʃ/" or "/la?/", an immature version, as a default, which is seen in younger children acquiring EA. The discontinuous negative was at times used correctly. However, it was a difficult morphological structure. One possible explanation is that the discontinuous negative has to be used in a sequential manner across a verbal phrase, which is syntactically more complex. In addition, its use depends on the morpho-syntax of the verb, an area of difficulty for AEL. It was only during the last recording that AEL consistently used the discontinuous negative without error.

Examples of AEL's errors with the particles for the discontinuous negative can be used to demonstrate early understanding of bound morphology. His productions resulted in him producing one of the discontinuous morphemes without the other. This is not a feature observed in typical children acquiring EA and it was not observed in Arabic aphasic adults (e.g. Mimouni and Jarema, 1995).

When AEL was aged between 4;00 to 4;04 he frequently played with toy cars. To illustrate his difficulty using the discontinuous negative four examples are presented below, all of them used to express the idea that a toy car door does not open. In addition to forms produced with errors AEL produced the target form, /ma-bi-ji-ʔftaħʃ/ It doesn't open, twice on two separate occasions when he was 4;04.

Examples of the Error varieties for the discontinuous negative

Age	Number of times produced	Phonetic Transcription and Coding
4;00 years Error Analysis	3	*/diftaħʃ Target : /**ma**-bi-ji-ʔftaħʃ/ Omissions- negative particle ma→ø; Aspectual marker bi→ø; Substitution- /-ji/→/d/
4;04 years Error Analysis	2	*/**ti**ftaħʃ/ Target :/ma-bi-**ji**-ʔftaħʃ/ Omissions- Person marker -ji → -ti; negatitve particle ma→**Ø**; Aspectual marker bi→**Ø**

4;04 years Error Analysis	1	*/mabijftaħhuʃ/ Target :/ma-bi-ji-ʔftaħʃ/ Addition of /ħ/ and /u/ which marks plural
4;04 years Error analysis	1	*/ʃiftaħuʃ/ Target :/ma-bi-ji-ʔftaħʃ/ Addition of /u/ marks plural; Omissions- Person marker -ji → Ø; negative particle ma→Ø; Aspectual marker bi→Ø

He expressed the discontinuous negative correctly a total number of three times from when he was 3;01 to 4;04 years old. When commenting on his driver who had not come, he said /magdi ma-ga-ʃ/ (*Magdy hasn't come*) and on two other occasions when he was commenting on the car door not opening he said, /ma-bi-ji-ʔiftaħʃ/ *It doesn't open.*

In a later recording period his use of the negative was more productive although he continued to produce errors. In the following example when he was 4;06, he was describing a picture of

a boy playing with blocks wearing a short sleeved shirt. He omitted the verb phrase and used the independent negative marker [3]/ballaʃ/ *don't*, often used in Imperatives, in place of *not*.

20/06/00#9	/mukkaʕaba:t ø kum ballaʃ kum/
	Blocks sleeve don't sleeve
Target	/mukkaʕaba:t miʃ la:bis kum tawi:l/ Blocks the boy is not wearing a long sleeved shirt

5.3.6.3 Use of the definite article

AEL omitted the definite article when its use was obligatory. However percentage of omission was to the same extent as the younger controls. From 5;02-5;09 years, his percentage of correct use was generally greater than his percentage of omission where the presence of the definite article is obligatory. Table 5.7 below is a summary of AEL's percentage use and omission of articles from when he was 4;06 to 5;09.

Table 5. 7 AEL use of the definite article from 4;06-5;09 years

Age	Use of definite article	Omission of definite article
4;06-4;09	40.9%	59.1%
4;10-5;01	33.33%	66.7%
5;02-5;05	55.56%	44.4%
5;06-5;09	65.22%	34.8%

[3] /ballaʃ/ is an independent negative marker often used in imperatives.

For example, when he was aged between 4;06 to 4;09 years he produced 301 utterances. Of these he used the definite article correctly 40.9% of the time and he omitted it 59.1%. When Hanna was 1;11 years her percentage of omission was 50% and at 2;07 years Sanna's percentage of omission was 33.33%. For example, 05/06/00#11 * /[4]Ømotosikl taħt el-nafaʔ/ target:/el- motosikl/.

5.3.6.4 Use of prepositions

AEL occasionally used prepositions correctly but he was also observed to omit or substitute prepositions when their use was obligatory. In the example below when 4;06 , he omitted the preposition /min/ *from* and the definite article / əl-/.

03/06/00#11	/na:zil ø selim/ (ø = min əl) down step

On other occasions AEL was observed to substitute one preposition for another. For example, when aged between 5;06 to 5;09, /bəl/ and /ʕalla/ were both substituted more than once for /fil/.

In the following example when he was 4;11 he was putting the toy cars away in a box. He substituted the preposition *in* /fil/ with the preposition *with* /bel/ and he also omitted the definite article/ əl-/.

27/11/00#3	/baħot ø ʕarabeyya bəl ʕelba/ put car with box

[4] ø is used to indicate where the omitted morpheme is placed

5.3.6.5 Addition, Omission and Substitution of Pronouns

Pronoun enclitics were problematic from early on and continued to be so until the last recording. Both bound and free pronouns were problematic for AEL. When he was 4;06-4;09 he used the object bound clitics /-u/ and /-ha/ corresponding to *it,* correctly in /sallaħu/ fix it and /ħotaha/ put it. He otherwise omitted subject and object clitics during this period, producing utterances such as */ʔiʃbukø /(i-hum) hook (them) and */sa:ʔidø /(i-ni) *help (me)* and */donya ʔiftaħø/ (i-ha) *open it*; where both the feminine person marker and the object clitic were omitted.

He rarely used the possessive pronoun /-et/, for example, 31/06/00#1 /ʃant**et** donia/ *donia's bag.* On other occasions when using possessive pronouns they were used with the incorrect agreement for gender. In the following example, the word /ʃibʃib/ *slipper*, is masculine, he used the feminine possessive pronoun in place of the masculine possessive pronoun, producing, 5/06/00#15/ʃibʃib**ti**/, the target being, /ʃibʃibb**i**/.

When aged 4;06 and describing a picture of a girl brushing her teeth he substituted the pronoun *her* /ha/ with *his* /u/, and produced the utterance, 19/06/00#21 /bi-t-ixsil sinnanu/ *she is brushing (**his**)teeth*, the target is /bi-t-ixsil sinnanha/ *she is brushing (**her**)teeth.* His production is syntactically correct but the use of /u/ instead of /ha/ leads to a gender agreement error.

Another example was when he was 4;06 and he was asking the adult the colour of a bus. The word *bus* /otobi:s/ is masculine. In the following example, AEL substituted the masculine

object bound clitic with the feminine; 23/06/00#23 /otobi:s lonha ih? ʔazraʔ/ *bus what colour is it (-Fem.)? blue*, the target is /otobis lonuh ih? ʔazraʔ/ *bus what colour is it (-Masc.)? blue.*

5.3.6.6 Adjectives: errors with gender agreement

Arabic morphology is such that adjectives agree with the noun for number and gender, and the rules are complex. AEL had difficulty with his use of adjectives which were rarely produced. They were also rarely produced by the language impaired children, but when used by them they were generally correct.

Learning the names of colours begins when children are aged between 2;06-3;06 years (Omar, 1973). For AEL he easily leant the names of the colours but his difficulty was with selecting the correct form of the colour word for gender agreement with the object. In EA if the word for colour (/lo:n**u**/ *colour (It masc. is of the)* or /lon**ha**/ *colour (It fem. is of the))* is used with the attached pronoun clitic marking gender (-u and -ha,) then only the masculine form of the colour can be used. However, if the noun phrase preceding the object marks the gender then the corresponding masculine or feminine colour must be used. For example, /di lonha ʔazraʔ/ *This-Fem. is of the colour-Fem. white-Masc.* or /da lo:nu ʔazraʔ/ *This-Masc is of the colour-Masc. white-Masc.*

AEL developed a strategy where he would use the Arabic word for colour prior to naming the colour. By doing this he would use the masculine form of the colour, which seemed to be his default choice and he rarely used the feminine form of the colour unless in an echoic. The examples listed below demonstrate AEL's use of adjectives for colour and his difficulty with agreement. In the first example, AEL was describing the colours of cars which are feminine. He used the correct agreement for the first noun *one* (underlined below), and incorrectly

selected the masculine forms for the colours and thereafter used the masculine word *one* /wa:ħid/.

18/10/00#5	/<u>waħda ʔasfar</u> wa:ħid ʔaxdar wa:ħid ʔaħmar waħid ʔazraʔ/ one-Fem. yellow-Masc. one-Masc. green-Masc. one-Masc. red-Masc. one-Masc. blue-Masc. *One yellow one green one red one blue*
Target	/waħda safra waħda xadra waħda ħamra waħda zarʔa/ one-Fem. yellow-Fem. one-Fem. green-Fem. one-Fem. red-Fem. one-Fem. blue-Fem. *One yellow one green one red one blue*

In the second example, AEL correctly selected the feminine form of the word "colour" and because he had used the noun *colour* /lonha/, with the correct agreement his use of the neutral or masculine colours was correct.

23/10/00#5	/di wizza miʃ batta, əl-wizza lonha ʔabyad əl-batta lonha ʔasfar/ this-Fem. goose not duck, the-goose colour-Fem. white the-duck colour-Fem is yellow This is not (a) goose, the goose is white coloured (and) the duck is yellow coloured

5.3.6.7 Word order and errors of syntax

Errors with word order were rarely observed, but occasionally appeared in the earlier recordings. Intransitive verbs in EA can follow either an S-V order or a V-S order. AEL used the Intransitive verb *to fall* in the V-S order. Few word order errors were seen and AEL demonstrated the ability to understand that both word order forms can be used in EA.

For example he produced:

05 /06/00#7	/wiʔʕit eʃ-ʃagara/
	fell-3rdSingFem the(Def.Art)-*tree*
	The tree fell

The same phrase could also have been produced as /eʃ-ʃagara wiʔʕit/ where the word order is reversed.

When he was 4;06 he produced errors with word order where prepositional phrases were required. In the following example, he was pushing a bike on a ramp.

20/06/00#3	*/foʔ əl-ʕaggal/ *on the bike*
Target	/ əl-ʕaggal foʔ/ *the bike is on* (the ramp).

The error above is a semantic error and it implies that something (the ramp) was on the bike.

5.3.6.8 Disordered sentences: omissions of arguments and lexical items

Examples of disordered utterances produced by AEL will be discussed. The sentences were classified as disordered where due to lexical omissions it was not possible to understand the intent of the utterance even when the context was provided.

Example 1: The context is that AEL is playing with cars and a garage. He is pushing a car up a ramp.

05/06/00#6	*/ʔiftaħ ʕarabeyya ək-kassarit/ 1st SingMasc.-open car it-broken Open car it is broken

At 4;06-4;09, AEL omitted arguments for five of the utterances transcribed. Two examples of argument omissions are illustrated below.

Utterance code	Transcription and Gloss	Context

19/06/ 00#21	*/ʔiftaħ ʃaskari/ open police-man	AEL is moving a toy doll. From the play context it is not clear what he wants the doll to open.
01/06/00#5	*/ʃarabejja fok ø ʃarabejja fok ʃarabejja/ car undo car undo car	AEL is playing with a set of cars, motorbikes, a garage, traffic lights, boats and a house. He is pushing the cars as he produces this utterance.

In the next example, AEL was aged 4;06. He was requesting a sequence of events which he produced as three separate sentences. This example demonstrates his difficulty controlling syntax across a series of sentential phrases. The morphological and lexical omissions consequently affect his discourse skills.

The context of the situation was that after his therapy sessions he would ask for money, he would then ride in a taxi, go to the shops to buy an ice-cream, pay the shop-keeper and finally wait for his change. To express this series of requests he omitted the verb phrase, verb arguments and conjunctions and used the incorrect discourse order. The target is not made explicit and can only be inferred from the context, familiarity and routine of the event. The example illustrates how AEL's morpho-syntactic deficit affects his discourse in that he must rely on the listener to interpret and repair his utterances. The example also highlights AEL's difficulty with conjunctions which were omitted. Between the age of 4;06-4;09 AEL omitted conjunctions on four occasions where their use would be obligatory.

28/06/00#10	/negib filus/ /baʔi əl-filus/ /ʔrkab taksi/ /we-get money/ /[5]change the-money/ /1[st]SingMasc-ride taxi/
	/na:xud fil:us/ /nerkab taksi/ /negib ice-cream/ /na:xud baʔi əl-filus / /we-take money/ /we-ride taxi/ /we-get ice-cream//we take the change/

5.3.7 Analysis of the structured tasks produced by AEL

5.3.7.1 Lexical analysis for verbs: the Winslow verb pictures

One of the disadvantages of spontaneous language measures is that it is not always possible to elicit particular lexical items of interest. The forms produced by the child will be dependent upon the person (i.e. gender) they are interacting with and the activity (i.e. lexical verb selection) they are engaged in. For this reason AEL's pattern of verb use was compared with his sister's and the other controls on the elicited Winslow verb pictures test item. The combined results are listed below.

Table 5. 8 Comparing the results for Winslow verb pictures produced by the controls and AEL

Name	Age	Number correct (n=42)
Ali	2;05	0
Kenzy	2;07	9
Sanna	3;00	26
Omar	3;06	20
Samira	4;06	40
AEL	4;06	8

[5] This is *change* as in the remaining money.

There was a difference with AEL's verb use on this task when compared with the controls. He produced fewer verbs than all but one of the controls (Kenzy at 2;07 years) and when he did they were produced with errors.

When compared with his sisters who were recorded during the same period as AEL, both his sisters were able to accurately label many of the verb pictures. Out of the 42 target verbs AEL was only able to correctly label 8 of the target verbs. His twin sister labelled 40 of the verbs and his younger sister was able to label 26 of the verbs. AEL's production was similar to Kenzy who at the time was 2;07 years. This again confirms AEL's difficulty with verbs and clearly this is a feature of his language impairment.

It was hypothesised that EA-DLI children's range of verbs used would be limited when compared with the controls and that they would rely on General All Purpose (GAP) verbs (Rice and Bode, 1993) rather than using a specific verb. AEL produced GAP verbs and used the same verb form as Kenzy (age 2;07 years), *do*, /bi-yi-ʕmil/ *he is doing* or /bi-ti-ʕmil/ *she is doing*. His use of GAP verbs was no different than the younger controls. The verbs elicit the Aspectual markers for Progressive and Habitual but not the Past Tense. Examples of the verbs that AEL correctly produced are listed below, and they are compared with his sisters' productions of the same verbs.

Picture	AEL	Samira	Sanna
Picture 11: A **boy** brushing his teeth	*/bi-yi-ʕmil sinna:nu/ Asp.Prog-3rdSing.Masc.-do teeth-his	/bi-yi-ʔixsil sinna:nu/ Asp.Prog-3rdSingMasc-wash teeth-his	*/ di bi-ti-ʔixsil sinna:nha/ Asp.Prog-3rd Sing.Fem-wash teeth-her
Picture 17: A **boy** crying	*/bi-ti-ʕayyat/ Asp.Prog.-3rdSing.Fem-cry	/bi-yi-ʕayyat/ Asp.Prog.-3rd Sing.Masc-cry	/bi-yi-ʕayyat/ Asp.Prog.-3rd Sing.Masc-cry

For the first example, Picture 11, AEL's twin sister labelled the verb correctly and her use of agreement was correct for number, person and gender. AEL's younger sister, Sanna, used the correct verb and Aspectual marker, however she used the incorrect gender agreement (-yi→ -ti) and pronoun enclitic (–u → -ha). AEL, however, used a general verb /ʕmil/ *do* in place of a more specific verb *wash* (N.B in EA the verb expressing *brushing teeth* is *washing teeth*)

For picture 17, AEL selected the correct verb and Tense, but used the wrong gender agreement. The controls occasionally produced similar errors but when they were much younger. For example, for Picture 24, which is of a woman eating a sandwich, Sanna, AEL's younger sister's response was /huwa bi-ya:kul/ *he is eating.*

5.3.7.2 Lexical analysis for nouns: the Winslow noun pictures

AEL's productions of the Winslow noun pictures were compared with the controls.

Table 5. 9 Comparing the results for Winslow noun pictures produced by the controls and AEL

Name	Age	Number Correct (n=31)
Ali	2;05	12
Kenzy	2;07	15
Sanna	3;00	25
Omar	2;07	17
Omar	3;06	29
AEL	4;06	25

As predicted, AEL was able to label significantly more pictures of objects than he was verbs. He labelled 80.64% of the pictures which was the same number as his younger sister Sanna. His errors were either semantic or he did not respond. For example, when labelling a picture of /makwa/ an *iron* he labelled it a /barrad/*tea-pot* and he labelled an *egg* /biDa/ an *ice-cream* /iskrim/.

5.3.7.3 The Egyptian Arabic Renfrew Action Picture Test (EA-RAPT)

The EA-RAPT was administered twice to AEL, once when aged 5;01 and the second time at 7;01. Samira, AEL's twin sister, was also administered the EA-RAPT at ages 4;03 and 7;01 respectively, in addition to two other controls, Ali and Omar.

Using 10 line drawn coloured pictures, this test is designed to assess children's spoken language in a short and simple way in terms of information provided and the grammatical structures used. The EA-RAPT yields two raw scores, one is for the use of specific lexical

items (Information) and the second for the use of bound and free morphological structures (Grammar).

The first purpose of this structured task was to compare AEL's morphological and lexical development with his controls. The second was that the test provides baselines which can be used to determine development when re-administered, since raw scores can be compared. Unlike the English version the EA-RAPT was not standardised, therefore age norms could not be provided. The maximum possible score for Information is 40 and 40 for Grammar. The morphological markers examined specifically for EA by the EA-RAPT are:

1. Bound articles
2. Prepositions
3. Bound and free pronouns
4. Gender, person and number markers for verbs and nouns
5. Aspectual and Tense markers for Past and Non-Past
6. Conjunctions
7. Plurals and the dual

Table 5. 10 The scores for the EA- RAPT were as follows

Name	Age	Info	Gram.	Age	Info.	Gram.
AEL	5;05	20.5	8	7;01	31.5	21
Samira	4;03	34	34	7;01	39.5	38.5
Omar	2;07	11.5	13	3;11	30.5	33.5
Ali	2;10	19	9	-	-	-

AEL's results for the EA-RAPT support his morpho-syntactic deficit. His lexical development reflected by the Information Score indicated that he was able to use a greater range of specific items elicited by the pictures. Although AEL's grammar score increased between the first and second testing it continued to remain lower than the controls. Thus, despite AEL using a wider range of morphological markers, he continued to omit obligatory morphological markers or produced errors with agreement.

Interestingly, at 7;01 when Samira was re-tested for picture 5 instead of using the dual for *mouse* /əl-fari:n/ she used the word /əl-ʔitni:n/ *the- two.* AEL did not use the dual for either of the testing, but both times he used the singular for mouse /fa:r/. In his first response at age 5;01 he also omitted the definite article and the verb.

Picture 5: What has the cat done? /əl oTa ʕamalit ih?/
Target: /miskit <u>əl-fa:rin</u>/
Gloss: held-fem.sing. the-mice-two (dual)

The responses for picture 5 provided by AEL and his age matched control Samira are presented below.

Age	AEL	Age	Samira
5;01 Gloss	*/far/ mouse	4;03 Gloss	*/miskit əl-fira:n/ held-Fem.sing. the-mice
7;01 Gloss	*/miskit əl-far/ held-Fem.sing. the-mouse.	7;01 Gloss	*/miskit əl-ʔitni:n fa:r/ held-Fem.sing. the-two mouse.

5.3.7.4 The Egyptian Arabic Sentence Comprehension Test (EA-SCT)

The EA-SCT was used to assess AEL's understanding of morphological and syntactic structures. This test looks at the child's understanding of grammatical structures requiring the child to select one picture out of four, which most typifies the sentence used by the adult. For the EA version, the test was divided into 10 sub-tests. The first sub-test has six items and the remaining nine each have 4 sub-test items. AEL was administered this test twice, once at 5;01 and a second time at 7;01 When first administered he passed two sub-test items and obtained a raw score of 10. When administered the second time he passed five sub-tests and obtained a raw score of 26/42.

Table 5. 11 AEL's Sentence Comprehension Test scores when aged 5;01 and 7;01 years

Sub-test description	Raw Scores at 5;01	Raw Scores at 7;01	Pass or Fail
1.Noun-Adjective/Noun-Participle	6/6	6/6	Pass
2. Intransitive verbs	4/4	4/4	Pass
3. Transitive verbs	0/4	3/4	Fail
4. Intransitive +adjective	0/4	4/4	Pass
5. Dual	0/4	2/4	Fail
6. Past Tense	0/4	4/4	Pass
7. Future Aspect	0/4	2/4	Fail
8. Negative	0/4	4/4	Pass
9. Prepositions	0/4	3/4	Fail
10. Embedded Phrases	0/4	0/4	Fail
Total raw score	10/42	26/42	
Number of sub-tests passed	2/10	5/10	

The results so far have focused on AEL's expressive morpho-syntactic difficulties. However, as demonstrated by the results of the EA-SCT above AEL also had difficulty understanding specific morphological and syntactic structures. This confirms an Expressive-Receptive Morpho-Syntactic Deficit.

At age 7;01 years, AEL was able to understand verb-less NP constructions. He responded correctly to all six sub-test items. For example, /əl-fustan mitwasax/ (the-dress dirty) *The dress is dirty* and /el-koba:ya maksura/ (the-cup broken) *The cup is broken.* The Sub-tests failed were for Transitive verbs, dual plurals, Aspectual Future, prepositions and embedded phrases.

With regards to Tense, AEL correctly identified the Past Tense and Aspectual Progressive for intransitive verbs. In addition, he correctly identified the negative and intransitive verbs with adjectives. The EA-SCT was also administered to the control Samira twice, once at 4;03 and a

second time at 7;01. When first tested Samira obtained a raw score of 38/42. The second time she was tested she passed all nine Sub-tests, obtaining the maximum raw score.

In addition, three other controls were administered the EA-SCT: Omar at 5;02 years, Ali at 4;01 years and Habiba at 4;01 years. AEL's results at 7;01 years are presented below with the results of the controls to allow for comparisons.

Table 5. 12 AEL and Controls Results of Sentence Comprehension Test Raw Scores

Name	Age	Raw Score
AEL	7;01	26/42
Samira	7;01	42/42
Omar	5;02	39/42
Ali	4;01	33/42
Habiba	4;01	38/42

The results cited above demonstrate that when compared with his peers AEL correctly identified fewer sub-test items than his age matched control. His Raw score was closest to Ali who obtained a Raw score of 33 when aged 4;01.

5.3.8 Psychological Testing at 7;01 years

AEL was given the Wechler Preschool and Primary Scale of Intelligence Revised (WPPSI-R) to test his non-verbal skills when he was 7;01 years. The WPPSI-R is a standardized battery of sub-tests grouped into two scales, the Verbal and the Performance.

It is used to assess a child's abilities to process and reason with a variety of verbal, visual and motor tasks. AEL's background is Egyptian Arabic and the test is normed on an American population. Some of the items were slightly altered, e.g. the word dollar was replaced with the EA word for pound /ginnih/. The vocabulary sub-test was not included as it can not be validly translated into Arabic.

Overall the investigator's experience of using the WPPSI-R with other Arabic speaking children is that it is a fair estimate of the child's functioning. In addition, AEL's responses were consistent in their content and across sub-tests, supporting the validity of this assessment battery. At 7;01 years AEL earned a Verbal Scale Score of 62, which falls in the deficient range and a Performance Scale Score of 73, which falls in the borderline range.

5.3.9 Summary

AEL is a child with developmental language impairment. His language was examined longitudinally for four years from the age of 3;01-7;01 years. Structured tasks and spontaneous language measures were used to detail and evaluate the range and types of errors that were characteristic of his impairment. Some errors were also observed in the control data whereas other errors were specific to AEL and characteristic of his language impairment. One of the first features of DLI exhibited by AEL was his slow lexical acquisition and his delay in combining words to produce phrases. When last recorded AEL's MPU had increased but remained lower than the controls. With regards to his functional analysis he used mostly labels and requests and few Intraverbals. AEL's utterances contained errors, and whereas the control's percentages of errors dropped with age AEL's errors fluctuated and up until the last recording remained high.

Verbs were an area of difficulty, and like the controls AEL used the default verb form. He produced fewer verbs than his controls and continued to have difficulty with verb agreement for gender and person and occasionally with number. His type token ratios revealed that while his verb lexicon increased, Morphological variance remained low. Although early on in the data AEL omitted Tense and Aspectual marking, at the end of the recording period this was not an area of difficulty.

AEL did not omit the definite article any more than the controls, however he continued to have difficulties with pronouns and prepositions which were omitted or substituted. Agreement errors with adjectives and nouns also continued to be a problem. With regards to his use of negative, he initially relied on the simpler default negative form and later on correctly used the discontinuous negative; his use of negatives was therefore similar to the controls.

The results support the importance of longitudinal case studies. AEL's pattern of errors do support a developmental language impairment, however AEL does not meet the criteria of SLI (Leonard, 1998) because his non-verbal performance IQ score at 7;01 years fell in the border line range. Despite this his language difficulties remained the predominant area of difficulty.

5.4 Case Study 2: MHB

5.4.1 Introduction

The subject MHB was followed from when he was 4;06-6;02 years. This included two recording periods, one at 4;06-4;08 years and the second at 6;02 years. The 18 month period between the two recording blocks provided a unique opportunity to explore the developmental trajectory of MHB's language acquisition and impairment. In the first instance, it was unique because MHB did not receive therapy between the two recording periods; therefore any changes were a result of developmental progression (natural recovery). The errors that continued to characterise his language when he was older are characteristic hallmarks of his impairment,

MHB's family history, medical history, linguistic context and the initial clinical assessment using the DLI checklist will be provided with the fulfilment of the criteria used to establish an initial diagnosis of EA-DLI.

The picture of cognitive, linguistic and behavioural strengths and weaknesses did change over time. He continued to have a language impairment (LI). When re-tested at 6;02 years his performance IQ score fell within the average range, thus fulfilling the requirement for SLI Non-Verbal Performance score criterion.

A summary of the results will be discussed in relation to the spontaneous language samples recorded and the specific structured tasks. Specific emphasis will be given to MHB's pattern of linguistic impairments that can be considered potential clinical markers of EA-DLI. Comparisons will be made with the non-language impaired children who served as age matched and language controls.

5.4.2 Socio-linguistic context

MHB (D.O.B 14/10/1994), is the only child of Egyptian monolingual Arabic speaking parents, who lives at home with his mother and father. His parents are both University graduates. There socio-economic sphere is lower middle class. There is no known history of physical or emotional abuse and his home environment is supportive. The family history is negative for speech, language and learning difficulties. MHB has been exposed to number of vernaculars by his parents and other members of the household, as well as English from cartoons and T.V.

5.4.3 Medical and Birth History

MHB was born full term at 40 weeks gestation by caesarean section. His hearing was tested when he was 4;05 years using Evoked Auditory Brainstem Response (EABR) and his hearing thresholds were found to be within the normal range. He has never been hospitalised and he has an unremarkable medical history. MHB has no history of Otitis media with effusion and there is no evidence of a seizure disorder or any other neurological dysfunction, e.g. cerebral palsy or brain lesions. His developmental milestones were achieved within the normal range except in the area of language, which was delayed. MHB therefore fulfilled the partial exclusionary criteria in the areas of hearing, psychological and neurological development to meet a diagnosis of EA-DLI (Leonard, 1998).

5.4.4 History of difficulties and initial assessment

MHB was first seen by the examiner when he was 4;06 years old. He was referred by his parents due to concerns regarding his behaviour and history of slow language development. He acquired his first words when he was aged between 2;00-3;00 years and he started to combine words at 3;00-4;00 years. When first seen for assessment he was not attending a

nursery. Following the initial assessment he was enrolled into an Arabic speaking class in a bilingual English-Arabic speaking nursery.

MHB was assessed through play in the clinic by the investigator when he 4;06 years. In addition, the DLI checklist was used to provide a base-line and initial identification of his DLI. None of the structured tasks were administered at this time due to both the severity of MHB's language impairment and his difficulties with compliance with adult instructions. For the same reason it was not possible to formally assess MHB's non-verbal intelligence. The non-verbal skills typically used to assess non-verbal intelligence such as puzzles, block design cards, and matching were all skills MHB demonstrated. He therefore fulfilled the exclusionary IQ criterion that his non-verbal skills were more developed than his language skills (Leonard, 1998).

Following the initial observational assessment he received a course of Parent Child Interaction Therapy, which was when data collection was initiated. This was once per week for six weeks. MHB was recorded with his mother during these sessions. Each recording lasted 15 minutes in duration. In addition, MHB was recorded twice with his teacher at nursery, each session was for 30 minutes. MHB's parents discontinued therapy after the parent child interaction sessions. MHB was reassessed in December 2000, when he was 6;02 years due to concerns from his school. He received a full psychological assessment in addition to a speech and language therapy assessment.

5.4.5 Clinical description based on the initial assessment: verbal and non-verbal language skills at 4;06 years

MHB's language abilities were assessed informally through play and observation. His language was the most affected area and an Autistic Spectrum Disorder was ruled out. This

therefore fulfilled the exclusionary SLI criteria (Leonard, 1998) of no symptoms of impaired reciprocal social interaction or restriction of activities.

MHB's language was assessed using structured error analysis of spontaneous speech. No structured tasks were administered during the initial assessment period. The presence or absence of linguistic and non-linguistic features identified on the DLI check-list are summarised below:

Attention and Play Skills

MHB's attention and listening skills were inconsistent and depended on the activity. He stayed with toys of his own choosing for up to 20 minutes and he demonstrated relational play skills with the miniature dolls. He showed limited sequences of imaginary play which was reflected in his use of language. He was able to express a two sequence idea in his play. His play skills were delayed and more typical of a child aged between 3;06 to 4;00 years.

Expressive and Receptive Language Skills

At 4;06 years, MHB's understanding of spoken language was severely impaired. When given 10 pictures of every day objects (Winslow Noun pictures), he was able to select and label one out three named pictures. He was inconsistent in his ability to understand simple requests at a two word level. He was unable to identify objects or pictures by colour, size, or locate them by prepositions. He was unable to select one named picture out of three pictures of verbs.

His expressive language skills were also impaired. He used short phrases of two to three words. His use of adjectives, nouns, prepositions, verb phrases and inflectional morphology were limited. Difficulties with lexical retrieval were also noted. His language was characterised by morphological errors, e.g. agreement errors, substitutions and additions, in addition to

errors with syntax, due to lexical omissions and word order errors. In addition, he produced utterances that were un-analysable for function and disordered in their structure and use.

Articulatory speech skills were not an area of concern. MHB was able to blow, suck and execute a range of tongue movements (depression, elevation and lateral movements). No articulatory or verbal dyspraxia was identified.

Therefore at 4;06 years, MHB met all the exclusionary criteria set by Leonard (1998) and he was diagnosed with a developmental language impairment.

5.4.6 Education and Therapy Provision

From 4;06 to 5;02 years MHB attended an English-Arabic medium nursery. He received therapy in Arabic from when he was 4;06–4;08 years. Direct therapy was then discontinued due to the family's difficulty attending the clinic and indirect support was given to his nursery teachers. It was for this reason that data collection was postponed. MHB transferred to a mainstream school when he was 5;08 years. The language of instruction was predominantly Arabic with some English in accordance with the Egyptian National school curriculum. He was seen again at the clinic for an assessment when he was 6;02 years.

5.5 Methodology

The methodology is outlined in Chapter 3. Both spontaneous language measure analysis and specific structured tasks were administered to MHB. There were only two recording periods once at 4;06-4;08 years and the second at 6;02 years.

5.5.1 Specific analytical procedures: spontaneous language measures

In order to explore the developmental trajectory of his language acquisition and impairment the following spontaneous language measures and analysis were undertaken.

(A) Spontaneous language sample analysis:

- *Mean Morphological Units Per Utterance* (MPU) were calculated for the two recording periods.
- *A Functional Analysis* was conducted to establish the range of utterance types produced by MHB for the two recording periods. These were further analysed to establish error patterns and were compared with the controls.
- *Error analysis for Morphological and Grammatical Errors*- MHB's spontaneous language was analysed for salient morphological errors and percentage of utterances with errors were calculated for each of the two recording periods.
- *Lexical analysis for spontaneous use of verbs*: For the entire corpus all verbs produced were tabulated and analysed according to types of errors, and Aspect/Tense use. This allowed for the total number of verbs to be calculated. In addition, the verbs were analysed according to whether the errors were with (a) Tense and agreement (b) agreement only or (c) verb vocalic paraphasias. Further, type token ratios were calculated to assess lexical learning and development of verb types and tokens.

- *Grammatical and morphological analysis*: The most salient morphological errors produced by MHB were documented and compared with those produced by the controls. The aim was to determine the morphological pattern of errors that may be specific to EA language impairment. The following morphological categories were examined.

    1. Use of plurals and the dual

2. Use of negative particles
3. Use of the definite article
4. Use of prepositional concepts
5. Use of bound and free pronouns
6. Use of adjectival agreement

(B) Structured tasks and assessments administered

The experimental procedure for each of the structured tasks is detailed in Chapter 3. The DLI checklist was administered once when MHB was first seen at 4;06 years.

The following structured tasks were administered to MHB during the second recording period.

- The Egyptian Arabic Renfrew Action Picture test was administered once when MHB was 6;02 years.
- The Egyptian Arabic Sentence Comprehension Test was administered once when MHB was 6;02 years.

5.6 Results

The results of MHB's pattern of language impairments will be divided into three sections, (1) Spontaneous Language Analysis, (2) Structured Tasks, and (3) Psychological Assessment results when he was 6;02 years old. A summary of findings will be discussed at the end of this section. Comparisons will made between MHB and the non-language impaired controls who served as both age and language matched controls.

5.6.1 Results of Spontaneous language analysis

Eight spontaneous language sample video recordings were made when MHB was 4;06 to 4;08-years-old and two recordings were made at 6;02-years-old. The recordings were divided into two analysis periods. The data base comprised of a total of 238 utterances. The following table is a summary of his age during the recording periods, the number of spontaneous utterances produced during this period, the percentage of utterances with errors produced and the MPU for each period.

Table 5. 13 Summary of results for MHB: Number of utterances produced, Percentage of errors and MPU values.

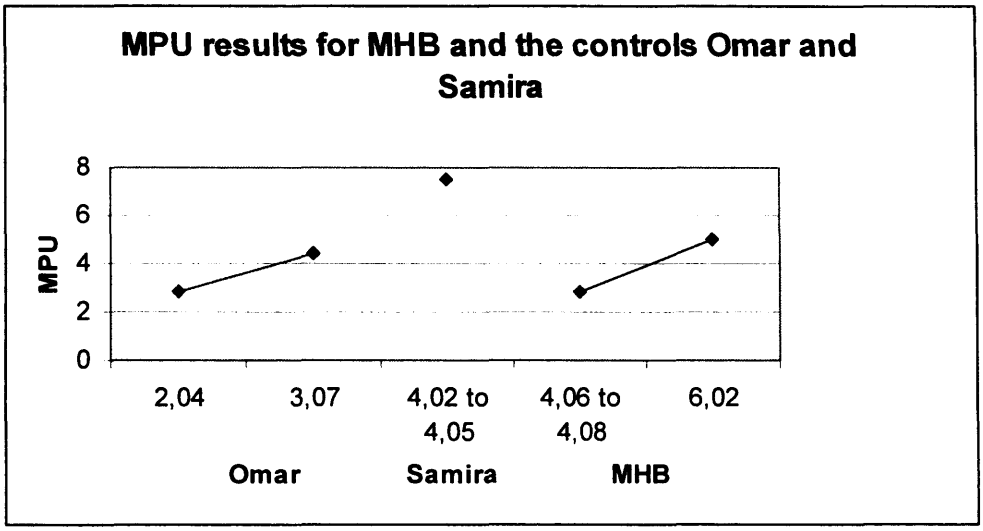
Age	**Number utterances**	**Number with errors**	**MPU**
4;06-4;08	154	88.31%	2.85
6;02	84	58.33%	5
Total	238	-	-

5.6.2 Analysis of MPU Results

Two MPU scores are provided for MHB. At age 4;06–4;08 his MPU was 2.85, later at 6;02 his MPU was 5.00. The MPU scores are felt to be accurate representations of MHB's lexical and morphological acquisition. The difference between his MPU values in the 18 months between the two recordings was 2.15. This rate of increase is within the expected rate of development, but much later when compared with his peers. MHB's MPU values are demonstrated in Figure 5.4 and the rate of progression can be seen in the incline on the graph. When compared with the longitudinal controls— for Omar, the difference between

his MPU values when aged between 2;04 -3;07 was 1.56. For the control Dudu, between the age of 2;03 and 3;07 the difference between his MPU values was 1.25.

Figure 5. 4 MPU results for MHB and the controls



In addition, when compared with the controls, higher MPU values would be expected at 4;06-4;08 and at 6;02 years. At 4;04 years Samira's MPU was 7.5, compared with MHB's MPU value of 2.85 when he was aged between 4;06-4;08 years (see Figure 5.4 above). The longitudinal control Omar had an MPU value of 2.84 when he was 2;04 years and an MPU value of 4.40 when he was 3;07 years. Thus MHB's MPU values are significantly below the expected range for his age. Difficulty with morphological acquisition is a characteristic feature of MHB's language impairment.

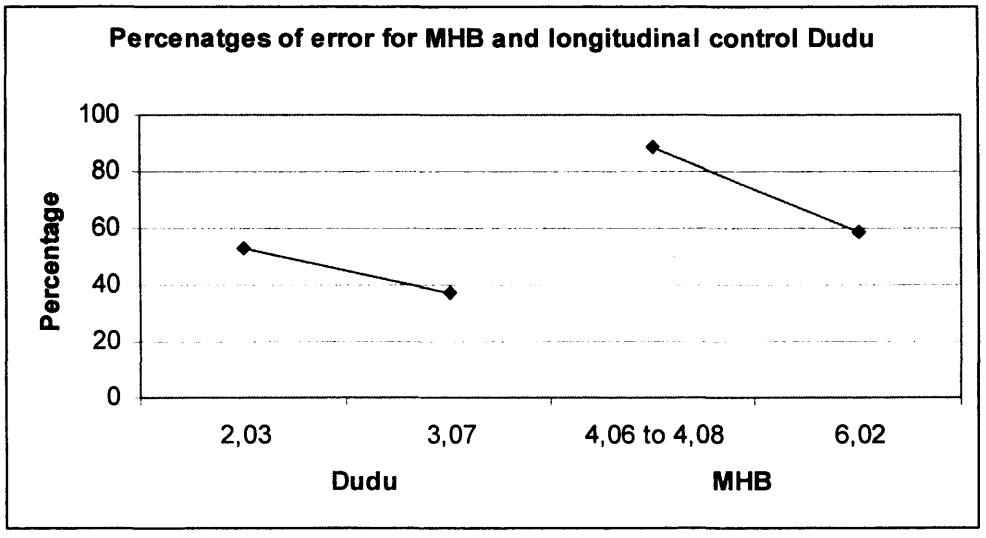
5.6.3 Percentage of utterances with errors

MHB's percentage of errors was a diagnostic characteristic of his language impairment. Despite the percentage of errors reducing, when compared with the controls, it remained high. In chapter 4, the spontaneous language sample analysis revealed that for the longitudinal controls, there is a direct relationship between higher percentages of errors and

morphological acquisition bursts. Since there are only two recording periods for MHB it is not possible to determine whether the relationship between high error patterns and morphological acquisition bursts would hold.

The graph (Figure 5.5) below is a visual representation of MHB's percentage of errors compared with the longitudinal control Dudu. Even though MHB's percentage of errors does decrease over time he still produces more errors at 6;02 years than Dudu produced at 2;03 years.

Figure 5. 5 Percentage of errors produced by MHB and the longitudinal control Dudu



5.6.4 Functional Analysis of Utterances

The results of the functional analysis revealed that Tacts and Others were the type of utterances used the most by MHB, for both recording samples. Intraverbals and Echoics were the least types of utterances produced. This supports MHB's receptive language difficulties, in addition to his difficulties using language expressively to narrate or label events that are not in his immediate environment.

Intraverbals include the ability to answer Wh- questions and require auditory cohesion and abstract reasoning skills. Table 5.14, below shows the distribution of MHB's functional use of utterances for the two recording periods.

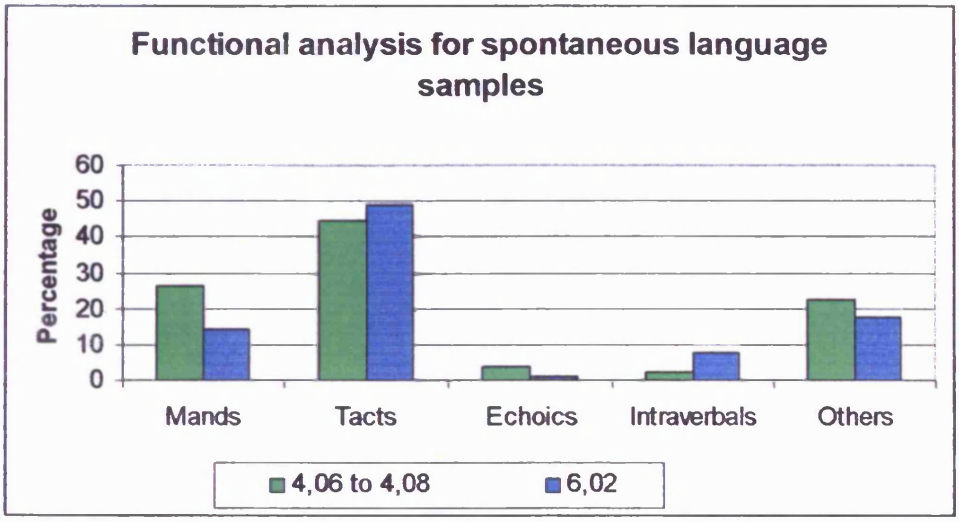
Table 5. 14 Functional Analysis of Utterances Produced by MHB

Age	#utterances	Mands	Tacts	Ec	IV	Disordered LP/RP
4;06–4;08	154	26.66%	44.66%	4%	2%	22.66%
6;02	84	14.29%	48.81%	1.19%	7.86%	17.86%

A distinctive feature of MHB's language impairment was his use of Learnt Repetitive Phrases (LP/RP) and Disordered Utterances which are sub-categories, coded under Others (i.e. Disordered and LP/RP). LP/RP were rarely observed and Disordered Utterances were never observed in the speech of controls, both are considered characteristic features of MHB's language impairment.

MHB attached Learnt/Repetitive Phrases (LP/RP) to utterances. The function of the LP/RP could not always be determined and were rarely produced in isolation. MHB produced long strings of lexical items which could not be analysed for function and were coded as Disordered. These were used either when there were breakdowns in his receptive language or they were interspersed within the discourse and their function could not be determined from the language context. It was the high incidence of disordered utterances that lead to his high percentage of errors (Table 5.14), as cited in the above section.

Figure 5. 6 Functional Analysis for MHB's utterances at 4;06-4;08 and at 6;02 years



Although the control children also produced Others, the types of utterances they produced were significantly different and the rate was much less than those produced by MHB. Three of the controls produced one utterance that was coded as Others: Omar (1 No Referent), Kenzy (1 No Referent) and Ismail (1 Neologism).

Dudu produced the greatest number of utterances that were coded as Others. Table 5.15 below compares MHB's distribution of utterances with those produced by the longitudinal control Dudu and the cross-sectional control Samira. When aged 2;03 years, 5 of Dudu's utterances were Others and at 3;07 two utterances were coded as Others. When compared with the controls Dudu's use of Others were the highest. However, when MHB's production of Others are compared with Dudu's, there are quantitative and qualitative differences.

Table 5. 15 Comparing MHB's Functional Use of utterances with the control Dudu and Samira

Utterance Function	MHB at 4;06-4;08	MHB at 6;02	Dudu at 2;03	Dudu at 3;07	Samira at 4;04
Others	22.66%	17.86%	12.5%	10.20%	0%
Mands	26.66%	14.29%	37.5%	34.69%	50%
Tacts	44.66%	48.81%	50%	34.69%	25%
Intraverbals	2%	7.86%	0%	10.20%	25%
Echoics	4%	1.19%	0%	10.20%	0%

When Dudu's and MHB's utterances are compared a different pattern of use is observed. 154 utterances were recorded when MHB was aged between 4;06-4;08; of these, 34 utterances were coded as Others (22.07%). Later at 6;02, 15 of MHB's utterances were coded as Others (17.88%). Four of the seven utterances produced by Dudu were Neologisms, two were Learnt Phrases and one was where there was no referent. Dudu did not produce disordered sentences characterised with lexical and morphological omissions. In addition, unlike MHB, Dudu's use of LP/RP, were functionally appropriate to the context and were never attached to another phrase, as observed to be the case for MHB. A detailed discussion of the control children's use of Others is discussed in Chapter 4. Examples of utterances produced by MHB will used to illustrate his use of LP/RP, Neologisms and Disordered Utterances.

5.6.4.1 Learnt/Repetitive Phrases (LP/RP)

MHB used Learnt Repetitive Phrases and attached them to utterances when he was labelling an action or an item. This is a-typical. When the control children were observed using LP/RP they were used in isolation and were in response to a comment directed by the adult. Three examples will be used to illustrate MHB's use of LP/RP. The LP/RP are underlined to enable the transcription easier to read.

Example 1

Context: MHB was playing with his mother in the clinic play-room. They were playing with toy farm and miniature animals. MHB placed a doll on top of the horse and his mother asked him a question. He responded correctly, labelling the boy, but added a LP/RP to the label.

29/05/99#112	*Adult:* /min rakib əl-ħosan?/ Who is riding the horse? *MHB:* /əl-wallad Tayyib/ Def.Art.the-boy good then *The boy good then*

Example 2

In this example, MHB used two LP/RP, both of these were used in other utterances in the sample. The LP/RP /la:kin/, would be similar to using "*but if*" at the beginning of a sentence in English. In EA, it should be produced with either a bound pronoun clitic or the object which MHB omitted. In addition, the Aspectual marker /ət-/ for the Past Participle was also

omitted. The LP/RP/maʕul/ is also used for emphasis, the root ʕQL, comes from ʕaql *mind.* Its use in English would be like saying *"Can that be true".*

Context: MHB was playing with his mother in the clinic play-room. He picked a toy car up that was broken. His mother had not said anything or asked MHB a question. She was seated next to MHB on the floor.

22/05/99#99	/la:kin ø kassar maʕʔul kassar/ oh but Part.-broke can that be true Part.-broke *Oh but broke can that be true broke*

Example 3

This is another example where MHB attached a LP/RP having labelled his play actions. The LP/RP/miʃ maʕʔul da/ would not be expected to be produced by a child or in this context. This phrase would be used by adults when an event has occurred that the adult refutes or disagrees with. It is therefore used with agitation which is evident by the intonation. The same intonation was used by MHB. The equivalent in English would be similar to the expression. "That cannot be true" or "I don't believe it".

Context: In this example MHB was looking for the toy horses that he was playing with. He looked inside the farm house. When he found them, he produced the utterance.

16/12/00#4	/əl-ħissina fi:n humma hinna guwa miʃ maʕ?ul da/ Def.Art.the-horse-plu where Masc.plu.-they here in that cannot be true *Where are the horses? Here they are inside I don't believe it*

5.6.4.2 Neologisms

Neologisms were frequently used by MHB during the first recording sample and were used less frequently in the second recording. It was difficult to establish the intended meanings or use of the Neologisms (Examples 1 and 2). On one occasion, however, when MHB used a Neologism (Example 3) he explained its meaning to the investigator which provided an interesting insight into his understanding syntax. When compared with the controls, they too used developmental Neologisms. When compared with MHB there is a difference in their use. For the controls these novel words were used with consistency and their meaning could be ascertained from the context, consequently the adults interacting with controls also used these forms and for this reason the word *developmental* precedes Neologisms. Only on one occasion when the control Dudu used a developmental Neologism was it not possible to establish the intended meaning from the linguistic or environmental context.

Examples 1 and 2

Context: MHB was playing with the investigator in the clinic play-room. The investigator was holding a bubble gun. To make bubbles a lever has to be turned around. MHB produced the first utterance, but the adult did not understand what he wanted. He then produced the second utterance where he verbally and non-verbally explained that he wanted the adult turn the lever round faster to produce more bubbles.

29/05/99#120	*/ʔixdini ya Tant/ Neologism oh Auntie
29/05/99#121	*/yalla ʔifiki:ha ʕalla yalla lif lif kidda/ come on Neologism on come on turn turn like this *Gestures turning lever around*

5.6.4.3 *Examples of Disordered Utterances*

MHB produced utterances that were coded as Disordered. They were semantically non-contingent, in that they could not be understood. At times they were syntactically well formed but the content was meaningless, other times they were neither semantically nor syntactically well formed and could not be analysed for form or function. Examples will be used to demonstrate different types of Disordered Utterances produced by MHB.

Example 1- In this example, the utterance is syntactically well formed, but semantically and pragmatically incorrect.

Context: MHB was seated at the table with the Psychologist and he was being assessed. She was showing him pictures from one of the test books.

16/12/00#13	*/ʔiwʕi təlimi:hum ʔaʃa:n xatri walla yəhimik əs-so:t baʔa/
	Don't you dare pick them up for my sake or the sound will bother you ok

Example 2- In this second example, the utterance is produced free of syntactic and morphological errors but pragmatically was non-contingent.

Context: MHB was seated on the floor playing with his mother. They were playing with a train set which consisted of miniature dolls, trains, train tracks and small accessories. The utterance that immediately preceded this example was produced by MHB, and was a description of what he was doing with the dolls. He was not therefore responding to a comment from the adult when he produced the Disordered Utterance, below.

16/04/99#16	*/ʔanna miʃ ʔa:dir əl-mattar ʔattaʕ əl-lamba/ I Neg.-not can Def.Art.-the-rain Past.-cut-2nd Masc.Sing. Def.Art.-the-light-bulb I can't take it the rain cut the light bulb

Example 3- This third example is an example of a Disordered Utterance that is un-analysable for form and content (17/04/99#7). The utterances before and after are also provided, which both contain morphological errors.

Context: MHB was in the clinic play-room with his mother. They were seated at a table playing with play-dough, which MHB had requested to play with.

17/04/99#6	*/ʕagina ʔimsik ʕagina busi neʃmil bi:t/ dough Imp.hold-2ndMasc.Sing dough Imp.look-2ndFem.Sing. Imperf.do-4thPlu house *Dough hold it dough look let's do a house*
17/04/99#7	*/si:bik a: momkin nutxul əʃmil a:/ *Disordered Utterance* leave-you.Sing.Masc. yes can we-go-in Imp.do.Masc.Sing. yes *Leave you yes can we go in do it yes*
17/04/99#8	*/busi [6]### di ### neʃmil/ look-1[s] Fem.Sing *jargon* this-Fem.Sing. Imperf.do-4thPlu. *You look this let's do*

To summarise, MHB's functional use of utterances did not follow the normal pattern of development. The utterances most used were Tacts and Others, with Intraverbals and Mands used the least. The high incidence of Others was a result of the Disordered Utterances and Learnt/Repetitive Phrases produced, and were a characteristic feature of MHB's language impairment.

5.6.5 Lexical Analysis: spontaneous use of verbs

MHB produced a total number of 128 verbs for 238 utterances. Total verb production was significantly less than would be expected, and when verbs were produced they were produced with errors. Verb production between the age of 1;00-3;00 years is approximately 20% (Karam El-Din, 1990).

As hypothesised morphological errors related to verb number, gender and person agreement was more frequent than errors related to Aspectual marking and Tense. In addition, vocalic paraphasias, were also present in the first sample.

Table 5. 16 Summary of Verb productions and analysis for MHB

Age	Total number of utterances	Total number of verbs	Percentage of correct verbs produced	Percentage of verbs produced with incorrect Tense/Asp. and agreement	Percentage of verbs produced with correct Tense/Asp but agreement errors	Percentage of vocalic paraphasias
4;06-4;08	154	97	44.33%	8.25%	40.21%	7.22%
6;02	84	31	77.42%	0%	22.58%	0%
Total	238	128	-	-	-	-

5.6.5.1 Tense and or Aspectual Errors

MHB was observed to omit morphemes marking Tense and Aspect which resulted in a simpler form, the default verb form. MHB used this form when he was aged between 4;06-4;08. The controls used the same form, but when they were much younger. For example,

[6] ### is used when jargon is produced that can not be transcribed

Ismail 2;08 produced /ʕayiz ʔitlaʕ/ I- want 2ndMasc.Sing. go-up, the target: being /ʕayiz ʔatlaʕ/ I-want 1st.Masc.Sing. go-up.

MHB's use of the default verb form was not a characteristic feature of his language impairment as it was also produced by the non-language impaired children. Although present in his data the frequency was not high, as indicated by the low percentage of errors related to Tense and Aspectual Marking. In addition, similar to the controls MHB correctly used the Perfective for regular and irregular forms. His use was similar to the control Sherif, who at 3;03 years also used the Perfective, but produced errors with agreement.

Example 1 -In this example MHB used the Past Tense in place of the Progressive Aspect, he also produced an error with Person agreement. He used the 3rd Person Masculine singular in place of the 1st Person Masculine singular.

Context: MHB was playing in his class-room at the nursery with a plastic horse. He wanted to ride the horse, as he approached the horse before mounting he produced the utterance below. His teacher and the investigator were also present in the room.

22/05/99#71	*/rikib/ Past-rode-2nd.Masc.Sing He rode
Target	/ha-ʔarkab/ Asp.Prog.-ride-1st.Masc.Sing I am going to ride

Example 2 -In the example below, MHB used the Default Form in place of the Progressive Aspect.

Context: MHB is playing with his mother with Play-mobile toys in the clinic play-room. The toys comprised of dolls of a mother, a baby, a girl, a boy, a push chair and a play-ground. He places the baby doll in the push chair and then makes the mother doll push the push chair. Commenting on his actions he produced the following utterance.

18/05/99#99	*/mama zuʔ be:bi/ mum Imp.Stem-push-2nd.Masc.Sing baby *Mum push baby*
Target	/ mama bə-t-zuʔ əl-be:bi / mum Prog.Asp.-3rd.Fem.Sing. Def.Art-the-baby *Mum is pushing the baby*

5.6.5.2 Agreement errors for Gender, Number and Person

MHB produced errors with gender, number and person agreement. Errors with Gender and Person agreement were present in the control data, however, errors with number agreement rarely occurred. MHB showed awareness of his errors and at times attempted to self-repair or correct what he was saying. He was observed to produce utterances where he repeated a verb, but he also used more than one verb token for the same root (e.g. 22/05/99# 108 and 17/04/99#54). Consequently, he produced errors for agreement, gender and number.

Example 1- This is an example where MHB produced errors with number, person and gender agreement. The target verb form is /ħottili/ 2ndFem.Sing. *put-for-me.* Instead, MHB produced two varieties 2nd.Plu.put-me/ħotuli/ and /ħotu/ 2nd.Plu.put. The /-li/ is the pronoun clitic meaning *me.*

Context: MHB was in the clinic play-room with his mother. They were playing with water. There was a bottle of drinking water on the floor and a cup. He picked the cup up and asked his mother to pour water into the cup.

22/05/99# 108	*/ħotu:li ħotu ħotuli/ 2nd.Plu.put-me 2nd.Plu.put2nd.Plu.put-me Put for me put put for me
	/ħottili/ 2ndFem.Sing. *put-for-me* *Put for me*

5.6.5.3 Vocalic Paraphasias and verb related morphological addition errors

A characteristic feature of MHB's language, were his productions of Vocalic Paraphasias. Syntactically, they took the position of Verb Phrase, the root is salient and corresponds with the intended meaning. It is the insertion of additional morphemes that lead to the production of the Vocalic Paraphasia. In the first sample seven verb Types were produced that were

coded as Vocalic Paraphasias. These also included verbs where an incorrect morpheme was added that did not match the selected vowel pattern (see 17/04/99#54 below).

Example 1- In this first example, the root of the verb is ʕML *make/do*. MHB was requesting an action from the adult. He wanted the adult to make a ball. MHB's ability to self- correct or repair his utterances was observed, as in Example 22/05/99#108 above. When attempting to produce the target Imperative Verb Phrase/əʕmilili/, 2ndFem.Sing.-do, meaning do-for-me; MHB produces two varieties/neʕmil/ and /neʕmili/. The first form is the Imperfect /neʕmil/ we-do and is repeated. For the second form he repeated the first production and added the morpheme /-li/ which is used to mark the pronoun clitic *me*.

Context: MHB was seated at a table with his teacher, they were playing with play-dough. MHB wanted his teacher to make a ball for him using the play-dough.

17/04/99#54	/neʕmil neʕmil *neʕmili ko:ra/ 4th.-do 4th.-do 4th-do-Pronoun-me we do we do we-do-me
Target	/əʕmilili/

5.6.5.4 Verb Type Token Ratios, Omissions and Substitutions of Verbs

MHB often omitted verbs where their use was obligatory in the utterance. In addition, he used GAP verbs such as /ʔiʕmil/ *do* and /ħot/ *put* when a more specific verb was required. This was also observed in the language productions of the younger controls but less

frequently. There was a discrepancy in his verb lexicon which did not follow the normal developmental pattern. He used semantically related verbs, such as /bus/ *look*, ha-ʔatfarrag/ *I-will-watch* and /warilak/ *show-you*; yet he did not use high frequency verbs which would be expected to be produced at 4;00 (Karam El-Din, 1990), e.g. /not/*jump*, /ʔa:kul/ *eat* and /ʔaʃrab/ *drink*.

Tokens of morphological productivity were calculated for the two recording periods. Verb Tokens had already been calculated in the previous verb analysis section, (see Table 5.16) that is the total number of verbs produced for each of the two samples.

Two additional analyses were computed. The first was to calculate how many verb types were produced for a given sample, in order to establish verb lexical acquisition. The verb type in EA was taken as the root of the verb. The second was to account for morphological development and acquisition, i.e. Morphological variance. The expected pattern of development would be that as age increases the values for tokens would approximate those for types. Thus as the child acquires more verb roots and develops an understanding of morphology, Morphological variance will also increase.

For example, when aged between 4;06-4;08 MHB produced 97 verb Tokens, of these there were 33 Verb Types (different roots), of the 33 Verb Types (roots) 3 verbs were produced with two or more different morphological patterns .

Table 5. 17 Summary of the MHB's Type Token ratios and Morphological Variance.

Age	# utterances	Verb Tokens	Verb Types	Tokens of Morphological Variance
4;06-4;08	154	97	33	8
6;02	84	31	22	3

From table 5.17 above, it may appear that Morphological variance became less as MHB became older, and to some extent this was true. But in the first sample his Morphological variance was mostly with GAP verbs such as /sib/leave, /bus/ *look*, /ħot/*put* and /ha:t/*give*, and they were often produced within the same utterance when he was repeating a verb form as cited in the examples above (Example 22/05/99# 108).

In the second sample Morphological Variance was with specific target verbs, e.g. /ul/ *say* and /ʕilħas/ *lick*. In the first recording sample, verb types were repeated using the same morphological form, which led to the discrepancy between Verb Types (33) and Tokens (97).

An additional factor which must be considered when examining the verb Types across the two samples is that firstly more utterances were recorded. Secondly, in the first sample MHB was recorded playing with his mother, teacher and the investigator with a variety of play materials. In the second sample, although MHB was recorded with the investigator and the psychologist, the play materials he was exposed to were not as a variable and would therefore affect the variety of verb types that could be elicited.

To summarise, MHB's use of verbs was less than would be expected for his age. He did not have difficulty with verb Tense or Aspectual marking, but continued to have difficulties with agreement for gender, number and person, which by 4;04 years was not an area of difficulty for the controls. His earlier errors with Tense and Aspect were similar to those produced by

the controls. MHB used GAP verbs where a more specific verb was required. He repeatedly used the same verb Tokens and his Morphological Variance was restricted. In addition, his verb lexicon included verbs that were semantically related and abstract, yet when he was required to use high frequency verbs he substituted the specific verb with a GAP verb.

5.6.6 Grammatical and Morphological Error Analysis

MHB's language was characterised by grammatical and morphological errors. A significant difference between MHB and the language and age matched controls was that not only did more of his utterances contain errors, but each utterance contained more than one error.

In this section a description of the morphological and lexical errors that occurred will be described. The errors were due to either- (1) omissions of obligatory morphological and lexical structures, e.g. omissions of prepositions and noun phrases; (2) agreement errors for adjectives and nouns; or (3) errors where one morpheme was substituted for another, e.g. the feminine pronoun /da/ this-Fem. is substituted for /di/ this-Masc. Many of the errors produced by MHB were also observed in the productions of the controls. It was the higher frequency of errors that differentiated MHB from the controls. There were few differences and these will be discussed below.

5.6.6.1 Plurals and the Dual

Nouns in EA form their plurals either by suffixation, or by an internal change to the word. The suffixed plural is formed by the affixation of a plural suffix to the singular form. Most of the errors MHB produced corresponding to plurals and dual were similar to those produced by the control children. At times to express plurality MHB repeated the noun rather than using the morphology for plurals. This was not observed as a default strategy employed by the non-language impaired controls although it was observed in the other language impaired

subjects. Other errors observed were the use of singular nouns in place of plurals, although the reverse was not observed.

Examples of errors using plurality and the dual:

Utterance code	Age	Phonetic transcription and coding
17/04/99#16	4;06	*/ragil ragil ʔiroʔsu bi hum/ man man Imp.-dance-2ndPlu. with them *Two men you dance with them*
22/05/99#89	4;07	*/xorum xorum xorum/ hole hole hole *holes*
14/12/00#37	6;02	*/ʕandi ʕarabeyya tanyin kitir ʔawi/ I-have car others lots very *I have other car lots* Target: /ʕandi ʕarabeyyat tanyin kitir ʔawi / *I have other cars lots (of them)*

5.6.6.2 Use of the negative

MHB had difficulty expressing the negative when the discontinuous negative form /m..ʃ/, was required. In addition, he over-used the lexical items /miʃ/ *not* and /laʔ/ *no*, as default forms which was seen in younger children acquiring EA. He used the discontinuous negative both correctly and in error during both recording periods. His error pattern is interesting as it implicitly demonstrates an understanding of morphological boundaries.

His productions resulted in words with one of the discontinuous morphemes without the other. This was rarely observed in the control children acquiring EA. These were not reported in the language of Arabic aphasic adults (e.g. Mimouni and Jarema, 1995). Below are examples of errors and correct use of the negative and discontinuous negative.

Utterance Code	Age	Phonetic Transcription and Coding
22/05/99#125	4;07	/lakin ma-ʕamalnaʃ kullu/ but Neg.Part-1st Plu.do-Neg.Part all-of-it But we did not do all of it
17/04/99#2	4;06	*/namu miʃ ʕaʕa:n ye-namu/ 3rd Plu.Perf.sleep not because Imperf.to-sleep Target :/ma-namu- ʃ/ *The did not sleep* Uses /miʃ/ in place of /ma..ʃ/
08/05/99#41	4;06	*/miʃ fi laban laban/ Not there milk milk Target: /ma-fi-ʃ laban/ *There is no milk*

14/12/00#13	6;02	*/ ʔanna miʃ waklu ba-ʔalħasu/ I Neg.not Moph.Par.-eat Asp.Hab.1stMasc.Sing.-lick I not vocalic paraphasia I lick it Target: /ma-ba-ʔakol-hu-ʃ/ *I do not eat it*
14/12/00#20	6;02	*/ ʕaʃan ma-netbali-ʃ ø neʕmiliʃ ø nafsina maneʔmilʃ ɣalTa/ conj.-because Neg.Part-we-wet-Neg.Part. ø do ourselves Neg.Part-we-do-Neg.Part. mistake Target: /ma- neʕmili-ʃ/ *we do not do* / ʕaʃan ma-netbali-ʃ ma- neʕmili-ʃ ʔalla nafsina maneʔmilʃ ɣalTa/ *So we don't get wet, we don't wet ourselves, we don't make a mistake.*

5.6.6.3 Use of the definite article

MHB's correct use of and omission of the definite article was not significant and in the second recording his use was almost 100% correct with only one omission.

Table 5. 18 Use of the Definite Article

Age	Use of definite article	Omission of definite article
4;06-4;08	68.5%	31.4%
6;02	96%	4%

5.6.6.4 Use of Prepositions

Prepositions were difficult for MHB. He either omitted them when their use was obligatory, or he selected an incorrect preposition, or he used the pronoun /hinna/ *here*. This pattern of error was seen across the two recording periods. The examples below illustrate his use and difficulties with prepositions.

Utterance	Age	Transcription and coding
29/05/99#128	4;07	*/lakin maʃi ø əl-bi:t/ But Imperf.walk.3rdMasc.Sing. the house Omits preposition /lil/ *to* Target: /lakin maʃi lil əl-bi:t/ But Imperf.walk.3rdMasc.Sing. Prep.to the house *But he is walking to the house*

14/12/00#8	6;02	Adult: /ʕayyizha fin?/ *Where do you want it?* (the sticker) MHB: */ heyya bil kum kidda/ *It with sleeve like this* Substitution: /ʕalla/ *on* → /bil/ *with*
16/12/00#2	6;02	*/busi mayya ʕasa:kir/ Imp.look.2ndFem.Sing. water ø Plu.-soldier Look water soldiers Omits preposition /ʕalla/ and Def.Art. /-el/ Target:/busi mayya ʕalla əl-ʕasa:kir *Look water on the soldiers*

5.6.6.5 Omissions and Substitutions of Pronouns

MHB generally used pronouns correctly, but at times substituted or omitted them when their use was obligatory. The few errors observed were similar to those produced by the controls. In the first recording sample he produced errors with pronoun gender and number agreement and he over-used /di/ this.Fem.Sing and /da/ this.Masc.Sing, when a specific noun was required. The second sample was examined for pronoun use and analysed for the following:

1. Correct use of /di/ this.Fem.Sing., /da/ this.Masc.Sing. and/dol/ those
2. Correct use of personal pronouns, bound and free.
3. Gender substitution errors with /di/ this.Fem.Sing. and /da/ this.Masc.Sing.

4. Gender or number substitution error for personal pronouns, bound and free.

For the second recording few errors with pronouns were observed. 94% of bound and free pronouns were correctly used, only 4% were errors of substitution for personal pronouns and 2% were gender errors where /di/ →/da/ or /da/ →/di/.

This was an unexpected area of competency, as it was hypothesised that MHB would have difficulty with bound and free personal pronouns. It is also interesting that he did have difficulty with number, gender and person agreement for verbs, but not with number and gender agreement with pronouns.

To summarise, MHB demonstrated a specific pattern of grammatical and morphological use. He had difficulty with the discontinuous negative, prepositions, plurals and the dual, his errors were however similar to those produced by the controls. He correctly produced object clitics which is unlike the Arabic agrammatic adults (Mimouni and Jarema, 1996; Mimouni, Kehayia and Jarema, 1996) who were observed to omit object clitics. He also correctly used the definite articles.

5.6.7 Receptive Language: answering verbal reasoning questions

MHB had difficulties answering questions that required abstract verbal reasoning and this is reflected with his reduced use of Intraverbals (see Table 5.15 Functional analysis results). If a question was asked by the adult where the response was not something within MHB's environment, i.e. an Intraverbal, his response was coded as an Intraverbal, however, if the response did not correspond with the question this would be marked as an error. For example, if the adult asks, "Where is Daddy?" And MHB replies "At work", this would be

coded as an Intraverbal. If however, MHB replied "on the table", this would be coded as an error.

Two examples of MHB's language will be provided, which illustrate the difficulties MHB had with answering questions correctly, and confirm that MHB had difficulties with both his expressive and receptive language skills. The examples are taken from his assessment session at 6;02 years.

Example 1: 14/12/00#24

MHB partially understands the question and responds accordingly. He responds as though the question was *What do we do with money?*,

Adult: Why is it better to keep money in the bank? /lih ʔaħsan nexalli əl-filus fi əl-baŋkʔ/
MHB: */ʕaʃan niʃtiri fi leʕab/ Because Imperf.buy.4th Prep.in toy.Plu *Because we can buy toys with it*

Example 2: 14/12/00#26

In this example, MHB does not understand the question, his response is unrelated. He may have understood the question to mean, *Why is there no water?*, since his response is that the (water) [7]motor is broken.

Adult: What happens to water when it gets cold?

[7] Most flats in Cairo have water motors and these are referred to as /moto:r/ *motors* and not / moto:r *əl-mayya/ water motor.*

/ʔiili bi-yi-ʔiħsal lil mayya lamma be-te-ʔəbradʔ/
MHB: */ʕaʃan moto:r ba:z/ Because motor not-work *Because the motor is not working*

5.6.8 Analysis of the Structured Tasks administered to MHB

Two of the structured tasks were administered to MHB when he was 6;02 the results are presented below. The Egyptian Arabic Renfrew Action Picture Test and The Egyptian Arabic Sentence Comprehension Test.

5.6.8.1 The Egyptian Arabic Renfrew Action Picture Test (EA-RAPT)

The EA-RAPT was administered once to MHB, when aged 6;02. The first purpose of this structured task was to compare MHB's morphological and lexical development with the controls. Unlike the English version the EA-RAPT was not standardised, therefore age norms are not be provided. The maximum possible score is 40 Information and 40 for Grammar. Details on the morphological markers examined by the EA-RAPT and the testing protocol are discussed in Chapter 3. The scores were compared with three of the controls.

Table 5. 19 Results for the EA- RAPT were as follows

	Testing 1			**Testing 2**		
Name	**Age**	**Information**	**Grammar**	**Age**	**Information**	**Grammar**
MHB	6;02	29	33	-	-	-
Samira	4;03	34	34	7;01	39.5	38.5

Omar	2;07	11.5	13	3;11	30.5	33.5
Ali	2;10	19	9	-	-	-

The results of the EA-RAPT support MHB's spontaneous language measures and morphological analysis. His score for grammar was similar to the control Samira who was aged 4;03; his score for information was less. MHB omitted or substituted prepositions, which in the spontaneous language samples was also an area of difficulty. When he was required to use the dual he substituted it with the plural and he omitted conjunctions. He did not use the target verb types, although, he used the correct Aspectual and Tense marking for all 10 responses, he produced person agreement errors. Verbs requiring a prepositional phrase were the most problematic for MHB, for example picture 3 on the EA-RAPT (16/12/00RAPT#3).

Picture 3: What has been done to the dog? /əlli ħassal lil kalb?/
Target: /marbut lih əl-ʕamud (bil ħabl)/ He has been tied to the post (with rope) Gloss:
*/marbut ʕaʃa:n ma-yimʃi-ʃ yimʃi wə hinna rabit/ *Tied because he can not leave leave and here tie*

5.6.8.2 The Egyptian Arabic Sentence Comprehension Test (EA-SCT)

The EA-SCT was used to assess MHB's understanding of morphological and syntactic structures in EA. Test protocol and procedures are discussed in Chapter 3. The results were as follows:

Table 5. 20 MHB results for EA-SCT at 6;02 years

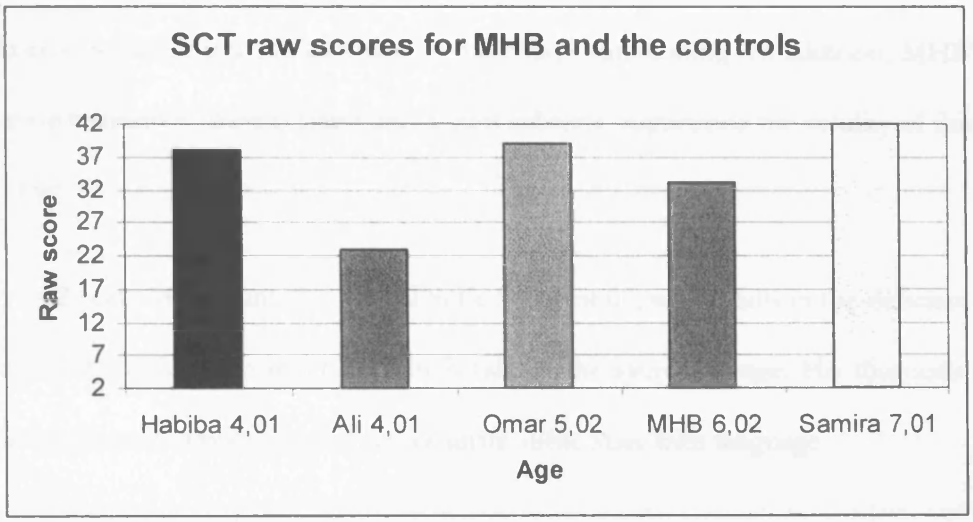
Sub-test	**Raw Scores at 6;02**	**Pass or Fail**
1.Noun-Adjective/Noun-Participle	6/6	Pass
2. Intransitive verbs	3/4	Pass
3. Transitive verbs	3/4	Fail
4. Intransitive +adjective	3/4	Pass
5. Dual	2/4	Fail
6. Past Tense	3/4	Pass
7. Future Aspect	3/4	Fail
8. Negative	3/4	Pass
9. Prepositions	3/4	Fail
10. Embedded Phrases	4/4	Fail
Total raw score	33/42	
Number of Sub-tests passed		3

MHB was able to understand verb-less NP constructions. He responded correctly to all six sub-test items. For example, /əl-fustan mitwasax/ (the-dress dirty) *The dress is dirty* and /el-koba:ya maksura/ (the-cup broken) *The cup is broken.* With regards to Tense, the scores are misleading; his errors were with selecting the incorrect object and not with Tense or Aspect.

The EA-SCT was administered to the control Samira, twice, once at 4;03 and a second time at 7;01.When first tested Samira obtained a raw score of 38/42. The second time she was tested she passed all nine Sub-tests, obtaining the maximum raw score, i.e. 42/42. At 6;02

years, MHB's raw score was 33/42. His results are presented below with the results of the controls to allow for comparisons.

Figure 5. 7 SCT Raw scores for MHB and four controls



The results cited above demonstrate that when compared with his peers MHB correctly identified fewer sub-test items than his controls. His Raw score was between Ali and Habiba who were both aged 4;01 years. The results of the EA-SCT identify and support MHB's difficulties with syntax and with negatives and plurals. Similar observations were noted during Psychological Testing and are described in the section below.

5.7 Psychological Testing: Non–verbal Results At 6;02 years

MHB had a formal assessment to test his non–verbal skills when he was 6;02 years using the Weschler Pre-School and Primary Scale of Intelligence- Revised (WPPSI-R). This is a standardised battery of sub–tests grouped into two scales, the Verbal and the Performance. It is used to assess a child's abilities to process and reason with a variety of verbal, visual and motor tasks. MHB's background is Egyptian Arabic and the test is normed on an American

population, some of the items were slightly altered, e.g. the word dollar was replaced with the EA word for pound /ginnih/. The vocabulary Subtest was not included as it can not be validly translated into Arabic.

Overall the investigator's experience of using the WPPSI-R with other Arabic speaking children is that it is a fair estimate of the child's functioning. In addition, MHB's responses were consistent in their content and across subtests, supporting the validity of this assessment battery.

At 6;02 years MHB earned a Verbal Scale Score of 67, which falls in the deficient range and a Performance Scale Score of 98, which falls in the average range. His diagnosis of EA-DLI was confirmed, supporting his predominant difficulties with language.

The Subtests that together form the Verbal Scale support MHB's receptive and expressive language impairment. For example, the Information Subtest assesses abstract verbal reasoning. MHB earned a score of 1 which was his lowest score; the responses required would be coded as Intraverbals. The results of the Functional Analysis of MHB's utterances have already demonstrated that appropriate use of Intraverbals was an area of difficulty for MHB. At 6;02 his percentage of Intraverbal use was 7.86%. His low score was due to his specific difficulty understanding language and his lexical retrieval difficulties. For example, when shown a group of pictures and asked in Arabic to point to the one that feels cold, /fin əl əs-saʔʕa law lamasna:ha/, the target being an ice-cream cone, he pointed to the picture of a coat.

MHB's performance was higher, falling in the borderline range, for tasks requiring abstract concept development and categorisation (Similarities Subtest), where he gained a standard

score of 7. He was able to identify the function of an object, but he could not name the category (i.e. describe how two words are similar) or describe the object (i.e. definition of a word), supporting his lexical retrieval difficulties. When he was unable to provide a target response he would respond with either a learnt/repetitive phrase or with a disordered utterance, both coded as Others.

MHB was more successful on the Subtests that were used to compute the Performance Scale. He performed well above average on the Picture Completion Subtest (Standard score 16) and the Object Assembly Subtest (Standard score 13).

Interestingly, his standard score on the Block Design Subtest (Standard score 5) was in the low average range. This sub-test assesses non-verbal abstract reasoning; in the absence of language it requires the child to analyze abstract patterns in order to produce them.

MHB also had significant difficulty with his ability to plan and execute a motor task with pencil and paper on the Geometric Design Subtest. His difficulties with planning and in fine motor control were also seen in the Mazes Subtest (Standard score 7).

In summary, the results of the psychological testing indicate that MHB is performing in the average range when compared to age peers on tasks which require perceptual skills, visual understanding and memory. In contrast, he had difficulty on fine motor tasks and with block designs. However, his greatest difficulties were with the understanding of questions requiring abstract verbal reasoning, and with naming verbal categories, due to problems with lexical retrieval. His verbal performance consequently was in the deficient range. The combined results support a diagnosis of EA-DLI, but also demonstrate that children with language impairment may also have a cluster of symptoms, language being the most affected. It is

interesting to consider whether the deficits of language contribute to poor performance on cognitive tasks, or whether there is a more generalised processing problem which affects cognitive tasks but language being the most affected. It is interesting that MHB had difficulty with Block Designs, which is typically reported to be an easier task for SLI children (e.g. Bishop, 1994).

5.8 Summary of Findings for MHB

MHB presents with a developmental language impairment that is supported by both formal assessments and spontaneous language measures and error analysis. The results of the psychological testing indicate that MHB is performing in the average range when compared to age peers on tasks which require perceptual skills, visual understanding and memory. However, his greatest difficulties were with the understanding of questions requiring abstract verbal reasoning, and with naming verbal categories. His verbal performance consequently was in the deficient range.

MHB demonstrated a specific pattern of grammatical and morphological use. He had difficulty with the discontinuous negative, prepositions, plurals and the dual. His errors were however similar to those produced by the controls. He correctly produced object clitics and he also correctly used articles.

His pattern of verb types did not follow the normal pattern of development and he produced fewer high frequency verbs than his controls. Morphological Variance for verbs was also reduced. MHB did not have difficulty with verb Tense or Aspectual marking, but continued to have difficulties with agreement for gender, number and person, which by 6;02 years should not be an area of difficulty. His earlier errors with Tense and Aspect were similar to those produced by the controls. MHB used GAP verbs where a more specific verb was

required. His verb lexicon included verbs that were semantically related and abstract, yet when he was required to use high frequency verbs he substituted the specific verb with a GAP verb.

MHB's functional use of utterances did not follow the normal pattern of development. He produced disordered utterances and Learnt/Repetitive phrases and he also produced neologisms and morphological paraphasias at a higher frequency than his controls. The utterances used the most were Tacts and Others, with Intraverbals and Mands being less used. The high incidence of Others was a result of the Disordered Utterances and Learnt/Repetitive Phrases produced, and were a characteristic feature of MHB's Language Impairment.

5.9 Case Study 3 NAD

5.9.1 Introduction

In this section the results are presented of the third language impaired subject, NAD. NAD was recorded from the age of 4;02 to 5;11 and is the only female language impaired subject. This section is divided into four parts. The first part is a summary of her (1) socio-linguistic context, (2) medical and birth history and (3) history of difficulties and the initial clinical impression that led to an initial diagnosis of DLI. The second part includes her educational history and the results of her psycho-educational assessment. The third part is a summary of the methodology specifically related to NAD. Finally, in the fourth part, the results of spontaneous language sample analysis will be presented followed by the results of the structured tasks. Specific emphasis will be given to NAD's pattern of linguistic errors that characterise her language impairment and comparisons will be made with the non-language impaired controls.

5.9.2 Socio-linguistic Context

NAD (D.O.B 19/11/1996) is the first born child to Egyptian parents. She lives at home with her mother, father and younger sister (D.O.B 19/01/02). Both parents are bilingual speakers of Arabic and French. In addition, her father is a speaker of English as a second language. The predominant home language is Arabic. The socio-economic sphere is middle class. There is no history of physical or emotional abuse and her home environment is supportive. Her younger sister is healthy. The family history is negative for language and learning difficulties.

5.9.3 Medical and Birth History

NAD was born full term with a normal delivery. There is no conclusive evidence of a seizure disorder or any other neurological dysfunction, e.g. cerebral palsy or brain lesions. However,

NAD did have a high fever with convulsions between the age of 13-18 months and again at 19-24 months. An Electro-Encephalograph (EEG) was done when she was 24 months and showed abnormal results. She was prescribed anti-epileptic drugs. She took the medication for one week after which her parents consulted another doctor who repeated the EEG, the results were normal and medication was stopped.

Her hearing was tested when she was 4;00 using Evoked Auditory Brainstem Response and her hearing thresholds were found to be within the normal range. NAD has no history of otitis media with effusion. Her developmental milestones were achieved within the normal range except in the area of language, which was delayed. NAD therefore fulfils the partial exclusionary criteria in the areas of hearing, psychological and neurological development to meet a diagnosis of DLI. (Leonard, 1998).

5.9.4 History of difficulties and initial assessment

NAD's parents first became concerned when she was 4;02 years and she was referred to the LRC for a speech and language assessment. At this time NAD's parents were concerned about her delayed language development and reduced attention span for adult-directed tasks.

Prior to being referred to the LRC, NAD had been attending a bi-lingual Arabic –French pre-school from when she was 3;02. When observed at the nursery compared with her peers her expressive use of language was significantly impaired. She was unable to memorise songs and had difficulty following instructions and initiating interactions with peers and adults. In addition, she was restless in class and had difficulty sitting for group activities. She had positive strengths in naming objects and a strong visual memory.

Her parents reported that at home she would engage in pretend play and could play on her own for up to 20 minutes. Her self-help skills were reported to be within the normal range. She had difficulty with sequencing and understanding concepts of time and was unable to tell a story. She was unable to describe to her parents what she had done at nursery or answer questions corresponding to past and future events.

She was assessed by the investigator when she was 4;02 and this is when data collection was initiated. Following the initial assessment she was referred to an Educational Psychologist.

The speech and language assessment results revealed a severe language and communication disorder, predominantly affecting her expressive and receptive language and pragmatic skills. At 4;02 NAD was seen by an Educational Psychologist. The assessment was discontinued after the administration of the first sub-test of the Weschler Preschool and Primary Intelligence Scale- Revised (WPSSI-R), due to NAD's limited co-operation. She was later re-assessed at age 4;08.

5.9.5 Clinical Description Based on Initial Assessment: verbal and non-verbal skills

NAD was first seen by the examiner when she was 4;02. She was assessed using the DLI checklist as part of the methodology described in this project. *The Childhood Autistic Rating Scale* (CARS: Reichler and Renner, 1998) was additionally used to assess NAD. An Autistic Spectrum Disorder was not identified on the CARS, which supports the exclusionary DLI criteria (Leonard, 1998) of no symptoms of impaired reciprocal social interaction or restriction of activities. NAD obtained a total score of 21 out of 60, which indicates non-autistic (a score between 15-30 is non-autistic, 30-36 is mildly-moderately autistic and 36-60 is severely autistic).

NAD's cognitive skills were an area of concern and the nursery had remarked that when compared with her peers she was unable to recall auditory information. None of the structured tasks were administered during this initial assessment period due to the severity of NAD's language impairment and her difficulties complying with adult instructions.

Attention and Listening Skills

NAD's attention and listening skills were moderately delayed by 12-18 months with some a-typical features affecting her language and communication skills. When playing on her own her attention was fleeting and she played briefly with the toys laid out in the room. She would start to play with one toy and would then leave it and move on to the next. She was able to concentrate on toys or activities of her own choosing, but it was only with adult intervention that NAD's attention could be extended. That is, when the adult followed her lead, she was able to remain on task for longer periods of time and extend her play ideas. This was only possible during play. When formal assessment batteries were introduced, NAD was highly distractible and unable to tolerate any adult direction.

NAD did not attend to directions or comments if they were not related to what she was doing. However, when the comments were directed to her play and actions she would look at the adult and remain with the activity for longer.

NAD was unable to integrate her use of auditory and visual attention and thus she had great difficulty completing visual comprehension tasks and picture structured tasks. NAD needed verbal and physical prompts to facilitate her attention and listening skills. Although NAD's difficulties can be attributed to her delayed language skills, there were associated issues of behaviour and compliance.

Play skills and Pragmatics

NAD used learnt phrases to initiate conversation. The pragmatic section of the DLI check-list revealed that she appropriately used facial expression and she appropriately initiated social interaction with adults using eye-contact and conversational turn-taking. Her pragmatic skills at a linguistic level were affected due to her receptive language difficulties.

NAD's play skills were delayed by 6-12 months. During the observation in the clinic she was seen to carry out different levels of play. She produced relational and imaginative play with home corner toys. When compared with peers her age, NAD's play was rigid and repetitive. She was able to follow the adult's model and imitate play behaviours, e.g. she pretended to drink from a cup, wash the doll's face and feed the doll. She also spontaneously replicated play ideas demonstrated by the examiner. She was able to complete an inset puzzle but was unable to complete an eight piece interlocking puzzle.

When observed in the clinic playing on her own, NAD emptied the toys from the boxes and had difficulty spontaneously extending her play ideas.

Expressive and Receptive Language

The DLI checklist identified NAD's expressive and receptive difficulties with language leading to a diagnosis of a DLI. She presented with a delay of 12-18 months. Her parents reported Arabic to be her functional language and the language she uses across all environments. Although she was also exposed to both French and some English, she used only two English and three French words which were labels. This was confirmed during the initial assessment and is detailed below. NAD produced a series of learnt and repetitive phrases, formed correctly for syntax and semantics.

Specific aspects of NAD's expressive language are summarised below—

(1) NAD had difficulty with the morphological system in Arabic. For example, 34.5% of her utterances produced during this initial assessment contained errors, whilst an age matched control produced less than 10% developmental errors. (2) She also had difficulty with agreement for number, gender and Tense. (3) She was observed to omit obligatory verb arguments.

(4) Her use of negatives was restricted. She used the negative form /miʃ/ before the verbs expressing the Progressive Tense, e.g. "/mabijlʕabʃ/" was produced as "/miʃ ʔilʕab/" rather than using the discontinuous morpheme /m—ʃ/. She used /laʔ/ (no) to express the negative which is typically seen in children 2-3;00 years of age. (5) NAD had difficulty with the production of personal pronouns and she used the third person singular in place of the first person. (6) A further characteristic feature of NAD's language was her word finding difficulties, which were highlighted when she was asked to name verb pictures and objects. She often produced semantic errors, e.g. calling a spoon a fork.

Specific aspects of NAD's difficulties with the comprehension of language are summarised below—

NAD's difficulty with the understanding of language was apparent during conversation when she was asked to answer questions related to ideas or topics outside of her immediate environment (intraverbals). When picture structured tasks were introduced and she was asked to answer questions about the pictures she did not respond correctly to any of the questions. She consequently attempted to control the conversation because then she could talk about topics that she understood.

NAD was able to follow instructions in context, however, in the absence of contextual cues her understanding was severely impaired. It was not always obvious that NAD had not

understood what had been said to her, due to her strengths in reading non-verbal cues. She was unable to answer EA equivalent *Wh* (who? where? why?) questions even if a forced alternative was provided. For example, "How did you come her today?" or "What did you have for breakfast?"

After the initial assessment session, informal measures were used to assess NAD's understanding. She was able to receptively identify named action pictures when presented in array of three and she was able to identify pictures of objects by their function but not by their class.

She had difficulty with the understanding of abstract concepts. She was able to identify objects by their size, i.e. big/little. At this time she showed a restricted understanding of the colours. She could identify *red, blue and yellow* in Arabic, although she had no difficulty visually discriminating different colours as demonstrated by sorting. In addition, she had difficulty understanding the prepositions, e.g. *in* and *under*, when related to objects and she could not identify pictures representing different prepositions.

Despite the reports from the nursery of speech difficulties, when NAD's speech skills were informally assessed, she was observed to produce normal developmental speech errors in line with her age, e.g. fronting. For example, she fronted the voiceless velar plosive /k/ and produced it as a voiceless alveolar plosive, /t/, thus maintaining the manner and voicing but changing the place of articulation.

Her oro-motor skills were not an area of concern. NAD was able to blow, suck and execute a range of tongue movements (depression, elevation and lateral movements), indicating that she did not have verbal dyspraxia (oro-motor impairment).

Therefore, at 4;02 NAD met exclusionary criteria and she was diagnosed as having a developmental language impairment affecting her pragmatics, expressive and receptive language skills. In addition, NAD was observed to have an additional behaviour disorder. NAD was observed to be wilful with both her parents and the examiner and she needed clear boundaries to modify her behaviour. A cognitive impairment was later identified as described in the section below, however this was seen to be secondary to her severe language impairment.

5.9.6 Psychological Assessment

Following NAD's initial speech and language therapy assessment she was referred for cognitive testing. The purpose of the assessment was to establish whether NAD's difficulties were specific to language or part of a global developmental delay. NAD was seen for a psychological assessment when she was 4;02. The evaluation was discontinued after the administration of the first sub-test of the Wechsler Preschool and Primary Intelligence Scale-Revised (WPSSI-R) due to NAD's limited co-operation. Following the initial block of the therapy, NAD's cognitive skills were reassessed. It was not possible to reuse the WPPSI-R due to the possible training effects, which would affect the validity of the results. The Differential Ability Scales (DAS -Elliot 1990b) was used instead when she was 4;08.

The DAS is an individually administered standardized cognitive test battery. The cognitive sub-section highly correlates with the WPSSI-R assessment. In addition, children with compliance and attention difficulties usually co-operate better when tested with the DAS (Elliot, 1990b). NAD was assessed in Arabic.

Test results and Interpretation of scores

On the DAS, NAD was given all of the six cognitive core sub-tests, which compute the General Conceptual Ability Score. This score is defined as:

"..the general ability of an individual to perform complex mental processing that involves conceptualisation and transformation of information" (Elliot, 1990b)

The different sub-tests can also be grouped into verbal and non-verbal reasoning clusters. In the non-verbal cluster there were two tasks, Pattern construction and Copying, for which NAD received scores of zero. When NAD's scores are expressed by age equivalents, her abilities are similar to a child of 2;07 for both her verbal and non-verbal abilities. Children with language impairment frequently score in the low average range due to the language demands, since there is always some degree of language processing in the non-verbal trials.

The speech and language assessment indicated a severe receptive language deficit. In addition, the DAS is not standardised on EA children and a direct translation from the English was used. NAD's highest performance on the DAS was seen on the Verbal Comprehension Sub-test. This relative strength may be explained by the therapy she received to address her receptive and expressive language needs. This sub-test assesses the understanding of language (including the understanding of syntax and prepositional and relational concepts). It also provides information on the child's ability to follow verbal directions as well as short-term auditory memory. Her difficulties were not with the latter part but with her understanding of syntax and abstract concepts.

5.9.7 Education and Therapy Provision

From 3;02 to 4;02 NAD attended a French-Arabic medium nursery. Following the initial assessment NAD received a block of Parent Child Interaction Therapy. This was followed by blocks of non-directive therapy twice per week with the examiner. After NAD was seen for the assessment she transferred from her school to an English speaking pre-school where she remained for 5 months. She was not developing her language, and the results of the assessment conducted by the Educational Psychologist highlighted difficulties in specific areas of cognition. She joined the same Language Unit as the subject AEL. She attended the unit from 4;10 to 5;11 years which was when the last recording was made.

5.10 Methodology

The methodology applied to this case study is detailed in Chapter 3. Both spontaneous language measure analysis and specific structured tasks were administered to NAD. For purposes of analysis the recording samples were divided into four three monthly blocks.

5.10.1 Specific analytical procedures: spontaneous language measures

In order to explore the developmental trajectory of her language acquisition and impairment the following spontaneous language measures and analysis were undertaken.

(A) Spontaneous language sample analysis

6. *Mean Morphological Units per Utterance* (MPU) were calculated for each of the blocks of spontaneous language samples.

7. *A functional analysis* was conducted to establish the range of utterance types produced by NAD for each spontaneous language sample block.

8. *Error analysis for morphological errors.* NAD's spontaneous language was analysed for salient morphological errors and percentage of utterances with errors was calculated for each of the four recording periods.

9. *Lexical analysis for spontaneous use of verbs.* For the entire corpus all verbs produced were tabulated and analysed according to types of errors, and Aspect/Tense use. This allowed for the total number of verbs to be calculated. In addition, the verbs were analysed according to whether the errors were with (a) Tense and agreement (b) agreement only or (c) non-target words in EA.

10. *Grammatical and morphological analysis.* The most salient morphological errors produced by NAD were documented and compared with those produced by the controls. The aim was to determine the morphological pattern errors that may be specific to EA language impairment. The following morphological categories were examined.

    a. Use of plurals and the dual

    b. Use of negative particles

    c. Use of the definite article

    d. Use of prepositional concepts

    e. Use of bound and free pronouns

    f. Use of adjectival agreement

(B) Structured tasks and assessments administered

The experimental procedure for each of the structured tasks is detailed in Chapter 3. An attempt was made to administer all the structured tasks to NAD. However, her behaviour and difficulties complying with adult instructions meant that she was un-testable on most of the structured tasks. The DLI checklist was administered once when NAD was first seen at 4;02. In addition, the following tasks were attempted.

5. The Renfrew Action Picture test was administered once when NAD was 5;00. Since the assessment can not be repeated until a minimum of one year following the initial assessment this task could not be repeated.

6. The Winslow Noun and Verb Pictures were administered from when NAD was 4;04 to 4;06.

7. The Sentence Comprehension Test was administered once when she was 5;05. She was unable to complete the assessment and testing was aborted.

5.11 Results

The results of NAD's pattern of language impairments will be divided into two sections, the spontaneous language analysis and the structured tasks. A summary of findings will be discussed at the end of this section. Comparisons will made between NAD and the non-language impaired controls who served as both age and language matched controls.

5.11.1 Results of Spontaneous Language Samples

A total of 16 spontaneous language sample video recordings were made from when NAD was 4;02 to 5;11. This comprised of a total of 272 utterances. For purposes of analysis recordings were divided into three-month blocks and analysis was done on each block. Table

5.21 is a summary of her age during the recording periods, the number of spontaneous utterances produced during this period, the percentage of utterances with errors produced and the MPU for each period.

Table 5. 21 Summary of results for NAD: Number of utterances produced, Percentage of errors and MPU values

Age	# of utterances	# with errors	MPU
4;02-4,04	128	53.13%	3.35
4;04-4;06	90	32.22%	2.66
4;09-4;11	15	53.33%	3.40
5;05-5;11	39	33.33%	3.69

5.11.2 Analysis of MPU Results

Figure 5.8 below represents the changes in NAD's MPU throughout the 21 month recording period. There were no significant changes in NAD's MPU throughout the recording period. Although her MPU values fluctuated they remained within a limited range. Her maximum MPU was 3.69 when she was aged between 5;05-5;11 and the minimum MPU was 2.66 when aged between 4;04-4;06. The expected pattern of development would have been to see an increase in MPU values over time. NAD's MPU values show an a-typical pattern of development and support her difficulties with morphology and lexical acquisition which are characteristic markers of NAD's language impairment.

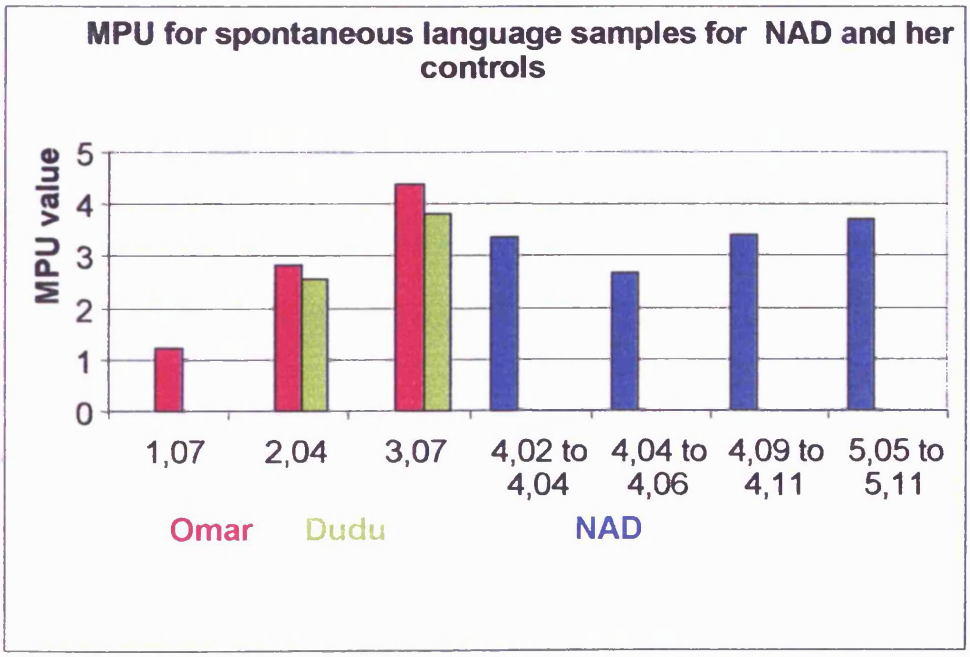
When compared with the controls not only did her MPU values not change over time but they were considerably reduced, compared with the age matched controls as illustrated in Figure 5.8 below. When NAD's MPU values are compared with two of the control subjects Omar and Dudu there is a clear difference. NAD shows an almost flat pattern compared with Omar and Dudu whose MPU values increased with age. For Omar his MPU values changed from 1.22 to 4.40 during 24 months, compared with NAD whose values fluctuated and

remained within a limited range. For NAD, her first MPU value at age 4;02-4;04 was 3.35 and at age 5;05-5;11, it was 3.69.

Table 5. 22 A comparison of NAD's MPU with the controls Omar and Dudu

Age	MPU NAD	MPU Omar	MPU Dudu
1;07	-	1.22	-
2;04	-	2.84	2.56
3;07	-	4.40	3.81
4;02-4;04	3.35	-	-
4;04-4;06	2.66	-	-
4;09-4;11	3.40	-	-
5;05-5;11	3.69	-	-

Figure 5. 8 MPU results for NAD and her Controls Omar and Dudu



A characteristic feature of NAD's expressive language was her use of (1) Learnt Repetitive phrases and (2) her short utterances. There were few occasions where NAD produced MPU values greater than 3.69, hence her MPU scores remained low.

In the example below NAD was with her mother playing with a jigsaw puzzle. She produced the following utterance with no errors and the MPU value was 8.

Utterance 18/11/02#3	/fi:n əl bi-yi-ʔitrakib hinna ya dina/ MPU=8 where the Asp.Prog-fit-3rd Sing.Masc. here oh dina
Translation	Where is the one that fits in here Dina

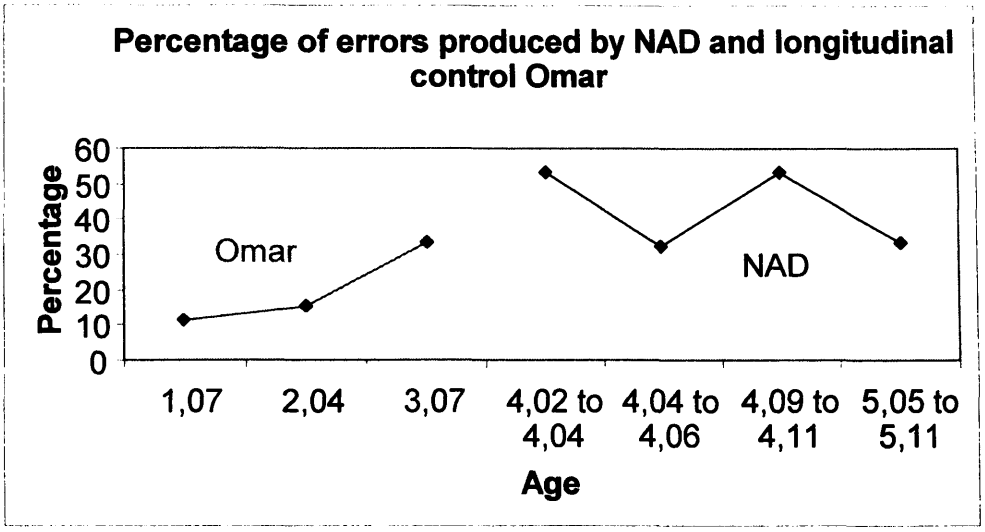
5.11.3 Percentage of utterances with Errors

NAD's percentage of errors continued to be a diagnostic characteristic of her language impairment. Although there was some fluctuation, her percentage of errors ranged from between 53.33% to 32.22%. The error pattern was not seen to reduce over time but fluctuated. This variability in performance is an additional diagnostic characteristic of NAD's language impairment (DLI).

In addition, unlike the controls there was no direct relationship between her percentage of errors and her MPU values. In chapter 4, the spontaneous language sample analysis revealed that for the longitudinal controls, there was a direct relationship between higher percentages of errors and morphological acquisition bursts, for example, for the control subject Omar, when aged 3;07 his MPU was 4.40 and his percentage of errors was 33.33%.

Figure 5.9 below is a visual representation of NAD's percentage of errors compared with the longitudinal control subject Omar. Omar was recorded at ages 1;07, 2;04 and 3;07. His percentage of errors began low and then increased rapidly between 2;04 and 3;07. This is when morphological learning advances and consequently more normal developmental pattern errors occur.

Figure 5. 9 Percentage of errors produced by NAD and control Omar



5.11.4 Functional Analysis of Utterances

The results of the functional analysis revealed that Mands and Tacts were the type of utterances used the most by NAD. Intraverbals were the least type of utterance produced. Intraverbals include the ability to answer Wh- questions and require auditory cohesion and abstract reasoning skills. An additional feature was that NAD used learnt repetitive phrases (LP/RP) which are a sub-category, coded under Others. LP/RP were infrequently observed in the speech of controls; e.g. two LP/RP were produced by the control Dudu; but are characteristic feature of NAD's language. These phrases were either attached to an utterance or she produced them in isolation within an inappropriate context. The function of the

LP/RP therefore varied. Occasionally, the LP/RPs were used as part of her behavioural disorder to gain negative adult attention, other times when she used them it was due to breakdowns in her receptive language and on other occasions their use could not be determined from the situation of the language context. The table below shows the distribution of NAD's functional use of utterances for the four recording periods.

Table 5. 23 Functional Analysis of utterances produced by NAD

Age	**Number of utterances**	**Mands**	**Tacts**	**Ech**	**IV**	**Others**
4;02-4,04	128	34.38%	50%	3.13%	1.56%	13.28%
4;04-4;06	90	46.67%	33.33%	2.22%	0%	17.78%
4;09-4;11	15	40%	40%	0%	0%	20%
5;05-5;11	39	56.41%	25.64%	0%	10.26%	7.69%

Her most frequently used utterance types were Mands (request) and Tacts (labels), following this it was Others and the least used utterance type were Intraverbals. There are similarities and differences between the pattern used by NAD and that used by the normally developing children. NAD and the control children were similar in that in their early language years the control children used mostly labels and requests almost at an equal value and few used

Intraverbals. However, the control children's use of Intraverbals increased with age which was not the case with NAD.

For the control children, their use of Intraverbals varied but ranged from 53.33% to 1.51%. NAD, however, began to use Intraverbals later and less frequently. For two of the recording periods she did not produce any Intraverbal responses (4;04-4;06 and 4;09-4;11).

Between the age of 5;05-5;11 she used Intraverbals 10.26% of the time. When compared with the longitudinal control children Sanna's use of Intraverbals was 5.55% at 2;07 years and 27.59% at 3;01. Kenzy's use of Intraverbals was 14.29% at 2;01 years and 19.15% at 2;07 years.

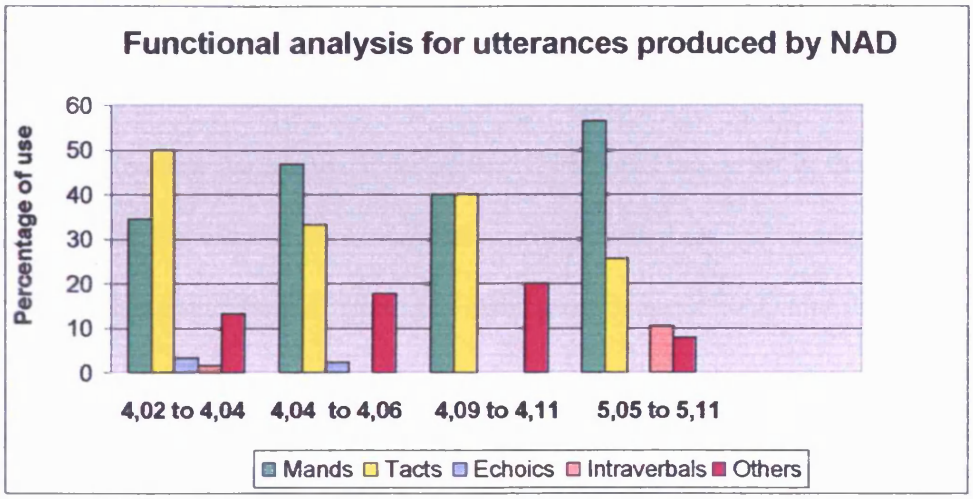
The cross-sectional control Sherif used Intraverbals 1.51% of the time when aged 3,03 and this was the lowest use of Intraverbals seen across all the controls. The reason for Sherif's reduced use of Intraverbals was due to his lack of compliance with adult directed instructions and his reduced familiarity with the investigator; and not due to an inability to provide Intraverbal responses. Thus he did not respond to questions compared with NAD, who either responded incorrectly or produced LP/RP phrases when required to provide an Intraverbal response.

The example below (13/06/02#9), illustrates how NAD responded when she was required to provide an Intraverbal response, but instead provided a response that was unrelated to the adult question.

She was at the time aged 5;05. The context was that she was asked by the investigator what her sister's name is. The target response, her sister's name, would be coded as an Intraverbal. The response she provides is unrelated to the question.

Utterance	**Adult** **NAD**
13/06/02#9	/ʔoxtik ʔismaha ih?/ sister-your name-her what /Tab taʃa:li/ alright come-2nd.Sing.Fem. all right come
Gloss	What's your sister's name? All right come

Figure 5.10 NAD's functional use of utterances for the four recording periods



A further difference between NAD and the control children's use of utterances was NAD's use of utterances coded as Others (detailed below), which she used more frequently than the controls and were produced across all four recording blocks.

13.60% of NAD's utterances were coded as Others. When compared with the cross-sectional controls only two of the children used such types of utterances. Ismail used Others 3.70% of the time when aged 2;08 and Samira used Others 10% of the time when aged 4;04. Of the longitudinal controls Omar only used Others 6.67% of the time when 3;07, whilst Kenzy only used them 2.13% of the time when aged 2;07 years. Dudu was the only longitudinal control who used the utterance type Others across two recording periods. At 2;03 his use was 12.5% and at 3;07 his use was 10.20%.

The criteria that led to control children's utterances being coded under the Others category were either (1) the function of the utterance could not be determined from the context and did not fit into the four other categories (label, request, echoic, intraverbal); or (2) although the utterance may be well formed grammatically it was non-contingent to the context and/or

(3) several morphological and syntactic errors were produced that rendered the utterance un-analysable for function.

To allow for comparisons between NAD and the controls, the utterances coded for NAD as Others were further analysed to establish if there was a pattern in her productions and to determine the similarities and differences between NAD and the controls.

When the utterances were examined the results revealed four sub-types of utterance types under the category of Other.

The first was with her use of Neologisms, which were infrequently produced by the controls and the only control observed to also use Neologisms was Dudu. For NAD such words were used whilst she was playing or when asked a question that she did not know the answer to. The words she produced do not violate phonotactic rules of EA. The target is unknown and even if the word produced is due to phonological distortions of a target word, the target cannot be realised from either the context or from the pattern of phonemes. In addition, these Neologisms were not random productions that occurred once, but they were produced more than once in the same form. Second, NAD was observed to produce phrases where there was no known referent. That is the subject matter of her phrase could not be determined from either the linguistic context or from the play (environmental) context. On these occasions the utterances were well formed grammatically, but non-contingent to the context. This type of utterance was infrequently produced by the controls.

The third type which was infrequently observed in the language samples of the controls was her use of learnt/repetitive (LP/RP) phrases (only Dudu produced these). These were social phrases which would be used by adults. They sound odd when produced by a child and

would not be produced within the language context of NAD's parents who are educated and from a middle socio-economic sphere. Examples of phrases which were coded under the category of Others will be presented to illustrate their use. By default their functional use could not be explicitly determined and for this reason they were coded as Others.

Example 1

Context: NAD is in the clinic play-room playing with her mother. The investigator is in the room recording them.

Utterance	**NAD**	**Adult**
14/05/01#3	/mami ʕayza iskrim/ mum I-want ice-cream Mum I want ice-cream	/lamma nexallas hangib iskrim/ when we-finish we-will-get ice-cream When we finish we will get ice-cream
14/05/01#4 Other	/matoʕodi baʔa ʔinti moʔrefa/ Asp.Sit-3rd.Sing.Fem alright you-Fem.Sing. disgusting-Fem.Sing Would you sit down you are disgusting	*Her mother ignores her and continues to play with toys*

Example 2

Context: NAD is in the clinic play-room playing with the investigator. Both her parents are waiting out-side. She is seated at the table playing with play-dough an activity she enjoys. She produces a LP/RP. The function can not be determined and it is coded as an Other.

Utterance	**NAD**	**Adult**
14/05/01#8	/papi mistani barra/	
	dad wait-3rd.masc.sing outside	/ʔaywa papi mistani barra /
		yes dad wait-3rd.masc.sing outside
14/05/01#9		
Other:LP/RP	/ya dil ni:la[8]/	
	Oh what blue-dye!	*Adult ignores the utterance*
	Oh what crap!	
14/05/01#10	/ʔanna baʃmil torta/	
Tact	I making-1st.Sing cake	
	I am making a cake	

Example 3

Context: NAD is playing with the investigator in the play-room in the clinic. She is playing with the home-corner toys which include a toy kitchen and plastic pretend foods. She asks about the whereabouts of her father. Her responses to the adult's comments on her actions are LP/RP.

[8] /ni:la/ is a blue dye which was used to whiten clothes. It's use in EA is like swearing and is used by villagers when they are mourning. They pour it onto their clothes to express their sorrow.

Utterance	NAD	Adult
26/05/01#16	/huwa papi mistanni?/	
	he dad wait-3rd.masc.sing	
	Is Daddy waiting?	/aywa papi mistani barra /
		yes dad wait-3rd.masc.sing outside
Other: LP/RP	/ʔih baʔʔa/	
26/05/01#17	what left	/ʔinti bi-tilʕabi/
	What's going on	you-fem.sing. Asp.3rd.Sing.Fem.-play
Other: LP/RP		You are playing
26/05/01#18	[9]/ʔismallah ʕali:ti/	
	the-name-of-God upon-you	/ʔinti bi-ti-ʔiʕmili əl-ʔakl/
	(May God bless you)	NAD Asp.3rd.Sing.Fem-do the-food
		You are preparing the food

5.11.5 Lexical Analysis: spontaneous use of verbs

NAD produced a total number of 99 verbs throughout the 21 month recording period. Consistent with her MPU values being reduced she never produced more than one verb phrase per utterance. NAD's pattern of verb production partially supports the initial hypothesis that the EA-DLI children would have difficulty with their verb use; would use less verbs, and use of verb morphology related to number, gender and person agreement would

[9] Phonological process /k/→/t/, target production is /ʕaliki/

be difficult, resulting in morphological errors, but that errors related to Aspectual markers and Tense would be less frequent.

NAD correctly produced verbs and few errors were observed either for Aspectual markers, Tense or agreement. Although her morphological errors were occasionally related to verbs, these were not any more problematic than were her errors with syntax, morphological agreement errors for nouns and adjectives, and omissions of obligatory lexical items and morphemes; thus contributing to her high percentage of errors cited above.

Table 5. 24 Summary of Verb productions and analysis for the spontaneous language samples

Age	Total number of utterances	Total number of verbs	Percentage of correct verbs produced	Percentage of verbs produced with incorrect Tense/Asp and agreement	Percentage of verbs produced with correct Tense/Asp but agreement errors	Percentage of vocalic paraphasias
4;02-4;04	128	61	67.21%	4.92%	24.59%	3.28%
4;04-4;06	90	38	86.84%	0%	7.89%	5.26%
4;09-4;11	15	11	72.72%	9.09%	9.09%	9.09%
5;05-5;11	39	20	84%	5%	10%	0%

The results presented in Table 5.25 above support that for EA-DLI children Tense and Aspectual information is not as problematic as correct use of verb agreement information for number, person and gender agreement. When the agreement errors were further analysed to evaluate whether certain agreement information was more problematic than others, no pattern was found. NAD's percentage of errors for verb agreement were greater than the percentage of errors produced for Tense/Aspectual markings, apart from one exception where they were equal.

She was however on two occasions observed to produce vocalic paraphasias, which occurred during the first three recording periods. A morphological-paraphasia is where the root of the verb is transparent, but an addition error occurs due to one or more phonemes being inserted in addition to other target phonemes (vocalic patterns) which hold the verb information. This is a different error pattern to the Neologisms cited above in section 5.11.4 Functional Analysis of Utterances, where the target production is not transparent but the string of phonemes produced correspond with the phonotactic rules of EA, resulting in a neologism. Examples of NAD's errors for verb use are presented below.

5.11.5.1 Verb Non-Word Errors

In the first example, the verb is *smell* /ʃim/. NAD inserted an extra phoneme at the end which is a non-target morphological marker. The 2nd person feminine form of the verb would be /ʃimmi/ and the 2nd person masculine form of the verb would be /ʃim/. NAD was smelling (a sandwich), therefore although the target form is unknown regarding the Aspectual marker, the person and number agreement would be 1st person feminine singular.

Example 1

Context: NAD was eating a sandwich at the end of her therapy session whilst her mother was putting the toys away. Whilst eating her sandwich she smelt it, commenting on her actions she used a vocalic paraphasia.

12/04/01#17	/ʃimma/ Root of verb smell is transparent. Production coded as a MP
Target	/ba-ʃim/ or /ha-ʃim/ Asp-Prog-smell-1st.Sing. or Asp.-Hab-smell-1st.Sing. I am smelling

Example 2

In this example, she does not make any errors of additions of extra phonemes but it is her insertion of the non-target vocalic pattern that renders this an error, i.e. a vocalic paraphasia. Her agreement of the masculine pronoun /da/ *this* is correct.

Context: NAD was playing with dolls, a teddy bear and the home-corner toys. She placed the teddy bear on a small chair and the teddy bear fell of the chair. She was commenting on the action of the teddy bear falling off the chair when she produced a Vocalic Paraphasia in the utterance below.

16/09/01#6	/da waʔaʕ/ *Vocalic Paraphasia* this-masc *fall* (Aspect/Tense unknown)
Target	/da wiʔiʕ/ this-Masc. fell-Masc.3rd.Sing

5.11.5.2 Tense and Aspectual Errors

Errors with Tense and Aspectual markers rarely occurred in NAD's spontaneous language samples. When they did occur they were similar to those produced by the non-language impaired controls and consisted of errors in omissions of Tense/Aspectual markers. In the first recording period such errors occurred with 4.92% of the verbs. One of the normal error patterns observed in the control children was their use of the default verb. NAD was observed to use this form for a total of five verbs across the recording periods.

Example 1

In this example, NAD used the form /ʔiftaħ/ *open* and she omitted the Aspectual/Tense markers and agreement markers for number, gender and person. In addition, she omitted the definite article /əl-/ for the noun.

Context: NAD is looking at action pictures. She labels the picture of a man opening a box.

07/04/01#15	/ʔiftaħ ʕelba/ open-Masc.Sing. box open box
Target	/bi-yi-ʔiftaħ əl-ʕelba Asp.Prog.-2nd Masc.Sing-open the-box He is opening the box

5.11.5.3 Agreement errors for Gender and Number

NAD produced agreement errors for gender but errors for number related to verbs were not present in the sample. Gender errors resulted where the target was feminine and she used the masculine and the reverse. NAD was recorded with the investigator who was female, her mother and her father. Thus she had the possibilities to use masculine and feminine person

markers. In addition, errors occurred where within the same recording and when referring to the same object or person she used a different gender with the verb, e.g. when talking about a doll, in Example 3 below.

Example 1 agreement error where the target is feminine:

Context: She was playing with her mother using an inset puzzle and handed her mother a puzzle piece.

17/02/01#25	*/xud ya mama/ Imp-take-Masc.Sing. oh mummy Take (it) mummy
Target	/xudi ya mama/ Imp-take-Fem.Sing. oh mummy Take (it) mummy

Example 2 Agreement error with person and gender:

In this example (17/03/01#4), NAD produced an error with agreement for gender where she used the masculine in place of the feminine and she used the 3rd person singular marker in place of the 1st person singular marker. She also omitted the noun phrase which is an obligatory argument for the verb *do* /ʔiʕmil/.

Context: She was playing with home-corner toys and pretending to prepare a cake. She was commenting on her play behaviour.

17/03/01#4	*/ʔanna bi-yi-ʔiʕmil [10]ø/ I Asp.Prog.3rd Sing.Masc.-do I he-is-doing
Target	/ʔanna ba-ʔʕmil keka/ I Asp.Prog.1st Sing-do cake I am doing a cake

Example 3: Changes in gender agreement when referring to the same object. In this example, NAD described the actions of her doll /ʕaru:sa/ which is feminine. The verbs she used to describe the doll's actions agreed for number and person but she inconsistently used gender agreement, sometimes using the masculine and sometimes the feminine.

Context: NAD was in the therapy play room. She was playing alongside the investigator. She had a doll and a teddy bear, a chair, a bed and toy kitchen. She was commenting on her play actions whilst playing with the doll.

09/06/01#11	/ʔoʕodi ya ʕaru:sa/ (places doll on bed) sit-down-Imp.Fem.Sing oh doll-Fem.Sing. Sit down doll

[10] ø is used to indicate an omission of an obligatory lexical item

09/06/01#12	*/ʕayiz yoʕod/ (makes the doll sit on the bed) He-wants Asp.sit-Masc.Sing. He wants to sit
09/06/01#13	*/ʕarusa na:yim lih?/ (pretends doll is sleeping) doll-fem sleep-Masc.Sing why Why (is the) doll sleeping?
09/06/01#14	/ʕarusa siħyit/ (makes doll sit up) doll-fem Asp.Perf.wake-Fem.Sing. Doll has woken up

5.11.5.3 Agreement Errors for Person

NAD was observed to produce errors with person agreement. She often referred to her self in the third person or used her name rather than using the pronoun. When she did this she would use her name in place of the pronoun *I* and her verb agreement was in the third person, but number and gender agreement was correct (i.e. Sing.Fem.). For example, at the start of the session she would ask the adult what she was going to play with or do.

Example 1

Context: At the start of the session having entered the room she looked at the therapist and asked what she was going to do.

31/03/01#2 7	*/nadin ha-telʕab ih?/ NAD Asp.Hab-3rdFem.Sing.-Play what What is NAD going to play with
Target	/ʔanna ha-ʔalʕab ih?/ I Asp.Hab-3rdSing.-play what What am I going to play?

Example 2: NAD used her name in place of the pronoun /ʔanna/ *I* and she used the 3rd person marker in place of the 1st person marker.

Context: NAD was sitting at the table in the clinic play-room with her mother. She was colouring.

31/03/01#2 5	*/nadin teʕmil ih teʕmil ʃaxbat/ NAD 3rdFem.Sing.-do what 3rdFem.Sing.-do scribble What is NAD doing doing scribble
Target	/ʔanna baʕmil ih ba-ʃaxbat/ I Asp.Prog-do what Asp.Prog.-1st Sing.-scribble What am I doing scribbling?

Other errors with agreement resulted either when she was commenting on her actions or when she was requesting actions or events from the adults.

Example 3: In this example, NAD used the 3rd person feminine markers in place of the 1st person feminine person markers. In addition, a phonological error also occurred where the target initial /l/ was substituted with a /t/ i.e. /lewaɦdaha/ → /tewaɦdaha/, in the pronoun meaning on-her-own.

Context: NAD was sitting at a table colouring and her mother was sitting besides her. She produced the following utterance (31/03/01#16), transcribed below.

31/03/01#16	*/taʃrafi tewaɦdaha/ know-2ndSing.Fem own-her You know on her own
Target	/ʔaʃraf lewaɦdi/ know-1stSing.Fem. own-my I can do it on my own

5.11.5.4 Omissions and substitutions of Verbs

NAD omitted verbs where their presence in an utterance was obligatory. Similar to the younger controls she also used general verbs (GAP verbs), when a more specific verb was required. Examples, of NAD's errors involving omissions and substitutions errors with verbs are listed below.

Example 1: a verb omission

Context: NAD was pretending to make tea. She pretended to put sugar into the cup. She omitted the verb and produced a phonological error where the /k/→/t/ in /sukar/ *sugar.*

12/04/01#7	*/ʔistanna ø sutal/ wait-1stMasc.Sing sugar wait sugar
Target	/ʔistanni ħoti sukar/ wait-1st Fem.Sing put-1st Fem.Sing sugar *Wait put the sugar*

Example 2: Substitution of the verb

In this example, instead of using the verb /ʔalawin/ *colour* she uses the verb *do* /ʔaʃmil/. She also omits the preposition *with* /bil/.

Context: NAD was sitting at the table with her mother. There was a paper on the table and a selection of different coloured crayons. She wanted to colour using an orange crayon.

05/05/01#20	/ʃayza ʔaʃmil ʔalwa:n orəʤ/ want-1stFem.Sing. do-1st.Sing colours orange I want orange colours (crayons)

Target	/ʃayza ʔalawin bil orəʤ/ want-1stFem.Sing. colour-1stSing with orange I want to colour with the orange

Example 3: Semantic substitution of the verb

In this example, instead of using the verb /ʔoʃod/ *sit* she used the verb *get-up (from sitting)* /u:m/. She also omitted the preposition /ʔalla/ *on* and the definite article /-əl/.

Context: NAD was in the therapy play-room with the investigator. She returned to where the investigator was sitting and as she sat down she produced the following utterance.

31/03/01#21	*/ʔanna um mil ø ʔard/ I get-up from floor I am going to get up from (sitting on) the floor
Target	/ʔanna hoʃod ʃalla əl-ʔard/ I Asp.Prog-Sit on the-floor I am going to sit on the floor

5.11.5.5 Participles and the Passive

NAD used and omitted Participles and the Passive. Her rate of omission was not found to be significant. She used and omitted the participle /ʃayza/ want-1stFem.Sing. She rarely used Participles, but when she did her use was correct for agreement of number and gender. For

example, when describing a single car that was not working (damaged) she correctly produced the Participle using the correct agreement for gender and number.

07/04/01#4	/bayza/ not-working-Fem.Sing

5.12 Grammatical and Morphological Error Analysis

The percentage of structural errors produced by NAD was discussed in the earlier section. Her errors were a result of omissions and errors of agreement with Nouns and Verbs and other lexical and morphological structures. A significant difference between NAD and the language and age matched controls was that not only did more of her utterances contain errors, but each utterance contained more than one error.

In this section a description of the morphological and lexical errors that occurred will be described. These errors resulted due to either: (1) omissions of obligatory morphological and lexical structures, e.g. the omissions of definite articles, prepositions and Noun phrases; (2) agreement errors for adjectives and nouns; or (3) where one morpheme was substituted for another, e.g. the feminine pronoun /da/ this-Fem. is substituted for /di/ this-Masc.

5.12.1 Plurals and the Dual

NAD had difficulty throughout the 21 month recording period with her use of both irregular and regular plurals and the dual. Nouns in EA form their plurals either by suffixation, or by an internal change to the word. The suffixed plural is formed by the affixation of a plural suffix to the singular form. In EA, plurals and the dual are not consistently and accurately used by children in an adult target form until the age of 7;00 years and it is one of the later morphological structures to be acquired (Ravid and Farrah, 1999; Omar, 1973). Younger

children do express plurality as described in the morphological analysis section of the controls (Chapter 4, section 4.3.9) and errors with plurality and the dual are common.

A difference between NAD and the controls was that her use of plurals was limited and there were only three occasions where she expressed plurality.

On one occasion to express plurality NAD repeated the noun rather than using the morphology for plurals. This was not observed as a default strategy employed by the non-language impaired controls, although it was observed in the other language impaired subjects. On no occasion was she observed to use the dual correctly. An additional strategy used by the controls was to use words for number preceding the noun that they wanted to describe in the plural form. NAD did not use this strategy.

Example 1: In the example below when labelling what she had done NAD repeated the word for circle, instead of using the dual which would be the target or the broken plural.

Context: NAD was sitting at a table drawing with her mother. She drew two circles and commented to her mother on what she had done.

05/05/01#15	*/ʕamalna dayra dayra/ did-4thPlu.Past. circle circle We did circle circle
Target	*/ʕamalna dayrati:n/ did-4thPlu.Past. circle-dual We did (two) circles

Example 2: NAD used the regular feminine plural form of the noun for *blocks.* This form is reported to develop first in normally developing Arabic speaking children (e.g. Ravid and Farrah, 1999). The singular form is /mokaʕab/ and is masculine and the plural form is /mokaʕaba**:t**/ (the plural affix is marked in bold).

Context: NAD was at school in an individual session with one of her teachers. She was refusing to play with blocks, the utterance was produced free of errors.

13/06/02#8	/miʃ ʕayza ʕalʕab bil mokaʕaba**:t**/ Neg.-Do not want play-1st.Sing. with blocks-Fem.Reg.Plu. I do not want to play with the blocks

The third time a plural form was used the target form should have been the singular form and instead she used the plural form. She picked up a large ball from a selection of other toys and used the plural form of the word /koba:r/ *big.* The word for ball /ko:ra/ is feminine consequently the adjective needs to agree in number and gender. The target production should have been /kibi:ra/ big-Fem.Sing.

Example 3

26/05/01#21	*/toba:r/ big-plural big (ball)

Target	/kibira/ big-Fem.Sing.

5.12.2 Use of the negative

NAD at times had difficulty expressing the negative when the discontinuous negative form /m..ʃ/ was required. Although the discontinuous negative was at times used correctly it was a difficult morphological structure. The reason is that the discontinuous negative has to be used in a sequential manner across a verbal phrase which is syntactically more complex.

Examples of NAD's errors with the particles for the discontinuous negative can implicitly demonstrate early understanding of bound morphology. She was seen to produce one of the discontinuous morphemes without the other. This was not a feature commonly observed in the typical children acquiring EA and it has not been reported in aphasic Arabic speaking adults.

31/03/01#1	*/mimøʕa:ʃ leʕab/ not-have toys
Target	/ma-maʕha:-ʃ/ Neg.Part.-has-3rdFem.-Neg.Part She does not have NP

31/03/01#2	/ma-ʕandaha-ʃ/ Neg-Part- have-3rd Fem.Sing Neg.Part. She does not have any
16/09/01#	/ma-taxud-s əl-baTa/ /ʃ/ → /s/ Neg.Part-take-2nd Masc.Sing.- Neg.Part. the-duck Do not take the duck
24/06/02# Target	*/laʔ ʔanna miʃ ʕamilithum kidda/ no I did-not do-them-3rd Fem.Sing like-this /laʔ ʔanna ma-ʕamtihum-ʃ kidda/ No I did not do them like this
31/03/01#29	/balla:ʃ/ Do not want it

5.12.3 Use of the definite article

NAD omitted the definite article when its use was obligatory. However, there was great variability across the recording periods leading to an irregular pattern of use. The table below

is a summary of NAD's percentage use and omission of articles throughout the recording period.

Table 5. 25 Use of definite articles by NAD

Age	Use of definite article	Omission of definite article
4;02-4;04	69.23%	30.78%
4;04-4;06	30%	70%
4;09-4;11	75%	25%
5;05-5;11	40%	60%

5.12.4 Use of Prepositions

Prepositions were difficult for NAD. She either omitted them where their use was obligatory or she selected an incorrect preposition. Her difficulty with prepositions confirms both her morpho-syntactic-semantic deficit in addition to her difficulties with the understanding of abstract language concepts which in combination affects her use of language.

Example 1: In the following example, NAD omitted the preposition /ʕalla/ *on* , which is obligatory in this context. In addition, she omitted the verb /ʔaʕda/*sitting*. She also produced a phonological process where she substituted the /k/ in /korsi/ chair with a /t/. This was a consistent phonological process seen across her speech samples.

Context: NAD was playing with dolls and furniture which included a bed and a chair. She placed the doll on the chair and produced the following utterance.

31/03/01#16	*/wə ʕaru:sa ø əl-torsi/ and doll Def.Art.the-chair And doll the chair
Target	*/wə ʕaru:sa ʔaʕda ʕalla əl-korsi/ and doll sitting-Fem.Sing. on Def.Art.the-chair And dolly is sitting on the chair

5.12.5 Omissions and Substitutions of Pronouns

NAD had difficulty with her use of bound and free pronouns. This was apparent when she was referring to her self as cited above in section 5.11.5, in addition to other occasions when she was referring to adults or objects in her environment.

Example 1: Pronoun Substitution

A common error seen in the language of the controls and produced by NAD was with her use of the definite pronoun which agrees with the noun for gender and number. Her use of agreement for number was correct, but she would use the masculine for the feminine. There was a similar percentage of correct and incorrect use for gender agreement in her utterances.

07/04/01#15	*/ih di ħoSa:n?/ what this-Fem.Sing. horse-Masc.Sing What (is) this horse?

Target	/ih da ħoSa:n?/ what this-Masc.Sing. horse-Masc.Sing What (is) this horse?

Example 2: Pronoun substitution error and an addition error

In this example, NAD produced more than one morphological error. She used the plural infixed pronoun (*you*) in place of the feminine singular pronoun, in addition she substituted the morpheme /-i/ (me) with a phoneme /-a/. The resulting word was a *vocalic paraphasia.* The verb stem remained unaffected. It was her difficulty inserting target bound morphology corresponding to pronoun clitics which caused her problems. Interestingly, her sequential ordering of morphology was correct.

Context: She is in the therapy play-room. Her mother was playing with her. She had a box of toys which she tried to open. She could not open it, and she asked her mother to help her.

09/06/01#5	*/ʔiftaħ-u-hu-l-a/ Imp.open- you.Plu. -2nd Plu.- Clitic Dative Prep.- Addition error

Target	/ʔiftaħ- i- ha:- l- i/ open- Sing.Fem.Suffix you- 3rd Sing.Fem it-clitic pronoun- Prep- 1stSing Clitic Open it for me

5.12.6 Adjectives: errors with gender and number agreement and limited use

Agreement errors were a common feature in NAD's expressive language and errors with agreement were seen throughout the recording period. Her errors with verb and pronoun agreement were more frequent than her errors of agreement with nouns and adjectives. A reason for this could be that when compared with her controls on use of adjectives, she infrequently produced adjectives. The expected rate of production for a child aged between 5;00-6;00 years is 16% (Karam El-Din, 1990). Out of 272 utterances, only 2.94% of her utterances contained an adjective.

The adjectives that express *big* and *small* were used correctly, for both masculine and feminine agreement. For example, 26/05/01#25 /ʔdini Tabaʔ suɣayar/ (give-me plate-Masc small-Masc) *Give me the small plate* and 18/11/02#2 /ʔahih əl-kinbi:ra wə ʔahih əs- suɣayarra / (here the-big-Fem. and here the-small-Fem.) *Here is the big one and here is the small one.* Therefore, for the adjective *small* she used /suɣayar/ (small-Masc.Sing.) and /suɣayarra/ (small-Fem.Sing.).

5.12.7 Disordered Sentences: omissions of arguments and lexical items

Utterances coded as disordered were frequently produced by NAD, and a characteristic feature of her language impairment (See figure 5.10). It was not possible to understand the intended meaning of these utterances due to the numerous omissions and/or additions of lexical items.

The disordered utterances are differentiated from the learnt/repetitive phrases (LP/RP), in that for the LP/RP the syntax and morphology is unaffected but the function of the utterance can not be determined from the context. For the disordered utterances, even when contextual and discourse information before and after the disordered utterances is provided, the intended meaning can not be determined and an error analysis can not be done, due to the numerous omission/ addition errors.

Example 1

Context: In this example, NAD was playing with home-corner toys with her mother. She was pretending to cook food, her mother was assisting her. It is not clear from the context or from the utterance whether NAD was commenting on her own actions or her mothers or if she was requesting her mother to do something. She was at the time holding a plastic pot and a spoon.

12/04/01#24	*/guwa əl-maʕlaʔa ʕaʃan moloxiya/ in the-spoon because molokhia

Example 2

Context: NAD was playing with her mother with the dolls, bears and miniature furniture. She looked at her mother when she produced this utterance. The function can not be determined. Neither NAD nor her mother had dirtied their hands.

31/03/01#17	/zay teʃmil ih wasaxti ʔidiki/ how Asp.do-Masc.Sing what Part.-dirty hand-Plu.you How do what you dirtied your hands

5.13 Analysis of the Structured Tasks Produced by NAD

5.13.1 Lexical analysis for verbs: the Winslow verb pictures

NAD was administered the Winslow verb pictures when she was 4;06 years to enable comparisons with both the age and language matched controls In addition, this allowed for a means of comparing NAD's spontaneous use of verbs described above with her elicited use. All of the control children who were administered this structured task were used as controls. The results are listed below.

Table 5. 26 Comparing the results for Winslow verb pictures produced by the controls and NAD

Name	Age	Number Correct (n=42)
Ali	2;05	0
Kenzy	2;07	9
Sanna	3;00	26
Omar	3;06	20
Samira	4;06	40
NAD	4;06	11

When compared with the controls there was a notable difference between NAD's verb naming abilities. Out of the 42 target verbs NAD correctly labelled 11 of the verbs. NAD's ability to label verbs was similar to the control Kenzy who at the time was 2;07 years. This confirms NAD's difficulty with verbs and clearly for her is one of the many features of her language impairment. The verbs elicit the Aspectual markers for Progressive and Habitual but not the Past Tense (Perfective). NAD did not always produce target obligatory arguments, and even when she produced the target verb she produced errors of omission and substitution.

Examples of two verbs that NAD correctly produced are listed below, and they are compared with the controls' productions of the same verbs.

Table 5. 27 Examples of NAD and the controls productions on the Winslow verb pictures

Picture	**NAD 4;06**	**Samira 4;06**	**Sanna 3;00**	**Kenzy 2;07**
Picture 11: A boy brushing his teeth	*/da bi-yi-ʔixsil əl-sinna:nu/ He is brushing the teeth	/bi-yi-ʔixsil sinna:nu/ Asp.Prog-3SM-wash teeth-his	*/ di bi-ti-ʔixsil sinna:nha/ Asp.Prog-3FM-wash teeth-her	No response
Picture 13: A woman smelling a flower	/bi-t-sim əl-warda/ She is smelling the flower	/di bi-t-ʃim əl-ward/ Her, she is smelling the flower	/bi-t-ʃim əl-ward/ She is smelling the flowers	/bi-t-ʃim/ She is smelling

In the first example, Picture 11, Kenzy did not respond, and Sanna produced an error of gender agreement. NAD's and Samira's verb use was correct for agreement and Aspectual

marking. The error that NAD produced was that she added the definite article to the plural noun phrase for *his teeth* (the-teeth-his). The target production was produced by Samira, who at the time was the same age as NAD.

5.13.2 Lexical analysis for nouns: the Winslow noun pictures

As predicted, NAD was able to label more pictures of objects than she was verbs. The results do, however, support her reduced MPU scores and indicate difficulty with lexical acquisition and word retrieval difficulties. She labelled 64.52% of the pictures. For example, when labelling a picture of /ʃamʕa/ *candle* she labelled it /tofa:ħa/ *apple*, which would be a non-semantic error. She labelled /baʔara/ *cow* as a /xaruf/ *sheep*, which would be a semantic error.

Table 5. 28 Comparing the results for Winslow noun pictures produced by the controls and NAD.

Name	Age	Number Correct (n=31)
Ali	2;05	12
Kenzy	2;07	15
Sanna	3;00	25
Omar	2;07	17
Omar	3;06	29
NAD	4;06	20

5.14 Summary

NAD is female Language Impaired child who presents with a Developmental Language Impairment. Her language impairment was studied over a 21 month period. Data from spontaneous language samples and structured tasks were analysed to identify the language domains that were affected.

In summary, NAD presents with a complex profile and there are many other areas of development that are also impaired although none of these individually can account for her pattern of language impairment.

When compared with the controls, her language use and structure show a-typical developmental patterns, thus being given the diagnosis of developmental language impairment. Her MPU was restricted and did not change over the 21 month recording period. She produced errors in morpho-syntax affecting her use of verbs. As predicted Tense and Aspectual marking remained unaffected, and errors were predominantly with agreement for verb information. Her lexicon was restricted and she rarely used plurals and prepositions and when she did they were produced with errors. Adjectives were also infrequently produced. Her use of agreement for pronouns and verbs were equally affected and she produced gender, number and person agreement errors. She also omitted obligatory lexical items and morphemes contributing to the high percentage of error. The Functional analysis was a reliable indicator of NAD's difficulties. NAD functionally used language to request and label. When compared with the controls she rarely used Intraverbals which is indicative of her receptive language difficulties. She also rarely used echoics which was similar to the controls. Her over production of Learnt/ Repetitive Phrases and disordered sentences was highlighted and such phrases were rarely produced by the controls.

6. DISCUSSION

Introduction

Three children were examined longitudinally to investigate developmental language impairment (DLI) in Egyptian Arabic (EA). Twelve normally developing children served as controls for the three EA-DLI children. Specific cross-sectional and longitudinal data was collected to compare errors found in children developing language normally and the errors produced by the language impaired children. Data collection was conducted in Cairo, Egypt. Egyptian Arabic is a language previously not investigated for developmental language impairment.

This chapter will first begin by reintroducing the initial objectives and the linguistic areas of interest examined in this study. It will include a summary description of the Egyptian Arabic language and the difficulties encountered when undertaking cross-linguistic research. This will be followed by a summary of the methodology used to examine these areas of interest. Following from this, the outcomes and conclusions of the study will be presented and discussed in four parts in the next chapter.

6.1 General summary of findings

The first part is a discussion of the error patterns observed in normally developing EA children with a summary chart of the approximate age when these linguistic structures are acquired. Not all structures and error patterns described in Chapter 4 are included, as in some instances data was not sufficient. The second part compares the EA-DLI children's language with that of the control children. The aim here is to highlight shared linguistic error patterns observed in the control

children with those also present in the EA-DLI children's language, as well as to differentiate between error patterns only observed in the language of the EA-DLI children that may be considered potential clinical markers for EA-DLI.

The third part is a comparison of the EA findings of this study with other cross-linguistic studies. In the fourth part the theoretical and clinical implications of these cross-linguistic comparisons are considered, focusing particularly on the Extended Optional Infinitive Account (e.g. Rice and Wexler, 1996) and Surface Accounts (Leonard et al., 1992, 1997). The incompatibility of these theories with certain features of Egyptian Arabic will be discussed.

6.1.1 The aims of the research

The first aim of this research work was to identify and describe the linguistic patterns of impairment present in Egyptian Arabic Developmental Language Impairment (EA-DLI) as demonstrated by three monolingual children and to compare and differentiate these with error patterns observed in children acquiring Egyptian Arabic (EA) normally. The second aim was to compare Egyptian Arabic Developmental Language Impairment (EA-DLI) with Language Impairment examined for other languages, and to identify linguistic characteristics that are shared and those that are typologically specific to Egyptian Arabic.

The questions that were initially asked were:

1. What are the similarities and differences in error patterns between children acquiring Egyptian Arabic language normally and those with impaired language?

2. What are the most salient linguistic features of Egyptian Arabic Developmental Language Impairment?

3. What are the similarities and differences between Egyptian Arabic Developmental Language Impairment and other languages researched for (specific) language impairment (SLI)?

6.2 The language examined and the linguistic areas of interest

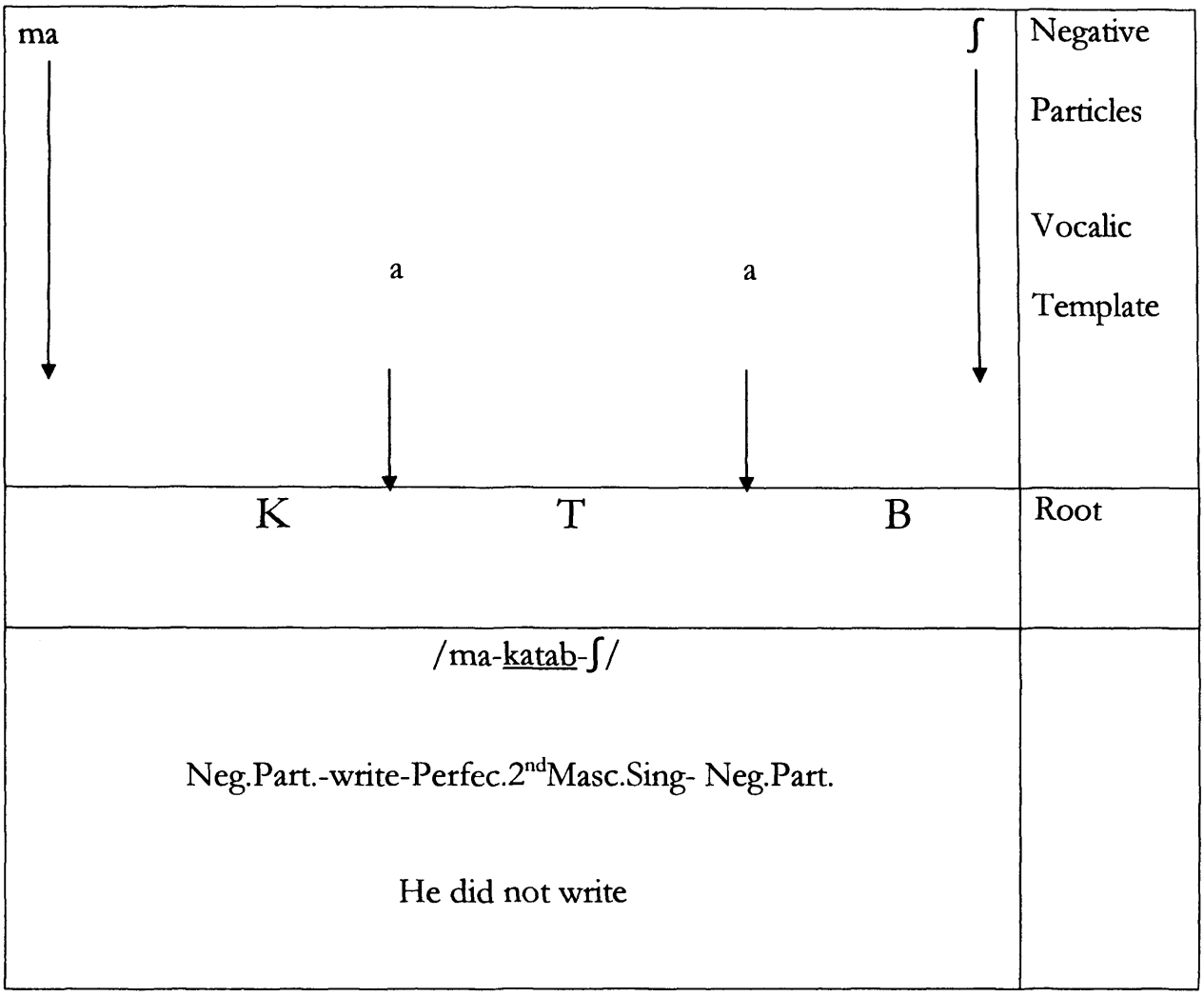
6.2.1 The Arabic language

Egyptian Arabic belongs to the Semitic group of languages. The only other Semitic language to have been studied for SLI is Hebrew. The language examined in this study was the spoken variety, Egyptian Spoken Arabic (EA). Arabic is an interesting test case for Developmental Language Impairment. Unlike many of the other languages examined for SLI, Arabic is a morphologically rich language with a complex system of bound morphology. In most instances, all verbs and most nouns and adjectives in Arabic can be considered to be formed from a combination of a consonantal root plus vocalic infixes. The root provides the common semantic core for words formed, i.e. nouns and verbs. All verbs are marked for gender, number and person. The root on its own is unpronounceable and is not a lexical item. It is only through the use of infixation, suffixation and prefixation that words can be generated. Each consonantal root may be compared to a train carriage and the connections between the carriages are the vocalic templates and morphemes that are then inserted between and on either side to then form the word.

Figure 6.1 below is an illustration of the tri-consonantal root as the semantic core of the word and the vocalic insertions that can be added and provide additional syntactic and semantic information. When considering the errors observed in the children it is important to keep this framework in mind. Also for this reason, rather than using type/token ratios to examine verb use in Arabic, the categories used were selected to accommodate the Semitic nature of the language. Therefore it was important to identify when the children were using different root forms, and then to identify the different forms that they were able to generate by using different vocalic templates as well as

morphological prefixes and, infixes and suffixes. For any given root, approximately 13 different verb forms can be conjugated which vary for Aspect/Tense, person, number and gender.

Figure 6. 1 The tri-consonantal root and examples of vocalic template and morphological insertions



Other interesting linguistic features of Arabic are that the negative can be expressed as a lexical negative or a split discontinuous negative where both forms are required and obligatory in the language. For example, the two morphemes /ma-/ and /-ʃ/ in /ma-ʔakal-ʃ/ *he-did-not-eat* are both used to express the negative and both forms are required. Regarding plurality, nouns in Arabic form their plurals either by suffixation, or by internal change to the word. A further characterising feature of Arabic is the use of the dual, which is used to express two of something, for example, /kitabe:n/

books-two, in English meaning *Two books*. The suffixed plural is formed by the affixation of a plural suffix to the singular form, as is the dual. Plurals for masculine and feminine objects can be regular or irregular and agree with nouns for number and gender. There are also irregular broken plurals that do not follow any phonological rules, they form the majority of plurals and are learnt by rote. Regarding use of pronouns the interesting feature is that more than one pronoun can be added to form pronoun clitic strings which can be added to nouns and verbs. With regards to sentence structure there are two types of sentences in Arabic: the verbal sentence and the nominal sentence. Regarding nominal sentences Arabic does not require a copular or auxiliary. Therefore a sentence in English such as "The house is big" in Arabic is /əl-bit kibir/ *the-house big* and is a nominal sentence because there is no verb.

One of the methodological problems encountered when conducting cross-linguistic research is to identify and specify adequate levels of comparability across languages. Even when comparing languages from similar groups, e.g. Hebrew and Arabic, what may be used to describe a grammatical feature in any one given language may not necessarily exist in another language or may be expressed differently. For example, there are Infinitives in Hebrew but there is no such form in Arabic. Therefore, finding commonalities between languages, linguistic sub-systems and methodological tasks used to measure language, such as MLU or comparing grammatical categories such as Past Tense, can be difficult. Further when describing linguistic structures in this study, where possible, less 'Anglo-centric' terms were adopted to allow for appropriate comparisons between the languages examined cross-linguistically for SLI. For example, the term 'default verb form' was adopted where in other languages the term 'Infinitive' is used. These differences were considered when designing the structured tasks, measurements for language. For example, mean morphemes per utterance and tokens of morphological productivity were used instead of mean length of utterance and Type/Token ratios (as mentioned above).

There were two additional limitations that were considered as part of the methodology of studying EA-DLI. The first is that the available data on normal language development in monolingual Arabic speaking children is limited. Only two studies have been conducted that are published in English (Omar 1973; Ravid and Farrah, 1999). The second limitation is that there is no extensive reference grammar available that describes spoken EA although there is substantial material that describes Modern Standard Arabic (Eid, 1990). A micro-grammar that explains the relevant morphology of spoken Egyptian Arabic and defines the terms selected to describe key morphological features of the EA children's language has been presented in Chapter 2.

6.2.2 The linguistic areas of interest

Developmental studies conducted into monolingual Arabic (Ravid and Farrah, 1999; Karam El-Din, 1990; Omar, 1973), studies conducted on agrammatism in Arabic (Mimouni and Jarema, 1995; Mimouni et al., 1996; Safi-Stagni, 1991) and morphological and grammatical differences between EA and other Indo-European languages examined for language impairment were all considered when highlighting the linguistic areas of interest motivating this study.

The only study to have examined pre-school language impairment in Arabic was conducted in Sweden (Hakansson et al., 2003) and focused on bilingual language impaired pre-school children who spoke other varieties of Arabic (e.g. Palestinian, Iraqi and Syrian Arabic) and Swedish. The linguistic areas of interest are listed below in Table 6.1.

Table 6. 1 Linguistic Areas of Interest

1	When compared with the normally developing children the developmentally language impaired children will be slower in their lexical development and later in their emergence of word combinations. They will have more difficulty with their use of obligatory grammatical morphology. As a result their MPU values will be lower and slower to develop than their controls.
2	The developmentally language impaired children's percentage of errors will be greater than their controls' and will fluctuate. Normal developmental errors will be expected to be produced by the controls, but percentage of errors will steadily decline over time.
3	A functional analysis of language will show that the developmentally language impaired children will respond to fewer questions that require abstract verbal reasoning (i.e. Intraverbals) and they will produce more disordered and learnt repetitive phrases.
4	When compared with the normally developing children the developmentally language impaired children will omit more obligatory elements in their utterances including inflectional morphology and lexical items.
5	When compared with the normally developing children the developmentally language impaired children will produce less verb types and morphological variance will be limited. In addition verbs will be produced with errors of agreement for number, person and gender; but Tense and Aspectual marking will be less problematic. GAP verbs will be used by the younger controls and the EA-DLI children.

6	The control children will name more nouns and verbs than the language impaired children as tested by the Winslow nouns and verb tasks. Further both the younger control children and the language impaired children will name more nouns than verbs.
7	The developmentally language impaired children will omit and produce lower percentages of bound and free pronoun clitics, negative particles, prepositions and articles.
8	When using negative particles the language impaired children and the younger control children will begin by using the lexical negative particles and only later begin to use the discontinuous negative particles.
9	The developmentally language impaired children will produce less regular, irregular plurals and the dual than their controls. Over-regularization errors will be present in both groups.

6.3 How the linguistic areas of interest were examined

To examine these linguistic areas of interest and to answer the initial research questions the methodology and limitations encountered during this study are summarised below.

6.3.1 The subjects

The language of three EA-DLI children AEL, MHB and NAD was examined longitudinally using both qualitative and quantitative analysis. A language disorder checklist was designed *a priori* and used to select the three EA-DLI subjects. All three children met the initial inclusionary and exclusionary criteria for SLI (Leonard, 1998), that is the development of their language fell

significantly behind their development in all other areas, such as nonverbal intelligence, motor and socio-emotional abilities. In addition, the underlying cause of their language difficulties was at the time of selection unknown and not directly due to any acquired neurological lesions, e.g. cerebral palsy. They had passed hearing tests and did not have any episodes of otitis media. A positive history of language learning difficulties in the family may also have been present, as was the case with AEL.

It was only possible to informally assess the EA-DLI children's cognitive abilities because of their young age when first seen, therefore to remain conservative with diagnostic labelling, the three children were initially diagnosed with developmental language impairment and not specific language impairment. In addition, since the children's language was being studied longitudinally a change in language and cognitive abilities could be expected (Cole et al., 1995).

The table below is a summary of the age the three EA-DLI children were when first seen, sex, the period of recording, and the number of spontaneous utterances recorded and transcribed.

Table 6. 2 The developmentally language impaired subjects

Name	Age first seen	Sex	Period of recording	Total number of utterances
AEL	3;00	male	3;01-7;01	1015
MHB	4;06	male	4;06-4;08 and 6;02	238
NAD	4;02	female	4;02-5;11	272

Data was collected by video recording the EA-DLI children with their mothers and with the investigator during child-led play sessions. These took place mostly in the clinic play-room and

occasionally in the children's homes. Structured tasks were administered to examine specific areas of language. The experimental procedure for each of the structured tasks has been detailed in Chapter 3.

The children's language was phonetically transcribed using broad transcription and then analysed as detailed in chapters 2 and 3.

The children's language was then examined and analysed in accordance with the linguistic areas of interest. A summary of the structured tasks administered to the language impaired children are listed overleaf in Table 6.3.

Table 6. 3 Structured tasks administered to the DLI children

Structured Tasks	AEL	MHB	NAD
1. The Language Disorder Checklist(LDC)	yes	yes	yes
2. The Egyptian Arabic Renfrew Action Picture test (EARAPT)	yes	yes	yes
3. The Egyptian Arabic Sentence Comprehension Test (EASCT)	yes	yes	yes
4. The Winslow verb pictures (WinV)	yes	no	yes
5. The Winslow noun pictures (WinN)	yes	no	yes

6.3.2 The control data

The control data came from 12 monolingual normally developing Egyptian Arabic speaking children. The 12 controls were divided into seven cross-sectional controls and five longitudinal controls. Six controls were administered the structured tasks. A summary of the tasks given and whether the children were longitudinal or cross-sectional controls are listed below in Tables 6.4 and 6.5.

The majority of the data came from video recordings of the children playing with the examiner and with their mothers. Data was also obtained from a child in the same nursery as AEL who was

observed during his Arabic class (Marwan aged 3;00 years). His productions were phonetically transcribed by the examiner as it was not possible to video the children whilst in their nursery. His production of normal developmental errors allowed for an interesting comparison between him and AEL, since they were a similar age when recorded. Supplementary data also included an infant diary study on Habiba when she was aged between 12-18 months. Data was collected by Habiba's mother during bath times and meal times and her productions were phonetically transcribed using broad transcription. The purpose was to examine early word use and to be able to compare these with the productions of the EA-DLI children.

Table 6. 4 Summary of cross-sectional controls

Name	Sex	Age recorded	EARAPT	EASCT	WinV	WinN
1. Luli	Female	1;05	no	no	no	no
2. Hanna	Female	1;11	no	no	no	no
3. Ali	Male	2;05	yes	yes	yes	yes
4. Ismail	Male	2;08	no	no	no	no
5. Sherif	Male	3:03	no	no	no	no
6. Samira	Female	4:04	yes	yes	yes	yes
7. Marwan	Male	3;00	no	no	no	no

Table 6. 5 Summary of longitudinal controls

Name	Sex	Age recorded	EARAPT	EASCT	WinV	WinN
1. Omar	Male	1;07, 2;04, 3;07	yes	yes	yes	yes
2. Habiba	Female	1;01-1;06, 4;01	no	yes	no	no
3. Kenzy	Female	2;01, 2;07	no	no	yes	yes
4. Sanna	Female	2;07, 3;01	yes	no	yes	yes
5. Dudu	Male	2;03, 3;07	no	no	no	no

6.3.3 Methodological procedures for analysing the spontaneous language samples

A linguistic framework for coding and measuring the EA data was developed to examine the linguistic areas of interest and to explore the developmental trajectory and pattern of errors of the EA-DLI children and the controls. This included the following spontaneous language measures and analysis.

1. The children's mean morphemes per utterance (MPU) were calculated for all the spontaneous language recordings as a measurement of grammatical complexity. As mentioned in chapter 3, adopting MPU rather than mean length of utterance (MLU) is the preferred method of measurement for lexical and morphological acquisition when examining Semitic languages (Dromi and Berman, 1982).

2. A percentage of the total utterances that contained an error was calculated for the samples produced by the normally developing children and the EA-DLI children. If an utterance contained either one or more morphological errors or a functional error it was marked as an error. Therefore, the percentage of errors refers to percentage of utterances containing errors, regardless of whether the utterance contained one or more errors.

3. Errors produced were further documented and analysed to identify salient morphological errors and to allow for comparisons between normal developmental errors and those produced by the EA-DLI children with disproportionate difficulty. The following morphological categories were examined: (1) use of plurals and the dual, (2) use of negative particles, (3) use of the definite article, (4) use of prepositions, (5) use of bound and free pronouns, and (6) use of adjectival agreement.

4. To determine the range and patterns of utterance types a functional analysis was conducted on all utterances produced by the children. For each child, each utterance produced was coded into one of

five categories: (1) Tacts (labels), (2) Mands (requests), (3) Echoics, (4) Intraverbals and (5) Disordered/Learnt Repetitive phrases. A percentage of functional use for each of the categories was then calculated to allow for comparisons between the DLI and the normally developing children. This also allowed for emerging patterns of normal developmental patterns of utterance functions to be documented.

5. A lexical analysis for spontaneous use of verbs was conducted on the language samples produced by the EA-DLI children. This allowed for the total number of verbs to be calculated per recording period All verbs produced were also tabulated and categorised according to the type of error. They were categorised according to whether the errors were with (a) both Tense and Agreement (b) an agreement error only or (c) vocalic paraphasias. The vocalic paraphasias were used to describe productions where the root of the word was transparent, and syntactically the form produced took the place of the verb, but where an incorrect vocalic template was inserted thus rendering the word a non-adult target form. In addition, Tokens of morphological productivity were examined and were calculated for the three DLI children. Calculations were made for the controls Omar, Samira and Sanna, but data was insufficient to allow for comparisons.

6.4 The acquisition of morphological structures and normal developmental errors in Egyptian Arabic children

This section is a summary of the morphological structures acquired as produced by typically developing children. Descriptions are taken from the control data focusing on the normal developmental patterns that emerged. It was not possible to include all structures as in some instances there was insufficient data. To understand and document errors produced by developmentally language impaired children it is important to be aware of normal developmental error patterns and to know the approximate ages when morphological structures are expected to be mastered. Errors that are part of the developmental process can then be differentiated from those that would be indicative of language impairment.

Listed below is a summary of the morphological and grammatical structures examined and the approximate age range when they were produced by the control children. It is important to note that this is based on a limited corpus of developmental data. The initial aim of the developmental data was to describe and identify patterns of normal developmental errors (i.e. for form or function), thus allowing for comparisons between the EA-DLI children and normally developing children. The control children were between 1;01 to 4;04 years. The majority of recordings were conducted when the children were between 1;11 to 3;07 years as this is when most developmental errors are expected to occur. There was only one spontaneous language recording made of a child aged 4;04, and this is therefore the only reference for the upper limit for mastery of structures. Furthermore, the majority of the analysis of the data is based on spontaneous language sample recordings, where it is not possible to 'elicit' morphological structures. Therefore, a child may be able to produce a morphological structure but may not have produced it during the recording therefore its absence does not necessarily mean that it has not been acquired. The data was analysed for certain morphological structures, *post priori* structured tasks were not designed to test the production of these structures at different age ranges. The number of children recorded at the same age is also infrequent. Only two children were recorded at 2;07 (Sanna and Kenzy) and at 3;07 (Dudu and Omar), otherwise the age of recording was different.

Despite the limitations of the data base, error patterns were clear and evident across the data of the control children. The approximate age when these structures are acquired and expected to be used are approximations based on this limited set of data.

Regarding grammatical morphology, when morphological use is obligatory, its absence means it has not been acquired. Obligatory contexts are those places within a sentence where an adult speaker would use the morpheme. Non-acquisition of a morpheme will indicate concern if observed in a child whose linguistic stage indicates that mastery should have been obtained. By noting the number

of obligatory contexts for a morpheme and the number of times the morpheme was used correctly in those contexts, the percentage of correct use for the morpheme within the language sample can be calculated. For this work a criterion of 80% correct use in four or more obligatory contexts per language sample was used. Some of the structures identified were used by the children but not considered mastered either because they did not appear in four obligatory contexts or because correct use was less than 80%.

The information presented in this section will be of importance for both clinicians and researchers working with Arabic speaking language impaired children as it will aid in differentiating errors that are part of the normal pattern of development from those that may be indicative of language impairment. This information will also be useful for researchers developing pre-reading and reading materials for Arabic speaking children. The findings of this study support previous work conducted on language development in Arabic (Omar, 1973; Ravid and Farrah, 1999).

6.4.1 Order of emergence of grammatical morphemes in Egyptian Arabic

Table 6. 6 Acquisition of linguistic and morphological structures (80% correct use in four or more obligatory contexts)

Linguistic Structure Acquired	**Age range when acquired (years)**	**Number of children (n)**
1. Lexical Negative	1;11-3;03	4
2. Bound/Free pronouns	1;11-3;03	6
3. Definite Article	2;01-3;00	6
4. Perfective	2;04-3;01	5

5. Regular feminine plural	2;06-3;07	6
6. Conjunction /wə/ *and*	2;07-3;00	6
7. Aspectual Progressive marker /bi-/	2;07-3;07	4
8. Passive e.g. /ətkassaret/	2;10-4;04	6
9. Dual	2;11-4;04	3
10. Person marker with correct gender	3;00-4;04	6
11. Discontinuous negative	3;01-3;07	4
12. Pronoun clitic strings	3;07-4;04	2
13. Broken plural	+4;04	Not yet mastered
14. Regular masculine plural	+4;04	Not yet mastered

6.4.2 Error patterns

Pattern 1: Morphological burst and percentages of errors

The control children's range of MPU values was variable and patterns were similar to those reported for Hebrew (Dromi and Berman, 1981) and those reported by Omar (1973) for Egyptian Arabic. There is no comparable normative data available in Arabic to be able to correlate the age at which normal developmental errors occur in comparison to MPU values. However, cross-linguistic studies on English and Hebrew report around the age of 2;06-3;00 is when most over-regularization errors occur (Berman,1993a; Pinker, 1989; Bowerman, 1982), this was also confirmed by this work.

One of the findings in this study is that a consistent pattern of errors emerged regarding the normal developmental errors; the errors started low, increased at the time of morphological productivity (morphological burst), and then decreased. The increase of errors is at the stage when the children begin to combine words and use short phrases. For each of the controls the age at which a burst of morphological use occurred seems to be related to when their percentage of errors also increased. Following this peak in errors the control children's percentages of errors decreased with age and by the age of 4;00, less than 10% of their utterances contained one or more error.

Pattern 2: Range of utterance types

Regarding functional use of utterances the control children began producing Intraverbals as young as 2;01 and 2;04. Use of Learnt Repetitive Phrases and neologisms were infrequent and were used by only four of the 10 controls. Disordered sentences were not produced by the controls.

Pattern 3: Use of a default verb form and agreement errors for number, gender and person

The control children were observed to use a simpler unmarked verb form when required to use inflected verb forms. This simpler verb form has been labelled as the *default verb form* and it was used by the children when they were between 1;05-3;01. Tense was produced early on by the children and Past Tense (Perfective) was one of the easier constructions. The children were observed to omit

person markers when obligatory although they would use the pronoun which is not obligatory in Arabic[1]. For example, */huwa kul/ *he eats*, where the target should be /(huwa) bi-ji-ʔakul/ *He is eating*. The pronoun is underlined and the person marker is omitted as is the marker for progressive Tense. The children also omitted Tense and Aspectual markings. Substitution errors of gender markings on verbs were more frequently observed as an error pattern, for example, producing /bi-ja-ʔakul/ he-is-eating instead of /bi-t-ʔakul/ she-is-eating and was seen to be present until the age of 3;07-4;00 years. Errors with agreement for number information were not present in the data. Further, regarding verb use, the children were also observed to produce a preferred form of gender, whether for verb agreement or adjective noun agreement.

The children were also observed to omit verbs when obligatory. This error pattern occurred in the data when the children were aged between 1;11-2;08. Arabic does allow verb free sentences, i.e. nominal sentences, these omissions however were when the verb was obligatory as part of a verbal sentence.

Pattern 4: Use of negative

The following developmental pattern of use of negation was observed in the productions of the controls, they are ordered as they appeared developmentally in the data. By 3;07 years negative particles were used correctly:

1:05

1. The children use a simple lexical negative /laʔ/ or no
2. The children use the lexical negative /miʃ/ and (1) above.
3. The children use one or both of the discontinuous negative particles and (1) and (2) above.
4. The children use both of the discontinuous negative particles /m...ʃ/ and (1) and (2) above.

3;07

[1] Arabic is a Pro-drop language where pronominal subjects are optional

Pattern 4: over-regularization errors and patterns of noun plural use

Noun plural formation is a complex system in Arabic and researchers who have examined plural use in Arabic have found that plural development is one of the latest morphological structures to be acquired (Omar, 1973; Ravid and Farrah, 1999). This was supported in this work. The order of development is (1) the feminine regular plural develops first, (2) the broken plurals and the dual (3) regular masculine plurals. It must be noted that there were no productions of regular masculine plurals in the data although there were examples of other plural productions including the dual. This may have been because the oldest control child used in this study was 4;04 years; the acquisition of irregular plurals and masculine plurals are not mastered in Palestinian Arabic until after the age of 5 years (Ravid and Farrah, 1999).

Regarding error patterns the children were observed to use a lexical item that expresses quantity rather than using the plural form of the noun. For example, */kitir kita:b/ *many book*. Over regularization errors occurred when the target was the broken plural and the children instead added the feminine suffix /-at/. This is similar to errors observed in English where children will add an –s to irregular plural nouns (Foster-Cohen, 1999), thus resulting in an error pattern.

Pattern 5: substitutions of pronouns

Bound and free pronouns were produced early on by the children and were generally used correctly. Error patterns were observed and were mostly substitution errors. The first error was that the incorrect pronoun was selected and it did not agree with the gender, number or person for the selected verb or noun. The second error pattern was that a free pronoun was used instead of a bound pronoun clitic.

6.4.3 Summary

The control children produced normal developmental errors including errors or agreement for gender, number and person with verbs. Omission and substitution errors also occurred. Regarding their MPU values, an MPU burst was seen with higher percentages of errors. MPU values were similar to patterns reported for Hebrew (Berman, 1982, 1985). Between the age of 1;05-1;11 years the children used an unmarked default verb form. They rarely omitted verbs and pronouns were produced early on and rarely in error. The children first used a lexical negative and later used the discontinuous negative. As the children became older morphological productivity increased for each verb type.

6.5 Patterns of language impairment in Egyptian Arabic

In this section the error patterns observed in both the control children's language and EA-DLI children's language will be identified as well as those errors only observed in the language of the EA-DLI children which can be considered linguistic markers of EA-DLI. The presence of normal developmental errors was expected in the language of the EA-DLI children. The EA-DLI children were observed to persistently continue to produce error patterns when their chronological ages would not indicate such errors to be produced. The five pattern errors described above were also

present in the productions of the EA-DLI children, with some differences. These are discussed in more detail below.

6.5.1 Delayed lexical and morphological acquisition

When compared with the normally developing children the EA-DLI children were considerably slower in their lexical development and later in their emergence of word combinations and use of morphology, as measured by the MPU values. The EA-DLI children's MPU values did not increase at the same rate as the controls and their range remained restricted.

The MPU values for the controls in contrast were found to be similar to patterns reported cross-linguistically (e.g. Hebrew: Dromi and Berman, 1981), and with age they increased. For example, between 3;01-4;04 years MPU ranges were between 2.05-7.5 (n=5). The pattern of MPU values for the EA-DLI children was different to that of the controls. Using MPU as a measure of morphological acquisition was felt to be an accurate representation of the EA-DLI children's morphological acquisition.

The EA-DLI children's MPU values were seen to fluctuate and did not increase steadily with time. For example, AEL's MPU when aged between 3;01 to 3;05 was the same as one of the younger controls at 1;05 (MPU=1.14). It was not until AEL was 4;02 that his MPU reached 2.15, compared with his twin sister who at 4;04 had a MPU of 7.5. When he was 7;01, AEL's MPU reached 4.33. There were few occasions where NAD produced an utterance of more than 3.69 morphemes. Her MPU values were greater than 3.69, her MPU scores not only remained low, but fluctuated between 2.66 and 3.69. For MHB, at age 4;06-4;08 his MPU was 2.84, later at 6;02 his MPU was 5.00.

Therefore, from the evidence collected here, restricted and fluctuating MPU values are features of Developmental Language Impairment in Egyptian Arabic.

6.5.2 Percentage of errors remain high and fluctuate

The developmentally language impaired children's percentage of errors was greater than their controls' and fluctuated. For NAD, AEL and MHB, high percentages of errors could be seen as a diagnostic characteristic of their language impairment. Whereas the control children's errors reduced over time the EA-DLI children's percentage of errors fluctuated. This variability in performance is an additional diagnostic characteristic of their language impairment (DLI). There is no comparable normative data available in Arabic to be able to correlate the age at which normal developmental errors occur in comparison to MPU values. However, cross-linguistic studies in Hebrew and English report around the age of 2;00-3;00 is when most over-regularization errors occur (Berman 1993b; Bowerman 1982b; Pinker, 1989). The pattern of errors reported in this study for the normally developing children, i.e. the errors started low, increased at the time of morphological productivity and then decreased, was contrary to the pattern of the EA-DLI children. The EA-DLI children's errors remained high and fluctuated. In addition, unlike the controls there was no direct relationship between percentage of errors produced and MPU values.

For example, AEL's percentage of errors was 33.33% when he was 6;03 years. Three of the controls shared this same percentage of errors of 33.33%, but when they were much younger (Ismail at 2;08, Sherif at 3;03 and Omar at 3;07). AEL's percentage of errors fluctuated ranging from 33.33% to 72.53% compared with the oldest control whose percentage of errors, after 4;04 fell to less than 10%.

Similarly, NAD's percentage of errors ranged from between 53.33% to 32.22%. For MHB when recorded at 4;06 his percentage of errors was 88.31% and although there was a significant drop, when recorded at 6;02 his percentage of errors remained high at 58.33%. An additional difference

between NAD, MHB, AEL and the controls was that not only were more of their utterances produced with errors, but utterances more often contained more than one error.

6.5.3 Functional Analysis

There are similarities and differences between the patterns used by the EA-DLI children and those used by the normally developing children. The coding system used to determine the function of the utterances produced by the controls and the EA-DLI children served as a useful categorisation system as it clearly identified similarities and differences between the two groups of children. The EA-DLI children and the control children were similar in that in their early language years the control children used mostly labels and requests almost at an equal value and few used Intraverbals. As hypothesised, the control children's use of Intraverbals was more frequent and increased with age, which was not the case with EA-DLI.

Mands and Tacts were the types of utterances used the most by the controls and the EA-DLI children. For the controls this was during the early stages of their language acquisition, i.e. when under the age of 3;00 years. As the control children became older they also used more Intraverbals but continued to use Mands and Tacts. Echoics and Learnt Repetitive phrases and Disordered sentences were the least used. The control children's Mands became more complex as they used the Arabic equivalent of Wh- question forms rather than simple requests; and their ability to produce Tacts also developed in that they were able to narrate stories from books. Contrary to this, the EA-DLI children were similar in their use of Mands and Tacts, but they used Learnt/Repetitive Phrases and disordered sentences at a much higher rate than the control group. Intraverbals were the least frequent type of utterance used by EA-DLI children.

Echoics were rarely used by the control children and when they were produced it was after a normal developmental error had been corrected by the adult, and they self-corrected their initial

production by echoing the adult. Although the EA-DLI children were occasionally observed to produce Echoics they served a similar function to the controls.

The Language Impaired children on the other hand rarely used Intraverbals and when they did they used them much later. When AEL was 6;03, 26.66% of his utterances were Intraverbals, compared with his twin who at 4;04 used them 25% of the time.

The expected pattern that Intraverbals would be used less and later by the EA-DLI children was supported. The control children began producing Intraverbals as young as 2;01 and 2;04. In comparison, NAD's Intraverbal use was not above 10% until she was aged 5;05-5;11 years; and AEL's Intraverbal use was not above 10% until he was 5;05-5;08 years.

An additional characteristic feature of the EA-DLI children's expressive language was their use of Learnt Repetitive phrases, disordered sentences and neologisms, which were produced by all three of the EA-DLI children. Comparing the utterance types for the EA-DLI children, their most frequently used utterance types were requests (Mands) and labels (Tacts), followed by Learnt Repetitive phrases and Disordered sentences. Intraverbals were the least used utterance type for NAD and MHB. For AEL, his use of Learnt Repetitive phrases and disordered sentences reduced and at 6;03 years none were produced, compared to NAD who continued to produce them at 5;05-5;11, (7.69%), though her percentage of use dropped; and MHB whose Learnt Repetitive phrases and Disordered sentences constituted 17.86% of his utterances at 6;02.

The Learnt Repetitive phrases were infrequently observed in the speech of controls, and are considered a characteristic feature of both NAD's and MHB's language impairment, but less so for AEL since his use was similar to the controls. When used by MHB and NAD, these phrases were either attached to an utterance or they were produced in isolation within an inappropriate context. In contrast, although the controls used similar phrases (i.e. Learnt Repetitive Phrases and

neologisms) their use was far less frequent and there were differences. Kenzy at 2;07, Ismail at 2;08 and Omar at 3;07 each produced one such utterance. Dudu was the control who produced the most. At 2;03, 5 of his utterances were coded as these and at 3;07 two of his utterances were coded as these; thus they decreased with age. They were: five neologisms, two learnt repetitive phrases and one no referent. Disordered sentences were not produced by the controls.

The neologisms were produced by the control children and the EA-DLI children in a similar manner, whilst playing. NAD and MHB also used them when they were asked a question that they did not know the answer to. The neologisms are words produced that do not violate phonotactic rules of EA. The target is unknown and even if the word produced is due to phonological distortions of a target word, the target cannot be recognised from either the context or from the pattern of phonemes. NAD and MHB had word retrieval difficulties, which may explain their use of neologisms.

NAD and MHB were also observed to produce phrases where there was no known referent. That is the subject matter of their phrases could not be determined from either the linguistic context or from the play (environmental) context. On these occasions the utterances were well formed grammatically, but non-contingent to the context. This type of utterance was infrequently produced by the controls (n=2).

The third type which was not observed in the language samples of the controls was the use of disordered utterances. MHB and NAD produced long strings of lexical items which could not be analysed for function or syntax and were therefore coded as Disordered. These were used either when there were breakdowns in their receptive language or they were interspersed within the discourse and their function could not be determined from the situation of the language context. It

was the high incidence of disordered utterances that lead to the high percentage of errors cited in the above section for NAD and MHB.

6.5.3.1 Limitation to coding system

The coding system used for the functional analysis was initially selected because it was a straightforward way of categorising the utterances produced by the EA-DLI children. The analysis used accounts for single words and phrases with restricted MPU values, in addition to phrases where the MPU is greater. This is useful when coding language that is impaired. In addition, when examining the language of young children with language impairment and selecting children for this study it was necessary to exclude children with Autistic Spectrum Disorders. When such a coding system is used on children with Autistic Spectrum Disorders, the coding system selected, would reveal a different pattern regarding functional use of utterances; where Echoics and Tacts (Mands) would be more frequently produced, but verbal Mands (requests) would be less (e.g. Sundberg and Partington, 1982; Sundberg, 1987). It was important when selecting children for this study to differentiate between some children with Autistic Spectrum Disorders, who may make good use of non-verbal communication in their use of eye-contact but are impaired in their functional use of language, and those children with developmental language impairment as examined in this study. Second, when young children's language is examined, i.e. between 1-3 years, children produce short phrases and often produce single words. It was important to have a coding system which could account for the different functions that utterances serve for the EA-DLI and the control children, but at the same time one that was not over detailed which would make interpretations of data more difficult. Two types of comparisons were also necessary which were served by the selected coding system. The first was to compare the control children with the EA-DLI children. The second was to be able to observe the developmental pattern changes regarding the children's functional use of utterances. The selected system served the initial aims of the project well and allowed for necessary comparisons to be made to examine the 3rd linguistic area of interest. It was predicted that the

developmentally language impaired children would respond to fewer questions that require abstract verbal reasoning (i.e. Intraverbals) and they would produce more Disordered and Learnt Repetitive phrases. Otherwise they would show similar usage in their utterance functions for labelling and requesting and they would infrequently produce Echoics. The coding system adequately examined the 3rd linguistic area of interest, but there were limitations.

Although there are advantages to using a gross category system for functional analysis, the disadvantage is that it does not measure the complexity of the response within the category. This explains the variability between controls and why Kenzy and Sanna used Intraverbals before the age of 3;00 years compared with the other controls who began using them much later. There is no normative developmental data available on use of different utterance functions. Although it is difficult to make cross-linguistic comparisons, informal observations of children acquiring English and Arabic support the same pattern of development for the function of the utterances produced.

A further limitation of using such a coding system is that it did not allow for sub-categorization. It also did not allow for comparisons to be made between simpler and more complex forms of utterance types within categories, i.e. a simple request versus a complex question form. For example, within the Mand category if the child said "banana" and used a rising inflection and indicated that they wanted a banana this would be coded as a Mand. In the same way if a child said, "Can you name something that is yellow, it is fruit and you eat it?" this too would be coded as a Mand. Similarly a child responding to the question, "Tell me the names of three things you eat?" or "Tell me how you make a lemon drizzle cake?", would both be coded as an Intraverbal, although the latter is more complex.

6.5.4 Verb use and related patterns of morphological errors

As hypothesised the DLI children had more difficulty with their verb use. The Verb analysis and the results of the Winslow verbs tasks revealed that the EA-DLI children used less verbs and their use

of verb morphology related to number, gender and person agreement resulted in morphological errors, although errors related to Aspectual markers and Tense became less problematic over the course of the data.

6.5.4.1 Reduced verb types

The results of the Winslow verb pictures showed that for the control children, their pattern of verb use followed the expected developmental pattern and supported the findings reported in the Karam El–Din word list report (1990).

When comparing the results of the Winslow nouns and verbs, as expected the control children and the EA-DLI children were able to label many more nouns than they were verbs (N.B. MHB was not administered the Winslow Nouns and Verbs). For the controls their ability to name the noun and verb pictures increased with age. The oldest control at 4;04 named almost all of the Winslow verbs correctly (95.24%) and AEL's younger sister Sanna named 62.90% correctly at 3;00 years; compared with NAD who at 4;06 named 26.19% and AEL who at 4;06 named 19.05% correctly. Also when both aged 4;06 NAD and AEL were able to name more Winslow noun pictures than they were verbs, NAD named 64.52% and AEL named 93.55%, compared with a younger control (Omar) who at 3;06 named 93.55%.

Regarding spontaneous use of verbs, NAD and AEL named fewer verbs and nouns than the controls. NAD produced a total number of 99 verbs throughout the 21 month recording period. Consistent with her MPU values being reduced she never produced more than one verb phrase per utterance. AEL produced 377 verbs, 71.62% of which were produced with errors and 28.38% were correct. MHB also produced less verbs, however his difficulties with verb agreement were not as frequent as NAD's and AEL's. For the 238 utterances that were transcribed for MHB, of these only 128 verbs were produced; 77.42% were produced correctly and 22.58% were produced with errors.

6.5.4.2 Verb error patterns

As initially predicted, when the EA-DLI children produced a wider range of verbs their errors were predominantly with person, gender and number agreement and less with Tense. Both the control children and the EA-DLI children omitted inflectional morphology on verbs, which resulted in the production of a simpler form which has been labelled the *default verb form.* This form was used by the control children between 1;05-3;04 and was used by the EA-DLI children at a much higher frequency. For example, at 2;03 Dudu produced three and Hanna at 1;11 produced two default verb forms. When these results are contrasted with AEL there is a considerable difference. Between 3;10-4;01, of the 61 utterances transcribed, AEL produced 11 verbs and of these six were the default verb form. Between 4;02-4;05, 181 utterances were transcribed and he produced 77 verbs, 22 of which were the default verb form.

6.5.4.3 Omissions and substitutions of verbs

Verb omission was only observed early on in the control data, although it was a characteristic feature of the EA-DLI children's language. NAD, AEL and MHB all omitted verbs where their presence in an utterance was obligatory. Similar to the younger controls they also used general verbs (GAP verbs), when a more specific verb was required.

6.5.4.4 Errors with Aspect and Tense

For EA-DLI children Tense and Aspectual information was not found to be as problematic as was correct use of verb agreement information for number, person and gender agreement. Their pattern of verb errors for Aspect and Tense were similar to the normally developing children, but their errors continued when they would have been expected to have been mastered. When the control children and the EA-DLI children were required to use the Perfective (Past) Tense occasional errors were observed, however they were less frequent than those for the Imperfective (non-Past). The Aspectual marker for progressive was mastered by 2;07-3;07 and the Perfective was mastered

between 2;04-3;01. There are both regular and irregular forms of the Perfective Tense in EA, the latter being less frequent. The 3rd person singular masculine form of the Perfective is usually taken in Arabic as the citation form of the verb since it is the simplest form; and presumably this is why the children were seen to use it correctly early on in their syntactic development.

NAD and MHB correctly produced verbs and few errors were observed for Aspectual markers, or Tense, or for agreement. Although their morphological errors were occasionally related to verbs, these were not any more problematic than were their errors with syntax, morphological agreement errors for nouns and adjectives, and omissions of obligatory lexical items and morphemes; all contributing to their high percentage of errors cited above. Their pattern of verb use was different to that of AEL's, whose morpho-syntactic deficit had a marked effect on his verb use. His verb errors related to Tense and Aspectual marking were more frequent, however these errors reduced over time and at the last recording 100% of AEL's verb errors were with agreement and not with Tense. His errors were similar to those produced by the younger controls but frequency of occurrence was greater and they resolved much later. At 6;03 AEL produced 42 verbs, 23 of them were produced correctly and 19 were produced with subject verb agreement errors. Tense not being problematic was also seen for NAD and MHB. Between 5;05-5;11, NAD produced 20 verbs, only one of which was produced with a Tense error. At 6;02, MHB produced 31 verbs, and of these, none were produced with Tense errors and 7 were errors of subject verb agreement. The differences seen between the three EA-DLI children support individual variability in the pattern of errors that surface as part of the language impairment.

6.5.4.5 Number, gender and person errors

NAD, MHB and AEL all produced agreement errors for gender. This error pattern was also produced by the controls but less frequently. Gender errors resulted either, when the target was feminine and they used the masculine, or the reverse. The three children were recorded with the

investigator who was female, their mother and female teachers. NAD was also recorded with her father. Thus it would seem that the children had more potential contexts in which to use feminine person markers than they did masculine. Verb gender agreement errors were also produced with masculine and feminine objects; within the same recording, when the child was referring to the same object or person, they sometimes produced a different gender with the verb. When NAD was talking about a doll within the same recording she used both the correct and incorrect agreement for gender.

In addition, when the children were using the Imperative they frequently omitted the 2nd person feminine singular marker. If the children had been recorded only with males this error pattern would not have been detected.

When the agreement errors were further analysed to evaluate whether certain verb agreement information was more problematic than others, no pattern was found for any of the three EA-DLI children.

6.5.4.6 Participles and the Passive

It was initially hypothesised that EA-DLI children would either use participles as a default form or they would produce fewer agreement errors with participles since they are morphologically simpler. The reason is that participles are only marked for number and gender and they do not need supporting verbs. None of the language impaired children exhibited this pattern of impairment.

AEL, NAD and MHB correctly used Participles and the Passive, with a low rate of omission which was similar to that of the controls. When they used Participles their use was correct for agreement of number and gender. This is interesting because Participles in EA are not marked for person, although verbs are marked for Person. The EA-DLI children did not however use participles as a default substitute for verbs.

6.5.4.7 Vocalic paraphasias

AEL, MHB, and NAD all produced vocalic paraphasias. These were not observed in the control children's utterances. A vocalic paraphasia is where the root of the verb is transparent, but an addition error occurs due to one or more phonemes being inserted in addition to other target phonemes (vocalic patterns) which hold the verb information. This has been used by some researchers to support the organisation of the Arabic lexicon (Boudella and Marslen–Wilson, 2001) which is tangential to this study. This type of error is a different error pattern to the Neologisms cited above in the Functional Analysis section, where the target production is not transparent but the string of phonemes produced correspond with the phono-tactic rules of EA, resulting in a neologism error.

The presence of vocalic paraphasias does however support difficulty with inflectional morphology and since the root holds semantic information, and is more robust, this will be less vulnerable to error patterns. But the vocalic template holds syntactic and semantic information and is therefore more susceptible to error patterns due to weaknesses in morpho-syntax; a reported weakness in children with SLI children (Leonard, 1998).

6.6 Grammatical and Morphological Error Analysis

The EA-DLI children produced errors with nouns and verbs and other lexical and morphological structures, bound and free. The errors described below were also observed in the controls with few error patterns produced only by the EA-DLI children.

These errors were due to either: (1) omissions of obligatory morphological and lexical structures, e.g. prepositions; (2) agreement errors for adjectives and nouns; or (3) where one morpheme is substituted for another, e.g. the feminine pronoun /da/ this-Fem. was substituted for /di/ this-Masc. Each morpheme examined was compared with the controls productions.

6.6.1 Error patterns with the plurals and the dual

Similarities and differences were observed with the productions of plurals and the duals by the EA-DLI and control children. Nouns in EA form their plurals either by suffixation, or by an internal change to the word. The suffixed plural is formed by the affixation of a plural suffix to the singular form. In EA, plurals and the dual are not consistently and accurately used by children in an adult target form until the age of 7;00 and it is one of later morphological structures to be acquired (Ravid and Farrah, 1999; Omar, 1973).

Younger children do express plurality correctly as detailed in Chapter 4, however errors with plurality and the dual are common. The errors produced by NAD, AEL and MHB were similar to those produced by the controls. AEL did not produce the broken plurals. An additional strategy used by the controls and the EA-DLI children was to use a separate lexical item expressing quantity or number to describe the plural form. This has also been reported in the Palestinian Arabic data on plurals (Ravid and Farrah, 1999).

A difference, however, between the EA-DLI children and the controls was that their use of plurals was limited. An additional difference was a strategy adopted to express plurality which was not observed in the control data. The EA-DLI children were observed to repeat the noun rather than using the morphology for plurals.

6.6.2 Use of the negative

As hypothesised the early productions of the negative by the younger control children and EA-DLI used lexical negative particles, e.g. /miʃ/ *not* or /laʔ/ *no*. It was also hypothesised that the EA-DLI children would not use one of the discontinuous negative particles on its own /m..ʃ/, but instead they would produce the lexical negative particles /miʃ/ *not* and /laʔ/ *no*.

The discontinuous negative was mastered approximately between 3;00-3;07 (n=4). NAD, MHB and AEL had difficulty expressing the negative when the discontinuous negative form /m..ʃ/ was required. Despite this, the discontinuous negative was at times used correctly and they were also observed to produce only one of the discontinuous negative particles. Only one control, Dudu, was observed to share this error pattern and he was 2;03. A difference was that when the adult repeated the correct model back to Dudu he then spontaneously used the correct form, however when spontaneously expressing negation he used different forms. This was different to the EA-DLI children. When the correct form was repeated back to AEL he continued to use his own production and did not self-repair his error.

A possible reason for the EA-DLI children's difficulty with the discontinuous negative is that the discontinuous negative has to be used in a sequential manner across a verbal phrase, which is syntactically more complex. The EA-DLI children's productions resulted in words produced with errors due to only one of the discontinuous morphemes being produced. The errors observed for negative productions do however indicate that the EA children develop the ability to understand the functions of the morphemes early on, although they may not consistently produce them.

6.6.3 Use of definite articles

The control children and the EA-DLI children were occasionally observed to omit the definite article when its use was obligatory. This was one of the least problematic structures for the EA-DLI children. Although observed as an error pattern in the controls it was mastered early between 2;01-3;00.

For the controls, at 1;11, Hanna's rate of omission and use of the definite article were the same (50%) and this was the lowest rate of omission; the other two controls who omitted definite articles

were Samira and Kenzy and were both aged 2;07 years, but percentages of use were always higher than percentages of omissions. The same pattern of usage was seen for the EA-DLI children.

NAD, AEL and MHB both omitted and used the definite articles, however, for NAD there was great variability across the recording periods leading to an irregular pattern of use; at 4;09-5;11 her correct use was 75%, but at 5;05-5;11 correct use 40%. For AEL and NAD their rate of omissions decreased with age, when AEL was aged 5;06-5;09 his correct use was 65.22%, and 6;02 MHB's correct use was 96% and considered mastered.

An explanation for the definite article not being problematic for the EA-DLI children and not a consistent developmental error for the controls is that in EA its use relies on a phonological process of assimilation and not a morphological process.

6.6.4 Use of Prepositions

Prepositions were consistently difficult for the three EA-DLI children and a characteristic feature of their language impairment. For the control children as they became older they used more prepositions and percentages of omissions reduced. The highest rate of omission was 50%, by Omar at 2;04 and Sanna at 2;07. The EA-DLI children's use of prepositions was similar to the younger controls. They either omitted them when their use was obligatory or they selected an incorrect preposition. For all three EA-DLI children their difficulties with prepositions confirms their morpho-syntactic deficit in addition to their difficulties with the understanding of abstract language concepts, which in combination affects their use of language.

6.6.5 Omissions and substitutions of Pronouns

The pronoun system in Arabic is complex as pronouns can either be bound or free and they agree with nouns for number, person and gender. Pronouns were produced early on by the controls, and they were generally used correctly. Errors of omission and substitution for agreement of gender and

person were produced, although the latter was less frequent. Bound and free pronouns were mastered early on between 1;01-3;03 (n=6), however pronoun clitic strings were not mastered until later 3;07-4;04 (n=2). The lowest percentage of use of bound/free pronouns, by the control children, was 90.32%. For the EA-DLI children, pronouns were problematic for AEL and NAD but not for MHB.

The substitution errors produced by the younger controls resembled cross-linguistic data (Brown, 1973), where young children used their names instead of /ʔanna/*I*. A language specific feature of EA was that instead of using the person marker on the verb the control children used the pronoun /ʔanna/*I*, thus resulting in an error. EA is pro-drop language where pronominal subjects are optional, but person markings on the verb are obligatory.

6.6.6 Word order errors

Errors with word order were rarely observed, but occasionally appeared in the earlier recordings. Intransitive verbs in EA can follow either a S-V order or a V-S order. It was hypothesised that grammatical rules that are part of the typology of the language will be more susceptible to errors in DLI. It was therefore interesting that few word order errors were seen and AEL demonstrated the ability to understand that both word order forms can be used in EA. Word order errors were present in NAD's and MHB's language and were coded as disordered sentences and contributed to their high percentage of errors.

The three EA-DLI children had difficulty with their understanding of specific grammatical structures and morphemes as examined by the Egyptian Arabic Sentence Comprehension Test. NAD was unable to complete the EA-SCT, therefore no scores are available. AEL obtained a raw score of 26/42 and MHB obtained a raw score of 33/42 which was the highest of the EA-DLI

children and reflects his higher cognitive abilities. Their scores are compared below with the controls, and from table 6.7 below we see that the EA-DLI children scored less than the controls.

A limitation of this study is that the primary focus has been on the children's expressive impairments and the only receptive analysis was the EA-SCT and the results of the Intraverbals. Given the emerging morphological difficulties it would be of interest in further studies of EA-DLI to examine specific areas of inflectional morphology, such as person markers versus gender and number markers and lexical negatives versus the discontinuous negative.

Table 6. 7 Sentence Comprehension Test raw scores

Name	Age	Raw Score
AEL	7;01	26/42
MHB	6;02	33/42
Samira	7;01	42/42
Omar	5;02	39/42
Ali	4;01	23/42
Habiba	4;01	38/42

6.7 Summary

In summary, similarities and differences have been observed in the errors produced by the EA-DLI children and the controls. The EA-DLI children produced more errors and their MPU values were reduced. The EA-DLI children produced significantly less Intraverbals and more Others, i.e. Learnt Repetitive phrases and Disordered utterances. Morphological errors were present in both groups. Use of the definite article did not show a significant error pattern. Adjective noun agreement patterns and plural dual patterns were similar in both groups, although the EA-DLI children repeated the noun to express plurality which was not observed in the productions of the controls.

Prepositions were problematic for all the EA-DLI children, however pronouns were only problematic for two, NAD and AEL. The discontinuous negative was also a difficult construction, but errors were similar to those produced by the controls. Verb production continued to be problematic for the EA-DLI children and errors with agreement persisted, although Tense and Aspectual agreement was not problematic.

The main features observed as clinical markers of Egyptian Arabic-DLI are as follows:

1. Restricted MPU values
2. High percentage of errors
3. Overuse of the default verb form
4. Fewer Verbs produced than Nouns
5. Difficulty with verb agreement for person, gender and occasionally number but not with Tense and Aspectual Marking
6. Omissions of obligatory morphological structures
7. Omissions of object clitics
8. Presence of vocalic paraphasias
9. Reduced Intraverbals compared with Tacts and Mands
10. Use of disordered sentences and Learnt Repetitive phrases

6.8 Arabic Agrammatism and EA-DLI

The EA-DLI children showed similarities and differences in their pattern of errors to those reported in the adult acquired Agrammatic subjects (e.g. Mimouni and Jarema, 1995; Mimouni et al., 1996). Similar to the Agrammatic subjects, the EA-DLI children had difficulty with pronoun clitics and the discontinuous negative particles. Although the EA-DLI children were observed to use only

one of the discontinuous negative particles this was not observed in the Agrammatic Algerian subjects (Mimouni and Jarema, 1995; Mimouni, et al., 1996). Both groups had difficulty with their productions and use of verb inflections. The Agrammatic subjects appeared to have more difficulty with their use of the definite article. Although the language impaired children were observed to omit the definite article in obligatory positions, they did use them and their percentage of use was similar to their language matched controls.

The pattern of verb errors described in the EA-SLI data shows similarities and differences to the pattern of errors seen in the Agrammatic Algerian Arabic data (Mimouni and Jarema, 1995; Mimouni et al., 1996). The Agrammatic subjects either omitted prefixes resulting in a switch to the morphologically unmarked Past Tense form, or they substituted an entire verb form leading to gender and Tense substitutions.

In the Saudi Agrammatism data (Safi-Stagni, 1991) errors with agreement of gender were seen frequently; the errors involved the deletion of the feminine markers but never the addition of a feminine marker. The same holds for the EA-DLI findings. The gender marker to mark feminine was never added in the productions of the EA-DLI children, although it was frequently deleted. The EA-DLI children rarely used the dual marker; they alternatively expressed plurality in a rather unique way that was not observed in the Arabic Agrammatic patients.

6.9 The Egyptian Arabic language impaired data in the context of cross-linguistic research conducted into SLI

6.9.1 Introduction

The results presented in this study have allowed for preliminary descriptions of language impairment in Egyptian Arabic, a previously un-investigated language. The findings of this study demonstrate that the EA-DLI children understand and use the function of inflectional and

derivational morphology, however errors were also observed. Of the errors observed some were similar to the controls but produced at higher frequencies and others were only observed in the productions of the EA-DLI children.

Compared with other languages examined for language impairment some of the problems with grammatical features commonly reported in the cross-linguistic literature are also evident in Arabic, but there are differences. The aim of this section is to compare the EA-DLI findings with the cross-linguistic corpora reported in the literature review, in Chapter 1. The findings are discussed in light of the underlying models that have been proposed to account for SLI, in particular the Extended Optional Infinitive Account (Rice and Wexler, 1996), the Surface Accounts (e.g. Leonard et al, 1997) and the Agreement Deficit Account (Clahsen, 1989).

As described earlier Arabic provides an interesting test case for examining inflectional morphology in language impaired children. Several languages have been examined for the language characteristics of SLI, including Italian, French, Spanish, Swedish, Japanese, German, Dutch, Hungarian, Greek and Inuktitut (English: van der Lely, 1994; Rice et al, 1995; Rice and Wexler, 1996; Cleave and Rice, 1995; Oetting and Horohov, 1997; Leonard, 1998; Italian: Bortolini et al., 2002; Chilosi and Bottari, 1995; French: Le Normand et al, 1993; Gerard, 1991; Le Normand and Chevrie-Muller, 1991; and Van Hout, 1989); Spanish: Merino, 1983; Restrepo,1995; Bedore 1999a; German: Grimm, 1993; Clahsen, 1991; Grimm and Weinert, 1990; Swedish and Dutch: Hansson et al., 2000; Hansson and Leonard, 2003; Japanese: Fukuda and Fukuda, 1994; Greek: Dalalakis, 1994; and Inuktitut: Crago and Allen, 1994).

The only Semitic language to have been studied is Hebrew (Leonard et al., 2000; Dromi et al., 1999, 1993; Leonard and Dromi 1994; and Leonard, 1998).

Difficulty with the use of morphology and syntax, or a morpho-syntactic deficit, is observed across the spectrum of the SLI population (e.g. Leonard, 1998; Leonard et al., 1992; Johnston and Kamhi,1984).

The EA-DLI children were found to share some of the features with children examined cross-linguistically for SLI. The shared features include: — (1) slow lexical development and delay in the emergence of word combinations (2) expressive and receptive problems, although the expressive problems are more prevalent (3) omissions of obligatory elements in the sentence and variability in elements omitted and (4) problems with grammatical morphology but differing depending on the morpho-syntax of the language typology; and these are reported in the Italian, French, Hebrew, French, English, Spanish, Danish, Swedish and German studies.

A notable distinction between Arabic and the Indo-European languages examined for language impairment is that Arabic morphology is non-concatenative (McCarthy, 1981; McCarthy and Prince, 1990). As described earlier in this Chapter and in Chapter 2— verbs, many nouns and adjectives consist of a combination of a root and pattern. The root holds the basic semantic information and the pattern carries syntactic and sometimes semantic information. The verbs in EA agree with their subjects and carry affixes expressing person, number and gender, in addition to the affixation of Tense and Aspectual marking. There is no Infinitive in Arabic and Participles are simpler than other verb forms in that they are inflected only for gender and number information.

There are also developmental differences, for example in English the morphemes that mark plurality are acquired early on between 24-33 months (Brown,1973) whereas in Arabic the plural system is complex and not acquired by children until much later, around the age of 7;00 years (Ravid and Farrah, 1999; Omar, 1973).

Despite the similarities seen in errors produced by the EA-DLI children, there were differences. Similar cross-linguistic differences have been reported in the cross-linguistic literature for SLI. Researchers have identified grammatical morphemes that are problematic for children acquiring English, but studies from Romance and Semitic languages reveal profiles of grammatical use that are quite different (e.g. Dromi et al., 1999 and Bedore and Leonard, 2002).

Thus, when considering the linguistic markers (surface errors) of a language, it is important to consider the language typology since what will hold true for one language will not hold true for another. In addition, when comparing linguistic categories caution must be exercised as to what exactly is being compared. For example considering Tense and Aspectual marking, the way Tense is expressed in one language will be different from another language. Even for languages that are typologically similar, such as Arabic and Hebrew, differences are found. For example, in Arabic there is no Infinitive and there is no verb that is not marked for either Tense or Aspect, whereas in Hebrew there is an Infinitive which is inflected, different to Infinitives in English, which are bare forms and uninflected. An additional example of a linguistic difference between Hebrew and Arabic is that in Hebrew the Present Tense is expressed by using Participles that are marked for gender and number and not person, and the Past Tense is a more complicated paradigm and is marked for person, gender and number and the inflection is an affix. In Egyptian Arabic, however, the Aspectual marker for progressive (i.e. Present Tense in Hebrew) is a suffix and the verb is marked for number gender and person, whereas the Past Tense in Arabic is less complex, and although it is also marked for person, number and gender, gender distinctions are only in the 2nd and 3rd person singular for Past and Non-Past. For this reason the citation form which is the closest to the root is the Past Tense 3rd person, masculine singular, e.g. LBS /libis/ *wore*. Therefore if such a comparison can be made on morphological grounds, Past Tense in Egyptian Arabic is simpler than Past Tense in Hebrew.

Caution must therefore be taken when considering the shared grammatical surface characteristics of SLI and what the exact category is that is being compared. It is important when possible to avoid the use of anglo-centric terminology and instead adopt generic terms that can be used for cross-linguistic comparisons.

What must also be considered is that if there is an underlying deficit in the children's grammar this may manifest in different surface form errors depending upon the language typology. Indeed, the data presented in this study on Egyptian Arabic reveals that there are some shared cross-linguistic features, however many of the cross-linguistic grammatical markers reported for SLI do not hold for the EA corpora.

6.9.2 Verb Morphology Errors

The complexity of nominal and verbal morphology for EA affects language acquisition and many of the observed errors were related to morphological errors. Verbs in EA agree with their subjects and carry affixes expressing *person* (first, second, third), *number* (singular and plural) and *gender* (masculine and feminine), in addition to the affixation for verb information, e.g. Tense. The two primary verbal paradigms in EA are the Perfect and Imperfect.

Whilst the Perfect (Past) is characterised by the addition of suffixes for the encoding of the categories for person, number and gender, the Imperfect (non-Past) is characterised mostly by prefixes and some suffixes. There are various forms of the Imperfective and its use varies according to the context. A system of proclitics e.g./bi-/ and /ha-/, function as Aspectual markers and are used in spoken EA to mark Progressive, Habitual and Future action.

One of the most characteristic features observed in the language of the EA-DLI children was their difficulties with verb morphology. The onset of verb production by the EA-DLI children was much later than the onset of verb production by the controls. Normally developing Egyptian Arabic

children demonstrated an understanding of verb morphology early on in their language. Even when MPU scores were low the control children used a range of Tense inflections in addition to affixes marking gender, number and person. When the EA-DLI Tense findings are compared to the cross-linguistic SLI findings for English, Swedish and Hebrew (e.g. English: Leonard *et al.*, 2003, Serratrice et al., 2003; Swedish: Hansson and Leonard, 2003; Hebrew: Leonard *et al.*, 2000) we see a different error pattern for Tense and Aspectual marking. This is discussed in detail below.

Obligatory verbs were omitted by the EA-DLI children at a higher rate then the controls. This is similar to the Italian findings (Bottari et al., 2001). Differences are reported in the Spanish data. In one study, the SLI children produced more errors where verb inflections failed to agree with number of subject (Restrepo 1995). A later study that examined Puerto-Rican Spanish, (Anderson 2001), reported that subject verb agreement for gender was a problem for both the SLI and non-SLI children aged between 3;08-6;09.

As in the Hebrew data, morpho-syntax was a weak area as was the verb system (Rom and Bliss, 1981,1983; Dromi and Leonard, 1993).The earlier Hebrew data on verb inflections is similar to the EA-DLI data findings. Mean percentage use of verb inflections in Hebrew (Present and Past Tense) are reported to be between 76% and 56% (Rom and Leonard, 1990; Dromi *et al.*, 1993).

6.9.2.1 Tense and Agreement errors

The EA-SLI data has shown that the three language impaired children had difficulty with verb inflections for subject agreement (number, person and gender). Closer inspection has shown that there are differences between the Hebrew, Swedish and Spanish findings and the Egyptian Arabic data.

There are cross-linguistic reasons to suspect that Past Tense is more difficult than present Tense, however this was not the case for EA. In a language like Spanish both Present and Past Tense

inflections are marked by word-final syllabic inflections. The inflections highlighted mark person and Tense, but not gender. For example, "Habla" (speaks-3rd Person Singular Present) and "Habló" (spoke-3rd Person Singular Past). The use of Past Tense forms is acquired later than use of Present Tense in children acquiring Spanish normally (Bedore and Leonard, 2002, 1999a). The idea that Past Tense may be difficult for children with SLI has been reported in the Swedish-SLI data. In Swedish finite inflections mark Tense only and there are no distinctions for person or number. Hansson et al. (2000) found that the Swedish SLI children produced the Present Tense inflection in a comparable way to their MLU controls, however the Past Tense inflection was produced at lower percentages than in MLU controls. Thus Hansson et al. (2000) concluded that the Swedish problem was not related to Tense or the number of features but specifically to Past Tense.

Tense and in particular Past Tense has been reported to be an area of difficulty for English, Swedish, Spanish and Hebrew speaking SLI children (Swedish: Hansson and Bruce, 2002; Hansson and Leonard, 2003; Hebrew: Leonard *et al,* 2000; English: Leonard et al., 2003; Leonard, 1998; Conti-Ramsden and Windfuhr, 2002).

This was not observed in the Egyptian Arabic data and one of the advantages of conducting longitudinal studies has been this important finding. All three EA-DLI children initially had difficulty controlling Tense and Agreement information, but a progression emerged where Tense became less problematic and subject verb agreement continued to be an area of difficulty.

This pattern of use is the most obvious for AEL, and was only revealed because data was collected longitudinally. His pattern changed over the 4 year recording period (See Chapter 5: Table 5. 5 for Summary of AEL's verb productions and analysis of verb errors).

When the errors of subject verb agreement occurred the EA-DLI children did not always omit the gender, person and number marking, but they often mis-selected (substituted) the target morpheme.

This is contrary to some of the cross-linguistic data where Tense and in particular Past Tense has been proposed as a problem for SLI children. The EA-DLI data showed that for all three children Past Tense was not problematic. The EA findings do support the German findings; according to the Agreement-deficit account (Clahsen1989), German children with SLI have difficulties with relations between categories. In German these relations are seen when verbs must agree with the subject according to features such as person or number (Clahsen 1989; Clahsen et al. 1997; Clahsen and Hansen 1997).

6.9.2.2 Other aspects of Inflectional morphology

The EA-DLI children were observed to produce omission and substitution errors of morphemes. The cross-linguistic similarities and differences observed will be discussed. Researchers have proposed morpho-syntactic clinical markers associated with each of the languages examined for SLI. In Italian for example three grammatical morphemes serve as clinical markers for the SLI, they are: (1) omissions of function words, (2) omissions of direct-object clitics and (3) difficulty with the use of the 3rd person plural inflection (Bortolini et al., 2002; Cipriani et al., 1991). The Italian SLI children were less impaired in their use of prepositions than in their use of articles and clitics. The converse was seen in the Egyptian Arabic data, where the three EA-DLI children had difficulty with prepositions which they either omitted or substituted. In addition, children with severe deficits in Italian were also observed to not only omit function words, but also to occasionally omit main verbs and other open-class words (Bottari, et al., 2001) which was the same as the EA-DLI children, where open class words were occasionally omitted.

Limited use of function words, e.g. articles and clitics, have been reported in the French and Italian SLI data. From EA-DLI data, the definite article was not an area of difficulty for the EA-DLI children, which is similar to the French SLI children. The French SLI children used articles a higher

percentage of the time when compared with Italian, English and Dutch SLI children aged between 4;00 and 6;00 (Le Normand et al, 1993 and Beers, 1992).

In Egyptian Arabic, pronouns are either bound or free. Subject and object pronoun clitics were an area of difficulty for AEL and NAD, however they were correctly used by MHB. Similar to the EA-DLI children the French SLI children had difficulty with the nominative case pronouns which they used less than their MLU controls.

For the Spanish SLI children, difficulty with noun plural inflections and third person plural verb inflections has been reported. Noun plurals are one of the later morphological structures acquired by children acquiring Egyptian Arabic (Ravid and Farrah, 1999). The EA-DLI were slower in their development of plurals and they produced less plurals. Their pattern of errors was the same as the controls.

Omissions of grammatical morphemes and productions of incorrectly marked morphemes were more frequent in the speech of Spanish SLI children (Restrepo,1995) than their age matched and language matched controls. The most common type of error were agreement errors where articles failed to agree with the noun in gender (Merino, 1983; Restrepo, 1995) and as in the EA-DLI data verb inflections sometimes failed to agree with the number of the subject.

6.10 Theoretical accounts for EA-DLI

Grammatical features that are used to mark Aspect, Tense and agreement for number and person have been reported in the cross-linguistic literature to be an area of difficulty for children with SLI (e.g. English: Leonard, 2003; Serratrice et al., 2003; Rice et al, 1995; Rice and Wexler, 1996; Cleave and Rice, 1995; Oetting and Horohov, 1997; Leonard, 1998; Spanish: Bedore, 1999; Hebrew: Leonard et al., 2000).

Children with SLI are reported to have more difficulties with finite verb inflections than do their MLU controls, and the SLI children are reported to omit these inflections or substitute them with morphologically simpler non-finite forms (Bishop, 1994a and 1994b; Rice et al., 1995, 1998, 2000). For example, children in English will use non-finite uninflected forms producing sentences such as, "She walk" instead of "She walks" (Serratrice et al, 2003). Hebrew speaking children are also reported to use "abbreviated forms" (Leonard et al., 2000) or "stripped forms" (Berman and Armon-Lotem, 1997) and target verbs in the Infinitive and Present Tense are produced without the inflections, for example/me**xabek**/ Present Tense- *Hug* and /le**xabek**/ Infintive-*Hug* were produced as /**xabek**/ (Leonard et al., 2000).

Such observations have led researchers to propose different theories that account for these surface errors produced by the SLI children and more specifically their use of uninflected verb forms. In German, Swedish and English when the children with SLI fail to use the appropriate finite verb inflection, they produce an Infinitive instead. This has led Rice and her colleagues to propose the *Extended Optional-Infinitive Account* (Rice et al, 1995; Rice and Wexler, 1996; Cleave and Rice, 1997; Rice et al., 2000). The Extended Optional Infinitive Account has been used to not only account for errors observed in SLI for English but also for other languages examined, e.g. German and Swedish.

If a single theory is to be proposed for SLI then it must hold for languages that are typologically different.

6.10.1 The Extended Optional Infinitive Account

The Extended Optional-Infinitive Account will be discussed in relation to the EA findings. According to this Extended Optional Infinitive Account, the children with SLI either lack the knowledge that verbs must be finite in main clauses, or go through a prolonged period of development during which they assume that agreement and or use of Tense are optional. Thus

when a finite form is not selected, an Infinitive is used instead. But what happens when the children do not select the Infinitive? What would the Extended Optional Infinitive Account predict for languages which do not have Infinitive forms in the language?

Using a simpler verb form has been reported in the cross-linguistic data in Hebrew, English, German and Swedish (Hansson and Nettelbladt, 1995; Hansson et al, 2000; Hansson and Leonard, 2003; Hamann et al.,1998; and Hebrew: Leonard, et al 2000; and Leonard, 1998) and was a notable error pattern observed to be used by the EA-DLI children.

In a language such as Hebrew where Infinitive inflections are complex, the Extended Optional Infinitive Account would predict Infinitives to be problematic. Indeed Infinitives were not found to be selected by the Hebrew SLI children in place of finite verb inflections. In the Hebrew SLI data (Leonard et al., 2000) the children did not use Infinitives as their default verb form, which are more complex morphologically, instead they either used (1) the stripped forms that are characteristic of the early stages of Hebrew child language (Berman and Armon-Lotem, 1997) or they used (2) the Present masculine singular form or (3) the Past 3rd person masculine singular form as substitutes for the appropriate verb form. These two forms (2 and 3) in Hebrew are the simplest forms morphologically and are often referred to as the basic forms (Berman, 1985; Berman and Armon-Lotem, 1997).

Further, the Extended Optional Infinitive Account (Rice and Wexler, 1996) would have to predict a different form to be used for Arabic where there are no Infinitive forms. Despite the title of this theory being *Anglo-centric* and somewhat misleading, the types of errors produced by the EA-DLI children and the younger controls results are in fact similar to those reported cross-linguistically. This theory can still be used to account for the EA-DLI children's difficulties with verbs because the EA-DLI children and the younger controls did use a simpler unmarked form of the verb.

In this study the simpler unmarked form produced by Egyptian Arabic children has been labelled the default verb form, the source of this default verb form will be discussed in detail below. An amendment to this theory would be to propose that the DLI children for an extended period of time use simpler unmarked morphological forms, and depending on the language typology this may be any zero morphology default form, e.g. the Infinitive in Swedish and English (Hansson et al., 2000) or the Present masculine singular form and the Past 3rd person masculine singular form in Hebrew (Leonard et al, 2000) and default verb form in Egyptian Arabic.

6.10.1.1 A linguistic explanation for the default verb form

The citation form of the verb in EA is the 3rd person masculine form of the Past Tense (e.g. /katab/ he-wrote), and although this is the simplest form this was not selected either by the younger controls or the EA-DLI children as a default verb form.

The occurrence of the default verb form in the EA corpora was frequent in the EA-DLI children's language productions and was also present in the production of the controls. It was present in the first two years of AEL's language recording (3;01-5;01), in MHB's first recording (4;06) and also in NAD's language (4;02-5;11). The productions were also present in the younger controls language when under the age of 3;00 years. For example, Hanna at 1;11 years produced 2 default verb forms, Dudu at 2;03 years produced 3 default verb forms. While AEL produced considerably more, between 4;02 -4;05 he produced 22 default verb forms.

Frequency of occurrence is supported in the Hebrew findings, where the Hebrew SLI children produced a total of 30 stripped forms, compared with only 12 produced by the MLU matched controls (Leonard et al., 2000).

What has been labelled the default verb form selected in EA resembles one of two forms— either the Imperative in the 3rd person singular form (e.g. /ʔiktib/ *write*), or the Imperfective-stem. A study conducted on Kuwaiti Arabic reported that normally developing children substitute finite verb inflections with Imperatives (Khawla, 2003). An alternative argument is proposed suggesting that the default verb form in EA is not the Imperative in the 3rd person singular form as reported in the Kuwaiti study, but the Imperfective-stem, and how the reported default verb form in EA correlates with the uninflected verb forms reported in other languages.

It seems unlikely that these stripped forms are produced by chance as they are also seen in the productions of the controls, although less frequently. In addition, if this default verb form is the Imperative, it could be argued that the children overused the Imperative form because this was the form that they heard the most when instructions were being addressed to them. This could be plausible for the male children who would hear the 3rd person masculine singular form, but the females would hear the 3rd person feminine singular form. Thus, if it was that they were producing forms frequently heard we would also have seen gender distinctions in the data, which was not the case. For example, /ruħi/ go-3rd person feminine singular form would be produced by the females and /ruħ/ go- 3rd person masculine singular form would be produced by the males. In addition, other errors produced by the children were non-adult like and not produced by adults, thus it is not that the children only produce what they hear.

In Egyptian Arabic the Perfective-Stem (citation form) and the Imperfective -Stem are the two forms that are closest to the roots. In some contexts the Imperfective-stem is an un-pronounceable form and to make it pronounceable an initial syllable would need to be added in the initial position; the resulting form would then resemble the Imperative. In other contexts the Imperfective-stem on its own is pronounceable and is identical to the Imperative. Figure 6.2 below, is used to illustrate this. The Imperfective stem is highlighted and a gloss is provided for the attached inflections. The

morphemes represented are those that can be added and therefore also omitted or substituted by the EA-DLI children and the controls. The Perfective-Stem and the Imperative are also represented to allow for comparisons.

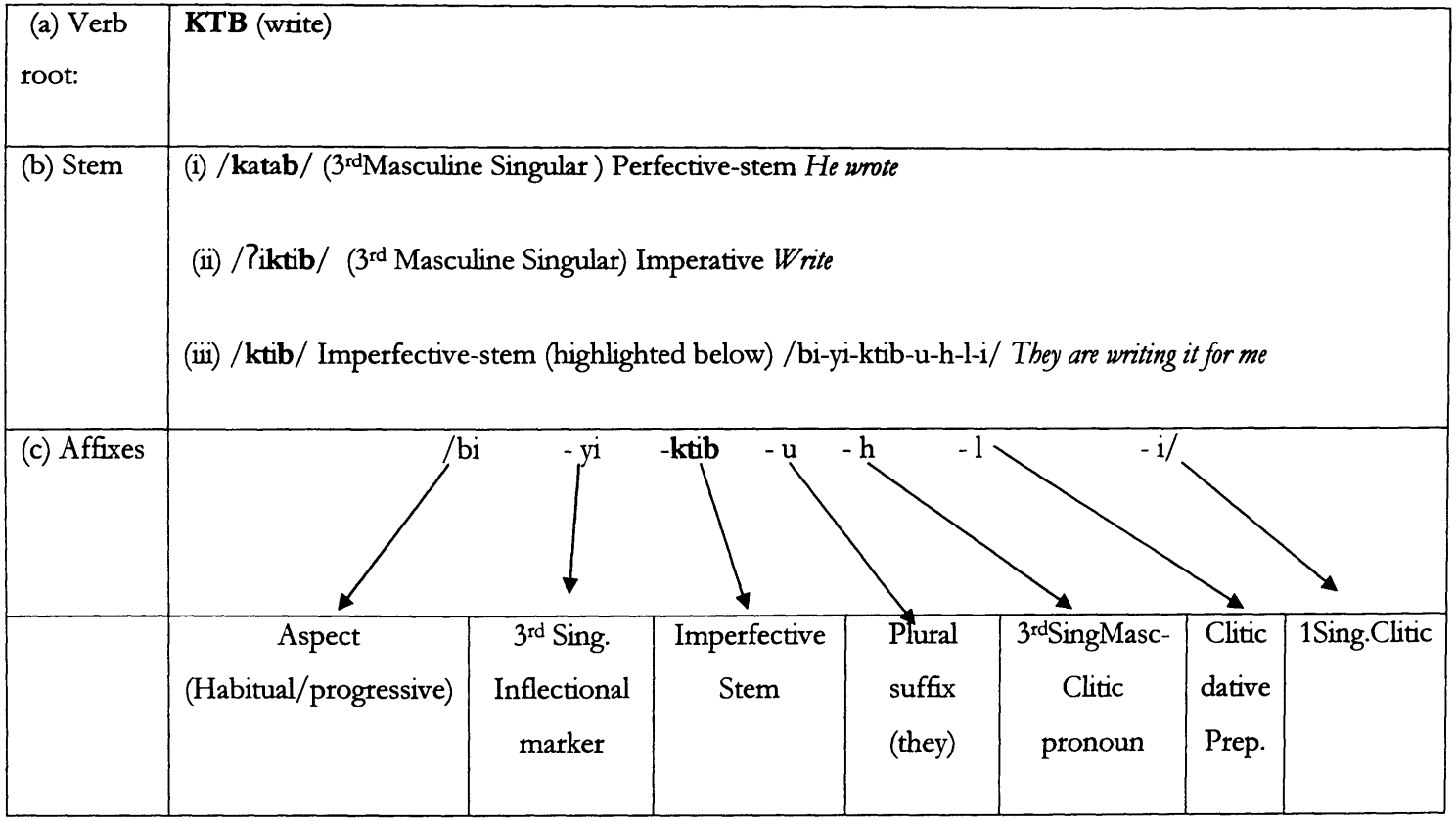


Figure 6. 2 The default verb form: an analysis of the Imperfective-stem and the morphemes that can be affixed and suffixed, and therefore stripped.

From the above, it could be argued that both the Imperative and the Perfective forms would be used equally in Egyptian Arabic, since they are both simpler forms and closest to the root, as can be seen above in Figure 6.2- the root is /KTB/, the Imperative is (i)/ʔiktib/ and the Perfective is (ii) /katab/. This was not found to be the case.

Although Tense substitutions errors were seen in the EA data, these were not as frequent as substitutions that resulted in the use of the default verb form. Surprisingly, the children did not produce the masculine singular form in the Perfective as the default verb form, e.g. **/katab/** *3rd Masc.Sing-.wrote*, which is the closest to the root in that it carries no affixes. Given the morphological simplicity of the Perfective we would have expected the normal children acquiring verb morphology to begin by using the simplest and least marked form of the verb as has been reported in the Hebrew data (Leonard et al, 2000), but the control children also used the default verb form. Thus both the EA-DLI children and the controls used the "stripped" Imperfective-stem.

The morphological analysis represented in Figure 6.2 above provides a visual representation of this. As previously mentioned the Imperfective-stem is not always pronounceable, and thus when it was not pronounceable it is hypothesised that the children inserted an initial vowel. Therefore referring to the example above, since the Imperfective stem **/ktib/** is not pronounceable (there are no initial consonant clusters in EA), the glottal and vowel are added /ʔi-/ thus producing /ʔiktib/. If this was a generalised phonological process, i.e. that a vowel is always inserted at the beginning of the Imperfective-stem, errors of addition would also have been observed. This was not the case. For example taking the verb /ha-ti-ruħ/ *Asp.Fut-3rd person feminine singular-go She will go*; if the inflections marking Tense and person, number, gender are removed the resulting form is the Imperfective-

stem /ruħ/*go*. This is identical to the Imperative /ruħ/ go-Masc.Sing, however no productions of [2]*/ʔiruħ/, where an additional syllable is placed, were present in the data.

For this reason the Imperfective-stem is being proposed as the default verb form used by the EA-DLI children and used by the younger controls until approximately the age of 3;00 years. Thus when the Aspectual, Tense, person, gender, number agreement markers are removed the remainder is the Imperfective-stem.

The use of unmarked default verb forms, i.e. Infinitives and omissions of verb agreement morphemes, has been worked through in the adult Agrammatic literature and it has been considered in relation to the cross-linguistic Agrammatic data (Menn and Obler, 1990). There are several cross-linguistic findings reported in the Agrammatic literature which can assist in the interpretation of the source of the verb forms selected by children with EA-DLI children. Similarly to characteristics of SLI (Leonard, 1998), adult Agrammatic language is characterised with difficulties of syntax, omissions and substitutions of function words and bound grammatical morpheme errors. Using evidence from Italian and Icelandic, Agrammatic patients have been reported to show substitution errors and not errors of omission, although it is not always easy to tell the difference between the two (Magnusdottir and Thrainsson; Miceli and Mazzucchi, 1990). Further it is reported that—

> *"in most languages that have person and number markings, verbs tend to be produced in their most common forms (usually 1st or 3rd person singular) or in forms that do not require agreement (typically Infinitives)", Section 4.2.13, pg 113, Non-fluent Aphasia in a multilingual world:, Menn at al., 1995).*

Therefore the important conclusion to be drawn is not that Infinitives are selected as the default verb form but that the forms selected are those that either do not require agreement, or they are common forms. Therefore for English this form may be the Infinitive, but for Hebrew and Arabic

[2] * is used when an error is present

the form selected will be a simpler verb or an unmarked verb form, and for Arabic this resembles the Imperfective-Stem.

Further, the Agrammatic patients are reported to use a strategy where they avoid complex verb mood and Tense forms (Menn et al., 1995), whether these are formed morphologically (by suffixation) or syntactically (by adding auxiliaries). In the case of English this would support using Infinitives and it would support the omissions of auxiliaries, e.g. *is* and *am*. This would also explain the reason the EA-DLI children and the younger controls used a simpler default verb form (Imperfective-stem), i.e. they avoided complex verb forms.

Considering the Agrammatic Hebrew and Finnish data, it is reported that the verb errors produced by these patients in case and number marking are to do with—

> *"how extensive and cohesive the paradigm, be it inflectional or derivational,.. the simpler the paradigm, the fewer the errors" (Chapter 2, pg. 1381, Cross Language Data and Theories of Agrammatism,. Menn at al., 1995)*

In conclusion, is not possible to test the exact form chosen by the EA-DLI children and younger controls, i.e. whether the default verb form is the Imperative or the Imperfective-stem, however it seems that the EA-DLI children and the younger controls do produce a simpler form and one that is pronounceable. The Egyptian Arabic data does not therefore superficially support the Extended Optional Infinitive account since there are no Infinitives in Arabic, although it does support a modified less Anglo-centric account that the EA-DLI children and younger normally developing children under the age of 3;07use a simpler default verb form.

6.10.2 The Surface Account

Difficulties with Tense and in particular Past Tense have been attributed to processing and prosodic difficulties— this has been labelled the *Surface Account* (Leonard et al., 2003; Leonard, 1998; Leonard et al, 1997). This account assumes a *general processing capacity limitation* in children with SLI, but also

assumes that in English, these limitations will have a profound effect "on the joint operations of perceiving grammatical morphemes and hypothesising their grammatical function" (Leonard, 1998, p.247).

The Egyptian Arabic findings do not conform closely to the predictions of the proposed grammatical accounts for Tense difficulties in SLI, since firstly Tense was not problematic and Past Tense was the least problematic paradigm for the EA-DLI children. Second, although the EA-DLI children do produce morphological errors they did not omit morphemes of short duration in the initial position such as the definite article and markers for the Passive. Many of their errors were errors of substitution. What will be argued is that the difficulties encountered by the EA-DLI children may be attributed to limited processing abilities but not due to prosodic difficulties.

Attempts have been made to explain the inconsistencies across languages by the prosodic typological differences between them. In the Surface Account it is assumed that words whose inflections are brief in duration relative to the rest of the word are more likely to be left as bare stems. For English, closed-class morphemes, such as articles and preverbal auxiliaries, seem to be most vulnerable. The English data supports high percentages of article omissions and omissions of the auxiliary in SLI children when compared with MLU controls (Leonard, 1989; Gleitman, et al., 1988). This has also been supported in Italian by Leonard and Bortolini (1998) who found that Italian speaking children with SLI differed from MLU controls only in morphemes that require the use of non-word-final weak syllables. In addition, McGregor and Leonard (1994) observed that English-speaking children with SLI were more likely to omit weak-syllable articles and pronominal subjects when they could not be attached to a preceding strong syllable.

This prosodic explanation could be due to the children's difficulties in perceptually processing and perceiving the inflections and as a result they do not *hear* them and therefore they do not produce them. This explanation would not however explain why the MLU controls produce the same types

of errors as the EA-DLI children and it would also not explain why the EA-DLI children were able to produce poly-syllabic words, bound definite articles, Participles and Passive markers.

Several investigators have criticized the Surface Account for its failure to account for differences in the use of grammatical morphemes that have identical phonetic and prosodic value, for example the plural /-s/ and the 3rd person singular verb inflection / -s/ in English (Gopnik and Crago, 1991; Rice and Oetting, 1993). The German data has been used to refute the Surface Account (Clahsen and Rothweiler, 1992). Participles are reported to be produced as accurately by the German speaking SLI children as by the MLU controls, which is similar to the EA-DLI children's pattern of use for Participles.

Considering the Egyptian Arabic data in more detail, the children occasionally omitted non-final word syllables but these were not necessarily of short duration. The morphemes used to mark the Passive and the Definite Article in EA can both be considered morphemes of short duration. Thus the Surface account would predict both of these forms to be problematic and omitted at a higher frequency than other forms but this was not found to be the case. The omission of articles was infrequent in the EA-DLI children's language and patterns of omissions were no different to the controls as were productions of the Passive.In EA the passive /ət-kassaer-et/ It-Fem.Sing-is-broken was productive in both the EA-DLI children's language and the MLU controls; as were Definite Article productions such /el-ʕarabeyya/ Definite Article-the-car.

With regards to verbs, the most frequent error patterns were agreement errors and not omissions. For example where the target requires a masculine marker and the child produces the feminine instead as in /bi-yi-ʔixsil/ 3rd Masculine singular *washing*, is produced as /bi-ti-ʔixsil/ 3rd Feminine singular washing.

The EA-DLI children had difficulty with discontinuous negative particles, where the use of both particles is obligatory. AEL and Dudu both used one of the particles; interestingly this was always the second one. When the controls and EA-DLI correctly used the discontinuous negative they continued to produce agreement errors. At 4;04, AEL produced the utterance /ma-bi-ji-ʔftaħʃ/ *It doesn't open,* twice on two separate occasions. He also at the same time produced an addition error for the same construction, where an additional morpheme was inserted, */mabijftaħħuʃ/; target :/ma-bi-ji-ʔftaħʃ/ (addition of /ħ/ and /u/ which mark plural). Such addition errors again can not be accounted for by the surface account, since it would not predict errors of addition but instead errors of omission. Further data would be required to examine negative particle use as this would be an interesting test case for the Surface Account.

The Surface Hypothesis does not therefore account for many of the errors observed in the Egyptian Arabic corpora.

6.10.2.1 A processing difficulty

An alternative explanation of the Surface Account will be to propose that the children's errors are not due to prosodic difficulties, but instead with difficulties of processing complex linguistic stimuli simultaneously; verb errors will be used to illustrate this.

A pattern of morphological development was seen for both the controls and the EA-DLI children. The children started with the root and in a sequential manner built on the stem adding the morphemes. The sequence was, (1) to produce verb forms without Aspectual/Tense and person, gender, number markers, (2) to use person markers but without Aspectual/Tense (person agreement errors occurring), and (3) to use Aspectual/Tense and person, gender, number markers. For the EA-DLI children although Aspectual/Tense markers were used correctly they continued to have agreement problems with person, gender, number markers.

In light of the current findings the errors seen to be produced by the EA-DLI children can not be explained by prosodic processing difficulties. An alternative explanation is that it is the interaction between phonological, prosodic, morphological and syntactic information that together place processing demands on children with SLI, especially when on-line processing is involved as with verb structures in Arabic. And although there is evidence for English where children have great difficulty with weak syllables, especially when they preceded strong syllables (Chiat and Hirson, 1987), for a language like Arabic this does not hold.

Leonard et al. (2000) have argued that these stripped forms are not produced at random, and the frequent omissions seen in the H-SLI children were of non-word-final weak syllables; they therefore proposed a phonological prosodic explanation. Although Leonard et al. (2000) used the findings of their study to support errors observed as reduced prosodic abilities, the Hebrew data does not support this. The H-SLI children often did produce reduced forms of the target by omitting a segment or a syllable, but they also substituted verbs with other verb forms of different syllable structure. In addition, Leonard et al. (2000) also raised the possibility that children with SLI may have insufficient knowledge of particular types of verbs, thus contributing to the children's errors. This could be due to whether the verbs are transitive or intransitive and the number of obligatory arguments. Although this is not discussed by Leonard et al.(2000), this has been addressed by other investigators (van der Lely, 1994). Verb argument structure was not examined in this study as the focus was on inflectional morphology.

6.10.3 Past Tense: an alternative hypothesis

Two accounts have so far been discussed that give an explanation for morphological errors observed in children with SLI; the Surface Account (Leonard et al., 2003; Leonard, 1998; Leonard et al, 1997) and Extended Optional Infinitive Account (Rice and Wexler, 1996). Both accounts use difficulties children with SLI have with Past Tense as supporting evidence. It has already been

explained that Past Tense was not an area of difficulty for the EA-DLI children. This therefore supports the need for researchers to consider typologically different languages when a cross-linguistic theory is being proposed to account for SLI regardless of the language typology. Findings from Dromi et al. (1999) on Hebrew-SLI report that the SLI children produced morphological errors as a result of processing limitations. These findings are particularly interesting in relation to the EA data due to the language similarities between Hebrew and Egyptian Arabic.

When examining the use of Tense, Dromi et al. (1999) found that the Hebrew SLI children resembled the MLU controls in their use of Present Tense verb inflections that had to agree with the subject according to number and gender, but they were poorer with their use of Past Tense inflections. Dromi et al. (1999) initially attributed these difficulties to processing limitations, the idea being that the children's difficulties with Past Tense agreement inflections were due to verb paradigms becoming complex thus leading to a breakdown in processing resulting in errors. Part of their initial hypothesis included the reasoning that difficulty with Past Tense and finiteness are due to the linguistic characteristics of Hebrew (Leonard et al, 2000), which in their later study they did find to be the case (Leonard et al., 2000).

This initial hypothesis (i.e. limited processing abilities) first introduced by Dromi et al. (1999), and later dismissed by the same authors (Leonard et al., 2000), seems more plausible and was, perhaps, rejected too soon. An important aspect of Hebrew which has been over looked by the researchers of Hebrew (Leonard et al., 2000) is that what they have labelled the *Present Tense in Hebrew* (Leonard et al., 2000, p320 paragraph 5) is not the Present Tense but the Present Participle. Participles in Egyptian Arabic and in Hebrew are marked for person and gender and not for number, therefore they are morphologically simpler. They were not found to be an area of difficulty for the EA-DLI children. The Past Tense however, in Hebrew, is more complex and as in Egyptian Arabic it is marked for number, person and gender. Past Tense verb use in Hebrew was re-examined in a later

study (Leonard et al., 2000), based on the notion that Past Tense in Swedish is an area of difficulty (Hansson et al., 2000). The Hebrew children were given a task where they were required to change Tense without having to alter features of agreement. Therefore, if on such a task the children with SLI have greater difficulty with Past Tense form than with Present Tense forms, Leonard et al. (2000) argued that Past Tense itself may be more problematic, independent of the number of features in the paradigm. Their findings were that the Hebrew SLI children had more difficulty than their age and language matched controls in the production of Present, Past forms and the Infinitive that required the use of only one phonological template. For the other three phonological templates examined the SLI children performed equally as their MLU controls. Leonard et al. (2000) concluded that Tense and finiteness were probably not the core difficulty related to verb morphology for Hebrew SLI children.

Therefore the language specific differences will clearly affect and dictate the outcomes of the results. In English Past Tense is reported to be a problem for children with SLI (e.g. Leonard et al., 2003), and the children are reported to produce bare stems in contexts requiring regular Past Tense (Leonard et al., 1992; Oetting and Horov, 1997; Rice and Wexler, 1996). Similar findings have also been reported for Swedish where the Swedish SLI children were more likely to replace Past Tense forms with Infinitive forms (Hansson et al., 2000 and 2003).

It is important when developing a generic theory for SLI to allow for these language specific differences since what will manifest as an error in Hebrew will be different to Swedish, English or Arabic. Rather than looking for the same clinical markers, such as Past Tense or Infinitives, it is more productive to predict different errors, i.e. different clinical markers, which will manifest due to the same underlying impairment.

A major difference between the Romance/Germanic languages and the Semitic languages is that for Hebrew and Egyptian Arabic, nouns, verbs and adjectives must always be inflected. It is therefore

study (Leonard et al., 2000), based on the notion that Past Tense in Swedish is an area of difficulty (Hansson et al., 2000). The Hebrew children were given a task where they were required to change Tense without having to alter features of agreement. Therefore, if on such a task the children with SLI have greater difficulty with Past Tense form than with Present Tense forms, Leonard et al. (2000) argued that Past Tense itself may be more problematic, independent of the number of features in the paradigm. Their findings were that the Hebrew SLI children had more difficulty than their age and language matched controls in the production of Present, Past forms and the Infinitive that required the use of only one phonological template. For the other three phonological templates examined the SLI children performed equally as their MLU controls. Leonard et al. (2000) concluded that Tense and finiteness were probably not the core difficulty related to verb morphology for Hebrew SLI children.

Therefore the language specific differences will clearly affect and dictate the outcomes of the results. In English Past Tense is reported to be a problem for children with SLI (e.g. Leonard et al., 2003), and the children are reported to produce bare stems in contexts requiring regular Past Tense (Leonard et al., 1992; Oetting and Horov, 1997; Rice and Wexler, 1996). Similar findings have also been reported for Swedish where the Swedish SLI children were more likely to replace Past Tense forms with Infinitive forms (Hansson et al., 2000 and 2003).

It is important when developing a generic theory for SLI to allow for these language specific differences since what will manifest as an error in Hebrew will be different to Swedish, English or Arabic. Rather than looking for the same clinical markers, such as Past Tense or Infinitives, it is more productive to predict different errors, i.e. different clinical markers, which will manifest due to the same underlying impairment.

A major difference between the Romance/Germanic languages and the Semitic languages is that for Hebrew and Egyptian Arabic, nouns, verbs and adjectives must always be inflected. It is therefore

plausible that if a language is richer morphologically this becomes a salient feature of the language and less vulnerable to errors. Consequently the EA-DLI children did not have problems with Tense. Whereas for English, which is not a highly inflected language, the children do have difficulties with Tense inflections, since inflectional morphology is not a robust feature of the language.

6.10.4 Summary

In summary, Egyptian Arabic is an interesting test case for Developmental Language Impairment and although shared cross-linguistic features were observed there are also many differences. As has been demonstrated, the specific characteristics that are reported to be important in one language vary for other languages due to the typological differences. Theories that have accounted for SLI in other languages will predict different surface errors for Arabic due to the linguistic differences, e.g. Extended Optional Infinitive Account and Surface Account. With regards to error patterns for verb agreement, the EA findings do support the German findings; i.e. Agreement-deficit account (Clahsen, 1989). Similar to the EA-DLI children, German children with SLI are reported to have difficulties with relations between categories. In German these relations are seen when verbs must agree with the subject according to features such as person or number (Clahsen 1989; Clahsen et al. 1997; Clahsen and Hansen 1997).

When examining the data on SLI there are shared underlying problems that are seen across the populations of SLI. However, significant cross-linguistic differences have been identified in this study and reveal two important variables for consideration. The first is that the processing requirements of languages are different. Secondly, the universal difficulties suggest that the development of any given language system is constrained or shaped by the particular grammar that the child is acquiring (Semitic or Romance).

Therefore given that the area of morpho-syntax is a common area of difficulty, comparing languages that have rich morphology with those that are morphologically simpler will provide compelling evidence with regards to how children learn and use grammar.

6.11 Clinical Issues: Defining the domain of language impairment

In this work when referring to the cross-linguistic data the term Specific Language Impairment (SLI) has been used and when referring to the Egyptian Arabic Data the term Egyptian Arabic – Developmental Language Impairment has been used. Three children were examined in this study for language impairment and all three met the initial exclusionary criteria, however as time progressed, NAD and AEL showed a different profile to MHB. For both NAD and AEL, their non-verbal cognitive abilities fell below the average range, yet NAD and AEL continued to share many of the linguistic deficits reported for MHB. For this reason, remaining conservative by using the term developmental language impairment, prior to the age of 7, has been supported in this work; only MHB at 6;02 met the pure SLI criteria regarding cognitive abilities. This differentiation will be discussed further in this section.

A variety of terms have been used over the years to describe children who primarily have difficulty with their acquisition and use of language. The changes and implications of using different terminology have been discussed in the literature review. The current literature on children with developmental language difficulties refers to either Specific Language Impairment (e.g. Leonard, 1998; Van der Lely, 1994; Conti-Ramsden and Windfuhr, 2002), or to Specific Developmental Language Disorder (Lees and Urwin, 1997; Rinaldi, 2000). Both terms are used where the language difficulty is not acquired, seen in a developmental process and where there is no evidence of a candid neurological disorder. An ongoing point of discussion amongst researchers continues to be the criteria used to identify children with SLI.

Researchers often compare cross-linguistic findings using studies in which there may be significant differences in subject selection and criteria for identification. Longitudinal studies are more time consuming, but they provide the researcher with a clearer clinical profile as to how the language impairment may evolve in line with non-verbal cognitive abilities. The results of this study and the change of diagnosis seen in two of the language impaired children question the definition of the domain of SLI leading to new considerations of SLI.

The following considerations are proposed— the first is the age the children are first seen when a diagnosis is given, the second is the criteria that are used to differentiate children with language impairment from children with normal language acquisition and the third consideration is how the children's development is tracked. With regards to age, children examined with English SLI under the age 5;00 years can show similar patterns of development as their MLU and age matched controls (Conti-Ramsden and Windfuhr, 2002). In a study on English SLI, difficulties were encountered with the clinical usefulness of linguistic markers for SLI pre-school children. Conti-Ramsden and Windfuhr, 2002, reported that Tense marking was not a particularly sensitive measure at this stage of development (under the age of 5;00 years). They found that performance in two Tense-marking tasks was similar for both the SLI children and children with normal language development at the same age.

Few longitudinal studies are conducted into SLI. When children with SLI have been examined longitudinally changes and instability in diagnosis have been noted (Cole et al., 1995). For example, had AEL not been examined longitudinally the important conclusions reached on patterns of verb use would not have been made. Tense and agreement would have been seen to be problematic, whereas only the latter was problematic.

When children with a language impairment are seen at the age of 3;00 years or under, their language difficulties will stand out relative to other cognitive skills that will still not have developed. As the

children become older several patterns may emerge. The first is that the child's cognitive skills develop but that their language problems continue to be problematic. This would confirm a diagnosis of SLI. The second pattern is that both the child's language and cognitive skills lag behind the normal pattern of development, which would imply a diagnosis of language impairment with an associated cognitive impairment. The third pattern would be that the child's language difficulties resolve due to spontaneous recovery.

All three of the EA-DLI children used in this study partially met the criteria of SLI and their language difficulties stood out compared with their other cognitive skills. All three children were seen at a relatively young age. Psychological testing was not possible, until much later. We have seen that for all three of the subjects they were initially un-testable using formal non-verbal intelligence tests such as the DAS or the WPPSI-R. However, when they were initially seen they were all informally able to complete simple sub-tests such as block design cards, puzzles and matching and they therefore fulfilled the exclusionary IQ criterion that their non-verbal skills were more developed than their language skills. At the end of the recording periods when the EA-DLI children were older and were able to complete the formal non-verbal intelligence tests only MHB fulfilled the criterion that his Performance IQ was above his verbal IQ. This raises a number of concerns, since for all three of the language impaired children their most obvious deficit was in the area of language; but for both AEL and NAD they no longer fulfilled the IQ criteria.

Although there are psychological tests that are sensitive to children who are young, when the children are young and their language is severely impaired this affects their ability to attend to formal testing procedures and the results will not be as reliable. For example, a psychological test was administered to NAD when she was first seen, however she was unable to conform to the test and testing was aborted. A diagnosis of SLI should not be given unless a child is testable, and until they are over the age of 7;00 years. Diagnostic labels such as language disorder or Developmental

Language Impairment should be used instead. If children are examined longitudinally and depending upon how they progress a diagnosis of SLI can then be reliably made. Therefore what is being proposed is that SLI is diagnosed later, after the age of 7 years, when reliable scores for cognitive abilities can be obtained.

A recent consideration has been the extent to which genetics affects language abilities and the overlap between genetic effects on nonverbal cognitive abilities (Plomin, 2002). Examining 10,000 pairs of twins, Plomin (2002) found that language problems for many children involve general cognitive problems and that genetic factors are responsible for this overlap. He therefore argued that research on language impairment should consider the term General Language Impairment (GLI), that includes cognitive impairment, in addition to Specific Language Impairment that excludes cognitive impairment. This would be a similar criterion of diagnosis as proposed in this work.

With consideration of the above, if the child is under the age of 7 the diagnosis would be Developmental Language Impairment and if over the age of 7 years, the diagnosis would be either General Language Impairment or Specific Language Impairment, depending on the child's cognitive abilities. Thus if a child's non-verbal performance score drops over the course of time, but their language difficulties continue to be the predominant area of difficulty, their diagnosis would be General Language Impairment with an associated cognitive impairment.

Part of the methodology used in this study was the Developmental Language Impairment checklist. This was sensitive in determining and differentiating the young children with EA-DLI from those with Autistic Spectrum Disorders. However it did not differentiate children with SLI from those with DLI, since all three of the children met the initial criteria using the checklist, but later AEL and NAD did not meet the criteria for SLI, although MHB did. When aged 3;01 AEL fulfilled the SLI criteria based on behavioural measures. At the age of 3;00 developmental checklists can be used and

there are assessment tools which can be used on young children. However, at such a young age children will have associated behavioural problems and difficulty with compliance. At this age there is no definitive nosology for determining whether SLI exists or not. From a developmental perspective there lies a range where it is difficult to be accurate in predicting the child's non-verbal cognitive abilities, although moderate-severely impaired cognitive skills can be relatively easy to diagnose. For all three of the EA-DLI children they had language acquisition difficulties and this was a prominent feature. With maturation the picture became clearer and a more widespread cognitive impairment was found for AEL and NAD. The difficulty lies in the no mans land where performance scores fall in the range of 85-70 (Leonard, 1998), but behavioural difficulties and poor linguistic abilities can mask the child's performance on cognitive tests. Therefore although these children's non-linguistic abilities may be deficient, their linguistic abilities by comparison are even more limited. An alternative consideration would be to examine other diagnostic criteria and consider Specific Language Impairment as a multifaceted spectrum.

The children in this study were initially selected at a young age (under 5;00) and given a diagnosis of DLI based on how they presented behaviourally through play and an observational assessment. This difficulty in making a differential diagnosis has been briefly mentioned in the literature and consistently researchers agree that there is no agreed method of diagnosis, and no agreed diagnostic criteria, and whether or not SLI is a discrete disorder or a spectrum disorder.

It is reported in the literature that by the age of 7;00-9;00 many of the children's language profiles look different from when they are initially seen (Rinaldi, 2000). Bishop and Edmundson (1987a &1987b) found that for some children their language difficulties will abate. However, what has been found for the EA-DLI children is that their difficulties with language acquisition continue to be problematic. In parallel to their language difficulty, for two of the children their cognitive impairment became more widespread, based on their performance IQs. This is either because the

language is weaker and affects cognitive abilities, or it is because there is a more generalised problem from the beginning affecting both cognition and language. An alternative possibility would be that the same linguistic symptoms are caused by varied widespread underlying aetiology. The sole difficulty for AEL and NAD is with language but as they mature their non-verbal cognitive performance is also compromised.

Difficulty in gaining clarity with this issue is going to be due to limitations in testing children under the age of 5;00 years. The children selected for this project have a pronounced difficulty with language acquisition relative to their performance in other cognitive spheres. What is apparent is that their language is less developed than other areas. For example, their pretend play is normal, their fine and gross motor skills are normal, their visual performance skills are normal. Their language is selectively impaired and behind their neurological and other developmental milestones.

The results of this study have demonstrated that for all three of the EA-DLI the most obvious feature is that their language system is not working well. From the discussion of the results of the EA-DLI children we have already seen that the children shared similar patterns of errors as well as differences; and when compared with the controls some of the errors produced by the EA-DLI children were also observed in the language of the controls. We have also seen that the language typology will dictate not only the way the language works, but which language features will be more vulnerable to errors. When considering the cross-linguistic SLI data we have already seen that different linguistic features are prevalent depending on the language group studied and what is problematic for a child acquiring one language e.g. Italian, may not be a problem for a child acquiring another language e.g. Hebrew or Arabic.

To ensure effective remediation and to have a greater understanding of developmental language impairment, more research is required across different language groups, since what will hold for one language will not hold for another. As our understanding of the various manifestations of

developmental language impairment evolves, more language specific and therefore more effective therapies can be developed to address the complex needs of these children.

Chapter 7

CONCLUSION

To add to the research tradition on developmental language impairment (DLI) this study examined Egyptian Arabic (EA), a language previously not investigated for DLI. Three questions were initially asked and have been answered by this work— What are the linguistic features of Egyptian Arabic Developmental Language Impairment? What are the similarities and differences in error patterns between children acquiring Egyptian Arabic language normally and those with impaired language? And what are the similarities and differences between Egyptian Arabic and other languages researched for (specific) language impairment (SLI)?

Three children with developmental language impairment were selected and their language was examined longitudinally AEL (3;01-7;01); MHB (4;06-6;02) and NAD (4;02-5;11). This study has demonstrated the importance of longitudinal studies, which are rare but proven to be extremely useful when tracking the productions of grammatical morphemes that develop over time. The available data on normal language development in monolingual Arabic speaking children is very limited. Only two studies have been conducted that are published in English (Omar 1973; Ravid and Farrah, 1999). To complement the available data on normal language development in monolingual Arabic speaking children, the collection of control data was an integral part of this work to allow for comparisons between normal non-adult target like developmental errors and errors produced by children with developmental language impairment. The control data came from 12 monolingual normally developing Egyptian Arabic speaking children. All data was collected in Cairo, Egypt.

Nine linguistic areas of interest were specified based on the morphological and grammatical differences and similarities between EA and Indo-European languages examined for language impairment. To test the hypotheses and to explore the developmental trajectory and error patterns of the EA-DLI children and the controls, spontaneous language measures and analysis were undertaken, in addition to structured tasks designed for this work.

The spontaneous language measures included calculating mean morphemes per unit (MPU), calculating percentage of utterances with errors, conducting a functional analysis to establish the range of utterance types produced by the children, and a lexical analysis for spontaneous use of verbs.

The spontaneous language measures proved useful in differentiating normal from impaired language patterns as well as measuring linguistic trajectory. The most salient morphological errors produced by the DLI children were documented and compared with those produced by the controls. The following morphological categories were examined: (1) use of plurals and the dual, (2) use of negative particles, (3) use of the definite article, (4) use of prepositions, (5) use of bound and free pronouns, and (6) use of adjectival agreement.

The data has provided evidence of normal developmental errors in Egyptian Arabic. The aims of this study were met and descriptions of similarities and differences between normally developing children and children with EA-DLI have been documented. Many of the linguistic characteristics observed in the EA-DLI children's language were also produced by the controls but less frequently.

The MPU values for controls were found to be similar to patterns reported cross-linguistically (e.g. Hebrew: Dromi and Berman, 1981). When compared with normally developing children the EA-DLI children were considerably slower in their lexical

development and later in their emergence of word combinations. Using MPU as a measure of morphological development has been supported in this work. The MPU values for the language impaired children were felt to be accurate representations of the children's morphological acquisition.

As hypothesised, the developmentally language impaired children's percentage of utterances with errors was greater than their controls and fluctuated. Normal developmental errors were present in the language of the control children which are not found in the adult target language; their presence in a child's language supports knowledge of grammatical rules and early understanding of morpho-syntax.

A further finding in this study has been the pattern of errors that emerged regarding the normal developmental errors. The errors started low, increased at the time of morphological productivity (morphological burst), and then decreased. This was contrary to the pattern of the EA-DLI children where their errors were seen to remain high and fluctuate.

The coding system used to determine the function of the utterances produced by the controls and the EA-DLI children served as a useful categorisation system as it clearly identified similarities and differences between the two groups of children.

Regarding the functional analysis, as hypothesised, the control children's use of Intraverbals was more frequent and increased with age, which was not the case for the EA-DLI children. Mands and Tacts were the types of utterances used the most by the controls and the EA-DLI children. For the controls this was during the early stages of their language acquisition, i.e. when under the age of 3;00. Contrary to this, the EA-DLI children were similar in their use of Mands and Tacts, but they used Learnt/Repetitive Phrases and disordered sentences at a much higher rate than the control group. Intraverbals were the least frequent type of

utterance used by EA-DLI children. Although there were advantages to using this category system for functional analysis, the disadvantage was that it did not measure the complexity of the response within the category.

The verb analysis, tokens of morphological productivity and the results of the Winslow verbs tasks revealed that the EA-DLI children used fewer verbs. Their use of verb morphology related to number, gender and person agreement resulted in morphological errors, although errors related to Aspectual markers and Tense became less problematic over the course of the data. Errors with Tense and Aspectual markers rarely occurred in NAD's and MHB's spontaneous language samples. Although they were more frequent for AEL, his productions reduced over time and at the last recording 100% of AEL's verb errors were with agreement and not with Tense.

This is an interesting finding and the EA data supports longitudinal case studies, without which this important conclusion would not have been reached. When the agreement errors were further analysed to evaluate whether certain verb agreement information was more problematic than others, no pattern was found for any of the three EA-DLI children.

A further finding of this study was that AEL, MHB, and NAD all produced Vocalic Paraphasias; which were not observed in the control children's utterances. A Vocalic Paraphasia is where the root of the verb is transparent, but an addition error occurs due to one or more phonemes being inserted in addition to other target phonemes (vocalic patterns) which hold the verb information. The presence of Vocalic Paraphasias supports difficulty with inflectional morphology. Since the root holds semantic information and is more robust, this will be less vulnerable to error patterns, but the melodic templates hold syntactic and semantic information and are therefore more susceptible to error patterns due

to weaknesses in morpho-syntax (a reported weakness in children with SLI children, Leonard, 1998).

The control children expressed plurality, however, errors with plurality and the dual were common. The errors produced by NAD, AEL and MHB were similar to those produced by the controls. A difference, however, between the EA-DLI children and the controls was that their use of plurals was limited. An additional difference was a strategy adopted to express plurality which was not observed in the control data. The EA-DLI children were observed to repeat the noun rather than using the morphology for plurals.

Regarding negatives, as hypothesised, early expressions of the negative by the controls and the EA-DLI children was to use lexical negative particles. NAD, MHB and AEL had difficulty expressing the negative when the discontinuous negative form /m..ʃ/ was required. Although the discontinuous negative was at times used correctly, the EA-DLI children and controls were also observed to produce one discontinuous negative particle without the other. The errors observed for negative productions do however indicate that the EA children early on develop the ability to understand the functions of the morphemes although they may not consistently or accurately produce them.

Limited use of function words, e.g. articles and clitics, have been reported in the French and Italian SLI data. The definite article was not an area of difficulty for the EA-DLI children, which is similar to the French SLI children (Le Normand *et al*, 1993 and Beers, 1992). Prepositions were consistently difficult for the three EA-DLI children and a characteristic feature of their language impairment. Their pattern of errors were however similar to the controls, they either omitted them when their use was obligatory or they selected an incorrect preposition. For all three EA-DLI children their difficulties with prepositions confirms their

morpho-syntactic deficit in addition to their difficulties with the understanding of abstract language concepts; which in combination affects their use of language.

The pronoun system in Arabic is complex as pronouns can either be bound or free and they agree with nouns for number, person and gender. Pronouns were produced early on by the controls and were generally used correctly. Errors of omission and substitution for gender and person agreement were present, although the latter was less frequent. EA is pro-drop language where pronominal subjects are optional, but person markings on the verb are obligatory. A language specific feature of EA observed was that sometimes instead of using the person marker on the verb the control children used the pronoun /ʔanna/*I*, thus resulting in an error.

This study primarily focused on the children's expressive impairments and the only receptive analysis used was the EA-SCT and the results of the Intraverbals. Given the emerging morphological difficulties it would be of interest in further studies of EA-DLI to examine specific areas of inflectional morphology both expressively and receptively, such as person markers versus gender and number markers and lexical negatives versus the discontinuous negative.

The results presented in this study have allowed for preliminary descriptions of language impairment in Egyptian Arabic, a previously un-investigated language. Compared with other languages examined for language impairment a number of grammatical features commonly reported in the literature are also evident in Arabic, as there are differences. Across the SLI sub-groups— difficulty controlling agreement with inflectional morphology, lack of mastery at expected developmental stages and limited use of inflectional morphology leading to

omissions of obligatory elements, are the most prevalent language features; and all these have been observed in EA.

A notable distinction between Arabic and the Indo-European languages examined for language impairment is that Arabic morphology is non-concatentive (McCarthy, 1975). As described in Chapter 2, verbs, many nouns and adjectives consist of a combination of a root and pattern. The typological differences therefore predict different surface errors although the underlying problem may be the same.

Using a simpler verb form, has been reported in the cross-linguistic data in Hebrew, English, German and Swedish (Hansson and Nettelbladt, 1995; Hansson *et al*, 2000; Hansson and Leonard, 2003; Hamann *et al.*, 1999; and Hebrew: Leonard, *et al.*, 2000; and Leonard, 1998) and was observed to be a notable error pattern used by the EA-DLI children. In this study the simpler unmarked form produced by Egyptian Arabic children has been labelled the *default verb form.* Although Tense substitution errors were seen in the EA data, these were not as frequent as substitutions that resulted in the use of the default verb form. The Imperfective-stem has been proposed as the source of the default verb form used by the EA-DLI children and used by the younger controls until approximately the age of 3;00 years.

Two linguistic theories used to explain the underlying difficulties in children with SLI have been compared against the EA findings— the *Extended Optional Infinitive Account* (e.g. Rice and Wexler, 1996) and the *Surface Account* (Leonard *et al.*, 1992, 1997). Aspects of these theories have been supported by the EA data. Regarding the Extended Optional Infinitive Account (e.g. Rice and Wexler, 1996), this theory predicts that children with SLI and younger normally developing children go through a period in which they do not know that Tense marking is obligatory in main clauses, which results in the production of non-finite uninflected forms. For the SLI children this period of optional use is extended, and in

English and Swedish the non-finite forms selected by the children are Infinitives. At first the Anglo-centric title of this theory is superficially not supported by the EA data firstly because there are no Infinitives in Arabic and second that Tense was not seen to be an area of difficulty for the EA-DLI children. However, the EA-DLI children and the younger controls under the age of 3;00 years did use a default verb form which would be predicted by the Extended Optional Infinitive Account. The important feature of this theory is that it predicts uninflected forms. Tense use was not seen to be problematic, although verb agreement information was. Instead, the default verb form resulted from the omission of less robust morphological marking such as Aspectual marking and person information. This provides further support that theories for SLI should predict different surface errors depending on the language typology.

Regarding the Surface Account (Leonard *et al.*, 1992, 1997), again this theory has not been fully supported by the EA findings. Firstly, morphemes brief in duration were not omitted by the EA children as has been reported in English for Tense and omissions of pronouns in Italian (Italian and English: e.g. Leonard et al., 1997). The children used definite articles and the passive, which in both cases are morphemes of brief duration. Secondly, the EA-DLI children frequently produced substitution errors for verb agreement information, which would not be supported by the Surface Account (Leonard *et al.*, 1992, 1997) and they produced Vocalic Paraphasias.

The combination of difficulties described in this study comprise of some features that are specific to Arabic and other features that have been identified in cross-linguistic studies of SLI. This study supports that the language typology will influence the error patters and the specific morphological features that will be impaired in any one given language.

The omissions of pronoun clitics, the discontinuous negative markers, person, number, gender agreement errors and the production of Vocalic Paraphasias together support that the impairments of SLI children extend beyond the grammatical features on lexical items and therefore supports a morpho-syntactic deficit.

Therefore, from this we could conclude three things. The first is that the omissions and substitutions are part of EA-DLI profile but will be specific to the rules of any given language. The second, as mentioned above, is that the omissions are part of the normal developmental process for children acquiring language normally, but for children with EA-DLI such omissions are more frequently observed. Thirdly, for languages where person markers are bound to the verb and the subject is not obligatory (pro-drop languages) person marking may be more problematic because the child needs to check features across a phrasal level (van der Lely, 1997).

The grammatical theories developed to account for SLI reported in English, German and Swedish (Hakansson *et al.*, 2003; Clahsen and Hansen, 1997; van der Lely, 2002) were judged against the evidence acquired in this study on the three EA-DLI children. The limitations of these theories have been discussed and alternative interpretations have been provided. The morphemes observed to be difficult for EA-DLI children partially support the grammatical theories that account for SLI in German and Swedish (Hakansson *et al.*, 2003; Clahsen and Hansen, 1997).

An additional important feature of this work has been on developing criteria for identifying children at a young age with language impairment (less than 3;00 years); this has taken the form of a clinical checklist— The Developmental Language Impairment Checklist. In addition criteria which can be applied to non-English speaking populations, i.e. non-language specific, have also been considered. The value of longitudinal studies has been demonstrated

by providing a detailed characterisation of how the cognitive and linguistic profiles of Egyptian Arabic children change over this critical age span of 3-7;00 years.

It is crucial when working on a language which has very little in terms of developmental linguistic literature that control data is collected to ensure that the identification of normal developmental errors (non-adult like productions) can be used to differentiate clinical errors from developmental error patterns. This work has provided a clear characterisation of the way the morpho-syntactic system in Egyptian Arabic is affected in the case of DLI. Specifically this study has demonstrated the changing pattern of Tense versus agreement within the inflectional system. These findings have been further considered within the broader cross-linguistic findings on SLI in a variety of languages with different expressions of morpho-syntax.

If SLI is a disorder present in children across population groups with a shared underlying cause and if a single model is to be proposed, this theoretical model should account for all languages regardless of the typology. Similarly, the theoretical model can not predict that the language features observed in one language will necessarily be present in another language as has been demonstrated by this study. Thus although the linguistic manifestations predicted may be accounted for by the theories, many of theories remain anglo-centric at a superficial level, e.g. Extended Optional Infinitive Account (Rice and Wexler, 1996). The findings of this study therefore asserts the need for researchers to examine the definition and theoretical explanations of SLI based on either a generic cross-linguistic definition/theory that can account for all languages or a definition/theory of SLI that can be customised according to the language groups examined.

BIBLIOGRAPHY

Albertini, J., 1980, The acquisition of five grammatical morphemes: Deviance or delay? Proceedings of the Symposium on Research in Child Language Disorders, 1, 94-111. Madison: University of Wisconsin, Madison.

Aljenai, K., 2003, Verb inflections in Kuwaiti Arabic Children. Seventh Annual Symposium on Arabic Linguistics, 9th-10th May. Alexandria Egypt.

Amayreh, M., and Dyson, A., 1998, The acquisition of Arabic consonants. Journal of Speech, Language and Hearing Research, volume 41, 642-653.

American Psychiatric Association, 1987, Diagnostic and statistical manual of mental disorders (DSM III-R- 3rd edition revised). Washington, DC.

Anderson, R.T., 2001, Learning an invented inflectional morpheme in Spanish by children with typical language skills and with specific language impairment (SLI). International Journal of Language and Communication Disorders, volume 36, number 1, 1-19.

Aram, D., Morris, R., and Hall, N., 1993, Clinical and research congruence in identifying children with specific language impairment. Journal of Speech and Hearing Research, 36, 580-591.

Aram, D. and Nation, J., 1975, Patterns of language behaviour of children with developmental language disorders. Journal of Speech and Hearing Research, 18, 229-241.

The ASHA Committee on Language, Speech and Hearing Services in the schools, April, 1980, Definitions for communicative disorders and differences, ASHA, 22, 317-318

Badawi, E. and Hinds, M., 1986, A Dictionary of Egyptian Arabic. Arabic-English. Beirut, Libraire du Liban.

Barnes, D., 1969, Language in the secondary classroom. In: Lees J and Urwin S (1991),Children with language disorders, p.151. Whurr Publishers.

Bartke, S., 1994, Dissociations in SLI children's inflectional morphology: New evidence from agreement inflections and noun plurals in German. Paper presented at the Meeting of European Group for Child Language Disorders, Gardenen, The Netherlands.

Bayley, N., 1970, Development of mental abilities. In P.H. Mussen (Ed.). Carmichael's manual of child psychology. Volume 1, pp. 1163-1209. New York: Wiley.

Bedore, L., 1999, The Acquisition of Spanish. In O. Taylor and L. Leonard (Eds.), Language Acquisition Across North America (San Diego: Singular), pp. 157-207.

Bedore, L. and Leonard, L., 2002, Grammatical morphology deficits in Spanish-speaking children with specific language impairment. Journal of Speech, Language, and Hearing Research, 44, 905-924.

Beers, M., 1992, Phonological processes in Dutch language impaired children. Scandinavian Journal of Logopedics and Phoniatrics, 17, 9-16.

Benton, A., 1964, Developmental aphasia and brain damage. Cortex1, 1, 40-52.

Berman, R., 1982, Verb-pattern alternation: the interface of morphology, syntax, and semantics in Hebrew child language. Journal of Child Language, 9, 169-191.

Berman, R., 1985, The acquisition of Hebrew. In Slobin, D. (Editor), The Cross-linguistic Study of Language Acquisition, vol. 1 (Hillsdale: Erlbaum), pp.255-371.

Berman, R., 1993, Marking of verb transitivity by Hebrew-speaking children. Journal of Child Language, 20, 641-669.

Berman, R., 1994, Developmental perspectives on transitivity: a confluence of cues. In Y. Levy (Ed.), Other Children, Other Languages: Issues in the Theory of Language Acquisition (Hillsdale: Erlbaum), pp. 189-241

Berman, R., 1997, The acquisition of Hebrew as a first language: emerging grammar and discourse. In J. Shimron (ed.), Studies in the psychology of language in Israel (Hebrew). Jerusalem, Israel: Magnes Publishing.

Berman, R. and Armon-Lotem, S., 1997, How grammatical are early verbs? Annales Littéraires de L'Université de Franche-Compté, 631.

Bernstein, D. K. and Tiegerman E., 1993, Language and Communication Disorders in Children 3rd Edition. New York: Merrill Publishing

Bever, T., 1970, The cognitive basis for linguistic structure. In J. Hayes (Ed.), Cognition and the development of language (pp.279-362). New York: Wiley.

Bishop, D., 1979, Comprehension in developmental language disorders. Developmental Medicine and Child Neurology, 21, 225-238.

Bishop, D., 1982, Comprehension of spoken, written and signed sentences in childhood language disorders. Journal of Child Psychology and Psychiatry, 23, 1-20.

Bishop, D., 1989a, Test for Reception of Grammar, 2nd Edition (Manchester: author at the Age and Cognitive Performance Research Centre, University of Manchester).

Bishop, D., 1989b, Autism, Asperger's syndrome and semantic-pragmatic disorders: Where are the boundaries? British Journal of Disorders of Communication, 24, 107-121.

Bishop, D., 1992a, The biological basis of specific language impairment. In P. Fletcher and D. Hall (Eds.), Specific speech and language disorders in children (pp.2-17). London: Whurr.

Bishop,D.,1992b, The underlying nature of specific language impairment
Journal of child psychology and psychiatry 33 (1), 3-66

Bishop, D., 1994a, "Is specific language impairment a valued diagnostic category? Genetic and psycholinguistic evidence". Philosophical Transactions of the Royal Society, B 346, 105-111

Bishop, D., 1994b, Grammatical errors in specific language impairment: Competence or performance limitations? Applied Psycholinguistics, 15, 507-550.

Bishop, D., 2002, The role of genes in the aetiology of specific language impairment. Journal of Communication Disorders, 35, 311-328.

Bishop, D., and Adams, C, 1989, Conversational characteristics of children with semantic-pragmatic disorder. II: What features lead to a judgement of inappropriacy?

Bishop, D., and Adams, C, 1992, Literal and Inferential Reading. Journal of Speech and Hearing Research, 35, 119-129.

Bishop, D., and Edmundson, A., 1987a, Language-impaired 4-year-olds: Distinguishing transient from persistent impairment. Journal of Speech and Hearing Disorders, 52, 156-173.

Bishop, D., and Edmundson, A., 1987b, Specific language impairment as a maturational lag: Evidence from longitudinal data on language and motor development. Development Medicine and Child Neurology, 29, 442-459.

Bishop, D., and Norbury, C.F., 2002a, Exploring the borderlands of autistic disorder and specific language impairment: a study using standardised diagnostic instruments. Journal of Child Psychology and Psychiatry. Volume 43 Issue 7, pp. 917.

Bishop, D., and Norbury, C.F., 2002b, Inferential processing and story recall in children with communication problems: a comparison of specific language impairment, pragmatic language impairment and high-functioning autism. International Journal of Language and Communication Disorders, volume 37, number 3, 227-251.

Bloom and Lahey M., 1978, Language Development and Language Disorders. Wiley and Sons.

Bol, G., and de Jong, J., 1992, Auxiliary verbs in Dutch SLI children. Scandinavian Journal of Logopedics and Phoniatrics, 17, 17-21.

Bortolini, U., Caselli, M., Deevy and Leonard, L., 2002, Specific language impairment in Italian: the first steps in the Search for a clinical marker. International Journal of Language and Communication Disorders, volume 37, number 2, 77-93.

Bortolini, U. and Leonard, L., 1996, Phonology and grammatical morphology in specific language impairment: Accounting for individual variation in English and Italian. Applied Psycholinguistics, 17, 85-104.

Boudelaa, S. and Marslen-Wilson, W., 2001, Morphological units in the Arabic mental lexicon. Cognition, 81, 113-118.

Bowerman, M., 1982, Starting to talk worse: Clues to language acquisition from children's late speech errors. In S. Strauss (Ed.) U-shaped behavioural growth. New York: Academic press.

Broca, P., Bulletin Societe d'Anthropologie Paris, 1861

Broca, 1865 in Translation of Broca's 1865 report. Localization of speech in third left frontal convolution, 1986, Archive Neurology, 1986, 43 (10): 1065-72.

Brown, R, 1973, A first language. Cambridge, MA: Harvard University Press.

Brustad, K.E., 2000, The Syntax of Spoken Arabic, A comparative study of Morrocan, Egyptian, Syrian, and Kuwaiti Dialects. Georgetown University Press Washington, D.C.

Caplan, D., 1987, Neurolinguistics and Linguistic Aphasiology an Introduction. Cambridge studies in speech science and communication. Cambridge University Press.

Chapman, R., 1978, Comprehension strategies in young children. In J. Kavanaugh and W. Strange (Eds.), Speech and language in the laboratory, school, and clinic (pp. 308-327). Cambridge, MA: MIT Press.

Chiat, S., 1983, Why Mickey's right and My key's wrong: The significance of stress and word boundaries in a child's output system. Cognition, 14, 275-300.

Chiat, S., 1989, The relation between prosodic structure, syllabification, and segmental realization: Evidence from a child with fricative stopping. Clinical Linguistics and Phonetics, 5, 329-337.

Chiat, S., 2000, Understanding children with language problems. Cambridge: CUP.

Chiat, S., and Hirson, A., 1987, From conceptual intention to utterance: A study of impaired language output in a child with developmental dysphasia. British Journal of Disorders of Communication, 22, 37-64.

Chilosi, A., and Cipriani, P., 1991, Il bambino disfasico. Pisa: Edizioni del Cerro.

Cipriani, P., Chilosi, A., Bottari, P., Pfanner, L., Poli, P., and Sarno, S., 1991, L'uso della morfologia grammaticale nella disfasia congenita. Giornale Italiano di Psicologia, 18, 765-779.

Clahsen, H., 1989, The grammatical characterisation of developmental dysphasia. Linguistics, 27, 897-920.

Clahsen, H., 1991, Child language and development dysphasia. Amsterdam: John Benjamins.

Clahsen, H., Bartke, S. and Gollner, S., 1997, Formal features of impaired grammars: A comparison of English and German SLI children. Journal of Neurolinguistics, 10, 151-171

Clahsen, H., and Hansen, D., 1993, The missing agreement account of specific language impairment: evidence from therapy experiments. Essex Research Reports in Linguistics, 2, 1-37.

Clahsen, H., and Hansen, D., 1997, The grammatical agreement deficit in specific language impairment: evidence from therapy experiments. In The Inheritance and Innateness of Grammars, Gopnik, M., (Ed.), 141-160. Oxford: Oxford University Press.

Clahsen, H., and Rothweiler, M., 1992, Inflectional rules in children's grammars: Evidence from German participles. In G. Booij and J. van Marle (Eds.), Yearbook of Morphology 1992 (pp. 1-34). Dordrecht, The Netherlands: Kluwer.

Cleave, P. and Rice, M., 1995, Acquisition of BE: a detailed analysis. Poster presented at the Convention of the American Speech-Language-Hearing Association, Orlando, Florida.

Cleave, P. and Rice, M., 1997, An examination of the morpheme BE in children with language impairment. The role of contractibility and grammatical form class. Journal of Speech, Language and Hearing Research, 40, 480 -492

Coën, R., 1886, Pathologie und Therapie der Sprachnomalien. Vienna: Urban and Schwarzenberg

Cole, K.N., Schwartz, I.S., Notari, A.R., Dale, D.S., and Mills, P.E, 1995, Examination of the stability of two methods of defining specific language impairment, Applied Psycholinguistics, 16:1, 105-121.

Conti-Ramsden, G. and Botting, N., 1999, Characteristics of children attending language units in England: a national study of 7 year olds, International Journal of Language and Communication Disorders 34, 359-66

Conti-Ramsden, G. and Botting, N., and Faragher, B., 2001, Psycholinguistic markers for Specific Language Impairment (SLI). Journal of Child Psychology and Psychiatry, 42, 741-748.

Conti-Ramsden, G., Christopher D., and Grove J., 1992, Characteristics of children with specific language impairment attending language units. European Journal of Disorders of Communication.Vol.27(4) 325-342

Conti-Ramsden, G. and Hesketh, A., 2003, Risk markers for SLI: a study of young language-learning children. Vol.38 (3), 251-263.

Conti-Ramsden, G. and Jones, M., 1997, Verb use in Specific Language Impairment. Journal of Speech and Language Hearing Research. 40 (6): 1298-313.

Conti-Ramsden, G. and Windfuhr, K., 2002, Productivity in word order and morphology: a comparative look at children with SLI and children with normal language abilities, International Journal of Language and Communication Disorders, 37 (1), 17-30.

Crago, M. and Allen, S., 1994, Morphemes gone askew: linguistic impairment in Inuktitut. McGill Working Papers in Linguistics, 10, 206-215.

Craig H. and Evans J., 1989, Turn exchange characteristics of SLI children's simultaneous and non simultaneous speech. Journal of Speech and Hearing Disorders 54,334-347

Crystal, D., 1979, Working with LARSP. London: Edward Arnold

Crystal, D., 1992, Profiling linguistic disability, 2nd Edition. London: Whurr publishers

Crystal, D., Fletcher, P. and Garman, M., 1976, The grammatical analysis of language disability. London: Edward Arnold.

Dalalakis, J., 1994, Developmental language impairment in Greek. McGill Working Papers in Linguistics, 10, 216-227.

de Jong, J., Fletcher, P., and Ingram, R, 1994, Verb argument structure in specifically language impaired children: Preliminary findings. Paper presented at the Meeting of European Group for Child Language Disorders, Gardenen, The Netherlands.

de Montfort Supple, M., 1996, Prologue: beyond bilingualism. Topics in Language Disorders, 16(4), 1-8.

de Villiers J. G. and de Villiers P. A., 1973, A Cross-sectional study of the acquisition of grammatical morphemes in child speech. Journal of Psycholinguistics Research, 2 (3) 267-278

de Villiers J. G. and de Villiers P. A., 1978, Language Acquisition, Cambridge: Harvard University Press

Dore, J. 1979, Conversation and Pre-school language development. In P. Fletcher and M. Garman (Eds.), Language Acquisition. London, England: Cambridge University Press

Dromi, E. and Berman, R., 1981, A morphemic measure of early language development: Data from Israeli Hebrew. Journal of Child Language, 9, 403-424.

Dromi, E., Leonard, L., Adam, G. and Zadunaisky-Ehrlich, S., 1999, Verb agreement morphology in Hebrew speaking children with specific language impairment. Journal of Speech, Language, and Hearing Research, 42, 1414-1431.

Dromi, E., Leonard, L. and Shteiman, M., 1993, The grammatical morphology of Hebrew-speaking children with specific language impairment: Some competing hypotheses. Journal of Speech and Hearing Research, 36, 760-771.

Dunn L., Whetton C. and Pintile D.,1988, British Picture Vocabulary Scale NFER-Nelson

Dunn, M., Flax, J., Sliwinski, M. and Aram, D., 1996, The use of spontaneous language measures as criteria for identifying children with specific language impairment: an attempt to reconcile clinical and research incongruity. Journal of Speech and Hearing Research, 39, 643-654.

Eid, M., 1990, Arabic Linguistics: the current scene. In Perspectives on Arabic Linguistics, I, Mushira Eid (Ed.), 3-37. Amsterdam: Benjamins.

Eid, M. and Holes, C., 1993. Perspectives on Arabic Linguistics V, Benjamins, Amsterdam.

Eisenson, J., 1968, Developmental aphasia: A speculative view with therapeutic implications. Journal of Speech and Hearing Disorders, 33, 3-13.

El-Hassan, S., 1977, Educated spoken Arabic in Egypt and the Levant: a critical review of diglossia and related concepts, ARLI 8:2, 112-113. In Holes, C., 1995, Modern Arabic Structures Functions and Varieties. Longman Linguistics Library. London and New York.

Evans J., 1996, SLI subgroups: Interaction Between Discourse Constraints and Morphosyntactic Deficits. Journal of Speech and Hearing Research Vol. 39, 655-660.

Eyer, J., and Leonard, L., 1995, Functional categories and specific language impairment: A case study. Language Acquisition, 4, 177-203.

Ferguson, C., 1959, Diglossia. In Hymes, D. (Ed),1964, Language in culture and society. New York

Fey, M. and Leonard, L., 1983, Pragmatic skills of children with specific language impairment. In: T.M. Gallagher, CA Prutting (Ed.), Pragmatic Assessment and Intervention Issues in Language. San Diego; College Hill Press.

Fleisch, H., 1968, L'Arabe classique. Beirut: Khayats.

Fletcher, P., and Garman, M., 1988, Normal language development and language impairment: Syntax and beyond. Clinical Linguistics and Phonetics, 2, 97-113.

Fletcher, P., and Garman, M., 1990, Language Acquisition, Studies in First Language Development. Second Edition. Cambridge University Press.

Fletcher, P. and Hall, D., 2000, Specific Speech and Language Disorders in children: Correlates, Characteristics and Outcomes. Singular Publishing Group, Inc.

Fletcher, P. and Peters, J., 1984, Characterising language impairment in children: An exploratory study. Language Testing, 1, 33-49.

Foster-Cohen, S.,H., 1999, An Introduction To Child Language Development. Longman London and New York

Fukuda, S., and Fukuda, S., 1994, Developmental language impairment in Japanese: a linguistic investigation. McGill Working Papers in Linguistics, 10, 150-177.

Gall, F., 1835, The function of the brain and each of its parts. 5, Organology. Boston: Marsh, Capen, and Lyon.

Gallagher, T., and Craig, H., 1984. Pragmatic assessment: Analysis of a highly frequent repeated utterance. Journal of Speech and Hearing Disorders, 49, 368-377

Gavin, W., Klee, T. and Membrino, I., 1993, Differentiating specific language impairment from normal language development using grammatical analysis. Clinical Linguistics and Phonetics, 7, 191-206.

Gerard, C., 1991, L'Enfant dysphasique. Paris: Editions Universitaires.

Gesell, A., and Amatruda, C., 1947, Developmental diagnosis (Second edition). New York: Hoeber.

Gleitman L.R., Gleitman, H. 1992, A picture is worth a thousand words, but that's the problem: The role of syntax in vocabulary acquisition. Current Directories in Psychological Science, 1.1 31 - 35

Gleitman L.R., Gleitman, H., Landau, B., and Wanner, E., 1998, Where learning begins: Initial representation for language learning. In F.J. Newmayer, ed., *Linguistics: The Cambridge Survey. Volume 3 Language: Psychological and Biological aspects.* Cambridge: Cambridge University Press

Goldsmith, John, 1976, *Autosegmental Phonology.* MIT PhD dissertation. Garland Press, New York, 1979

Gopnik, M., 1990b, Feature blindness: A case study. Language Acquisition, 1, 139-164.

Gopnik, M., and Crago, M., 1991, Familial aggregation of a developmental language disorder. Cognition, 39, 1-50.

Grela, B., and Leonard, L., 1997, The use of subject arguments by children with specific language impairment. Clinical Linguistics and Phonetics.

Grimm, H., 1993, Syntax and morphological difficulties in German-speaking children with specific language impairment: Implications for diagnosis and intervention. In H. Grimm and H. Skowronek (Eds.), Language acquisition problems and reading disorders: Aspects of diagnosis and intervention (pp. 25-63). Berlin: Walter de Gruyter.

Grimm, H., and Weinert, S., 1990, Is the syntax development of dysphasic children deviant and why? New findings to an old question. Journal of Speech and Hearing Research, 33, 220-228.

Gupta, A. F. and Chandler H., 1993, Paediatric speech and language therapy referral in Singapore: implications for multi-lingual language disability. European Journal of Disorders of Communication, 28, 311-317.

Hakansson, G, Salameh, E.K., and Nettlebladt, U., 2003, Measuring language development in bi-lingual children: Swedish-Arabic children with and without language impairment. Linguistics, Volume 41, (2), 255-288

Hall D. and Hill P., 1986, When does secretory otitis media affect language development? Archives of Disease in Childhood Vol. 61(1) 42-47

Hamann, C., Penner, Z., and Linder, K., 1998, German impaired grammar: the clause structure revisited. Language Acquisition, 7, 193-245.

Hansson, K. and Bruce, B., 2002, Verbs of placement in Swedish children with SLI, International Journal of Language and Communication Disorders, 37(4), 401-414.

Hansson, K. and Leonard, L., 2003, The use and productivity of verb morphology in specific language impairment: an examination of Swedish. Linguistics. Volume 41-42, 351-379.

Hansson, K., Nettelbladt, U., 1995, Grammatical characteristics of Swedish children with SLI. Journal of Speech, Language and Hearing Research, Volume 38

Hansson, K., Nettelbladt, U. and Leonard, L., 2000, Specific Language Impairment in Swedish: the status of verb morphology and word order. Journal of Speech, Language and Hearing Research, 43.

Hansson, K., Salameh, E., Nettelbladt, U., 2003, Measuring language development in bilingual children: Swedish-Arabic children with and without language impairment. Linguistics. Volume 41-42, 255-288.

Haynes, C., 1992, A longitudinal study of language-impaired children from a residential school. In P. Fletcher and D. Hall (Eds.), Specific speech and language disorders in children (pp. 166-182). London: Whurr.

Holes, C., 1995, Modern Arabic Structures Functions and Varieties. Longman Linguistics Library. London and New York.

Hopkins, S., 1984, Studies in the grammar of early Arabic, Oxford, OUP.

Howard, D., 1985, Agrammatism. In S. Newman and R. Epstein (eds.). Current Perspectives in Dysphasia. Edinburgh: Churchhill Livingstone, 1-31.

Ingram, D., 1972a, The acquisition of questions and its relation to cognitive development in normal and linguistically deviant children: A pilot study. Papers and Reports on Child Language Development, 4, 13-18.

Ingram, D., 1972b, The acquisition of English verbal auxiliary and copula in normal and linguistically deviant children. Papers and Reports on Child Language Development, 4, 79-91.

Jakubowicz, C., 2003, Computational complexity and the acquisition of functional categories by French-speaking children with SLI. Linguistics, Volume 41-2, 175-211.

Johnston, J. and Kamhi, A., 1984, Syntactic and semantic aspects of the utterances of language-impaired children. The same can be less. Merrill-Palmer Quarterly, 30, 65-85.

Johnston, J. and Ramstad, V., 1983, Cognitive development in preadolescent language impaired children. British Journal of Disorders of Communication, 18, 49-55.

Johnston, J. and Schery, T., 1976, The use of grammatical morphemes by children with communicative disorders. In D. Morehead and A. Morehead (Eds.), Normal and deficient child language (pp. 239-258). Baltimore: University Park Press.

Kamhi, A. G., 1992, The need for a broad-based model of phonological disorders. Language, Speech, and Hearing Services in Schools, 23, 261-268.

Karam El-Din, L., 1990, The vocabulary of Egyptian Arabic Children: the development of the most frequently used words by children aged one to six years. Ain Shams University, Cairo Egypt.

Karlin, I., 1954, Aphasia in children. American Journal of Disabilities in Children, 87, 752-767.

Kelly, D. J., 1997, Patterns of verb use by preschoolers with normal language and specific language impairment, Applied Psycholinguistics, 18:2, 199-218.

Kertesz, A., 1982, The Western Aphasia Battery. New York: Grune and Stratton.

Kevin, N. Cole, Ilene, S. Schwartz, Angela, R. Notari, Philips, S. Dale, and Paulette, E. Mills, 1995, Examination of the stability of two methods of defining specific language impairment. Applied Psycholinguistics, 16:1, 105-121.

Khan, L. and James, S., 1983, Grammatical morpheme development in three language disordered children. Journal of Childhood Communication Disorders, 6, 85-100.

King, G. and Fletcher, P., 1993, Grammatical problems in school-age children with specific language impairment. Clinical Linguistics and Phonetics, 7, 339-352.

Klee, T., 1992, Developmental and diagnostic characteristics of quantitative measures of children's language production. Topics in Language Disorders, 12, 28-41

Klee, T., Schaffer, M., May, S., Membrino, I., and Mougey, K., 1989, A comparison of the age-MLU relation in normal and specifically language-impaired preschool children. Journal of Speech and Hearing Disorders, 54, 226-233.

Kot, A. and Law J., 1995, Intervention with pre-school children with specific language impairments: A comparison of two different approaches to treatment. Child language Teaching and Therapy, Vol. 11 (2) 144-162

Kushnir, C. and Blake, J., 1996, The nature of the cognitive deficit in specific language impairment, First Language, 16, 21-40.

Lahey, M., 1990, Who shall be called language disordered? Some reflections and one perspective. Journal of Speech and Hearing Disorders, 55, 612-620.

Landau, W. and Kleffner, F., 1957, Syndrome of acquired aphasia with convulsive disorder in children. Neurology, 7, 523-530.

Lee, L., 1966, Developmental sentence types: A method for comparing normal and deviant syntactic development. Journal of Speech and Hearing Disorders, 31, 311-330.

Lee, L., 1976, Normal and atypical semantic development. Manuscript, Northwestern University, Evanston, IL.

Lees, J. and Urwin, S., 1991, Children with language disorders. London: Whurr Publishers.

Lees, J. and Urwin, S. 1997, Children with language disorders (2nd Edition). London: Whurr Publishers.

Leinonen, E. and Letts, C., 1997a, Referential communication tasks: performance by normal and pragmatically impaired children. Vol.32(2), 53- 65.

Leinonen, E. and Letts, C., 1997b, Why pragmatic impairment? A case study in the comprehension of inferential meaning, Vol.32(2), 35-51.

Leinonen, E., Letts, C. and Smith, B.R., 2000, Children's pragmatic communication difficulties. London: Whurr Publishers.

Le Normand, M. T. and Chevrie-Muller, C., 1991, Individual differences in the production of word classes in eight specific language-impaired preschoolers. Journal of Communication Disorders, 24, 331-351.

Le Normand, M. T., Leonard, L., McGregor, K., 1993, A cross-linguistic study of article use by children with specific language impairment. European Journal of Disorders of Communication, 28, 153-163.

Leonard, L., 1972, What is deviant language? Journal of Speech and Hearing Disorders, 37, 427-446.

Leonard, L., 1981, Facilitating linguistic skills in children with specific language impairment. Applied Psycholinguistics, 2, 89-118

Leonard, L., 1982, The nature of specific language impairment in children. In S. Rosenburg (Ed.). Handbook of applied psycholinguistics (pp. 295-327). Hillsdale, N.J: Lawrence Erlbaum.

Leonard L., 1989, Language learnability and specific language impairment in children Applied Psycholinguistics, 10, 179-202

Leonard, L., Bortolini, U., Caselli, M.C, McGregor, K., and Sabbini, L., 1992. Morphological deficits in children with specific language impairment: The status of features in the underlying grammar. Language Acquisition, 2, 151-179

Leonard, L., Camarata, S., Rowan, L., and Chapman, K., 1982, The communicative functions of lexical usage by language impaired children. Applied Psycholinguistics, 3, 109-125.

Leonard, L., Deevy, P., Miller, C., Rauf, L., Charest, M., Kurtz., R., 2003, Surface forms and grammatical functions: Past Tense and Passive Participle use by children with specific language impairment. Journal of Speech, Language and Hearing Research, Vol. 46, 43-55.

Leonard, L. and Dromi, E., 1994, The use of Hebrew verb morphology by children with specific language impairment. Journal of Speech, Language, and Hearing Research, 41, 1363-1374.

Leonard, L., Dromi, E., Adam, G., Zadunaisky-Ehrlich, S., 2000, Tense and finiteness in the speech of children with specific language impairment acquiring Hebrew, 35 (3), 319-335.

Leonard, L., Eyer, J., Bedore, L. and Grela, B., 1997, Three accounts of grammatical morpheme difficulties of English speaking children with specific language impairment. In J. Morgan and K. Demuth (Eds.), Signal to syntax (pp. 233-247). Hillsdale, NJ: Lawrence Erlbaum.

Leonard L. and McGregor K., 1994, Subject pronoun and article omissions in the speech of children with specific language impairment: A phonological interpretation. Journal of Speech and Hearing Research Vol. 37(1) 171-181

Leonard, L., McGregor, K. and Allen, G., 1992, Grammatical morphology and speech perception in children with specific language impairment. Journal of Speech and Hearing Research, 35, 1076-1085.

Leonard L., McGregor K., Bortolini U., Caselli M., 1992, Morphological deficits in children with specific language impairment: The status of features in the underlying grammar. Language Acquisition A Journal of Developmental Linguistics, Vol. 2(2), 151-179

Leonard, L., Sabbadini, L., Volterra, V. and Leonard, J., 1988, Some influences on the grammar of English- and Italian-speaking children with specific language impairment. Applied Psycholinguistics, 9, 39-57.

Leonard, L., Steckol, K., and Schwartz, R., 1978, Semantic relations and utterance length in child language. In F.Peng and W. von Raffler-Engel (Eds.), Language acquisition and developmental kinesics (pp. 93-105) Tokyo:Bunka Hyoron

Leonard, L.B., 1998, Children with Specific Language Impairment. Cambridge, MA MIT press.

Leonard, L.B. and Bortolini, U. 1998, Grammatical morphology and the role of weak syllables in the speech of Italian-speaking children with specific language impairment. Journal of Speech, Language and Hearing Research, 4, 1363 -1374

Letts, C. and Reid, J., 1994, Using conversational data in the treatment of pragmatic disorder in children. Child Language Teaching and Therapy, 10, 1-22

Levy, Y., and Schaeffer, J., 2003, Language competence across populations: Toward a definition of specific language impairment. Mahwah, NJ, US: Lawrence Erlbaum Associates, Publishers.

Lewis, M., 1973, Infant intelligence tests: Their use and misuse. Human Development, 16, 108-118.

Lindner, K., and Johnston, J., 1992, Grammatical morphology in language-impaired children acquiring English or German as their first language: A functional perspective. Applied Psycholinguistics, 13, 115-129.

Loeb, D., and Leonard, L., 1988, Specific language impairment and parameter theory. Clinical Linguistics ad Phonetics, 2, 317-327.

Loeb, D., and Leonard, L., 1991, Subject case marking and verb morphology in normally developing and specifically language-impaired children. Journal of Speech and Hearing Research, 34, 340-346.

Lovell, K., Hoyle, H., and Siddall, M., 1968, A study of some aspects of the play and language of young children with delayed speech. Journal of Child Psychology and Psychiatry, 9, 41-50.

Lowe, A., and Campbell, R., 1965, Temporal discrimination in aphasoid and normal children. Journal of Speech and Hearing Research, 8, 313-314.

Magnusdottirt,S., and Thrainsson, H., Agrammatism in Icelandic: two case studies. P. 443-544. In Menn, L., and Obler, L.K., 1990, Agrammatic Aphasia: a cross-linguistic narrative source book, Vol(2), John Benjamins Publishing Company, Amsterdam/Philadelphia.

Marchman, V., Wulfeck, B., and Ellis Weismer, S., 1995, Productive use of English past tense morphology in children with SLI and normal language. Technical Report CND-9514. Center for Research in Language, University of California at San Diego.

Marcus, G., Pinker, S., Ullman, M., Hollander, M., Rosen, T., and Xu, F., 1992, Over-regularization in language acquisition. Monographs of the society for research in child development, 57(4 serial no.228).

Matthews, P.H., 1997, The Concise Oxford Dictionary of Linguistics. Oxford University Press.

McCall, E., 1911, Two cases of congenital aphasia in children. British Medical Journal, 1, 2628, 1105; 2632, 1407.

McCall, R.B., Hogarty, P.S., and Hurlburt, N., 1972, Transitions in infant sensori-motor development and the prediction of childhood IQ. American Psychologist, 27, 278-748.

McCarthy, J.J., 1981, A prosodic theory of non-concatenative morphology. Linguistic Inquiry, 12, 373-418.

McCarthy, J.J. and Prince, A.S., 1990, Foot and word in prosodic morphology: The Arabic broken plural. Natural Language and Linguistic Theory, 8, 209-283.

McGregor, K. and Allen, G., 1992, Grammatical morphology and speech perception in children with specific language impairment. Journal of Speech and Hearing Research, 35, 1076-1085.

McGregor, K. and Leonard, L., 1994, Subject pronoun and article omissions in the speech of children with specific language impairment: a phonological interpretation. Journal of Speech, Language and Hearing Research, 37, 171-181.

Menn, L., and Obler, L.K., 1990, Agrammatic Aphasia: a cross-linguistic narrative source book, Vol(2), John Benjamins Publishing Company, Amsterdam/Philadelphia.

Menn, L., Obler, L.K., O'Connor, M., Holland, A., 1995, Non-fluent aphasia in a muti-lingual world. John Benjamins Publishing Company. Amsterdam/Philadelphia.

Menyuk, P., 1964, Comparison of grammar of children with functionally deviant and normal speech. Journal of Speech and Hearing Research, 11, 138-146.

Merino, B., 1983, Language development in normal and language handicapped Spanish-speaking children. Hispanic Journal of Behavioral Science, 5, 379-400.

Miceli, G., and Mazzucchi, A., Agrammatism in Italian: two case studies. P. 717-816. In Menn, L., and Obler, L.K., 1990, Agrammatic Aphasia: a cross-linguistic narrative source book, Vol(2), John Benjamins Publishing Company, Amsterdam/Philadelphia.

Miller, J. and Chapman, R., 1981, The relation between age and mean length of utterance in morphemes. Journal of Speech and Hearing Research, 24, 154-161.

Mimouni, Z. and Jarema, G., 1995, Agrammatic Aphasia in Arabic. CLASNET Working Papers, 3, 3-19

Mimouni, Z., Kehayia, E. and Jarema, G., 1996, The mental representation of singular and plural nouns in Algerian Arabic as revealed through auditory priming in agrammatic aphasic patients. CLASNET Working Papers, 4, 3-15.

Mitchell, T.,F., 1990, Pronouncing Arabic I. Oxford, OUP

Mitchell, T.,F., and El-Hassan, S., 1994, Modality, Mood and Aspect in Spoken Arabic: With Special Reference to Egypt and the Levant, Monograph Number 11. Kegan Paul International London and New York.

Moore, M., 1995, Error analysis of pronouns by normal and language-impaired children. Journal of Communication Disorders, 28, 57-72.

Moore, M. and Johnston, J., 1993, Expressions of past time by normal and language-impaired children. Applied Psycholinguistics, 14, 515-534.

Morehead, D. and Ingram, D., 1970, The development of base syntax in normal and linguistically deviant children. Papers and Reports on Child Language Development, 2, 55-75.

Morehead, D. and Ingram, D., 1973, The development of base syntax in normal and linguistically deviant children. Journal of Speech and Hearing Research, 16, 330-352.

Mostafa, N., 1994, The Arabic Language Test. Ain Shams University Cairo.

Nelson, K., Welsh, J., Camarata, S., Butkovsky, L. and Camarata, M., 1995, Available input for language-impaired children and younger children of matched language levels. First Language, 15, 1-17.

Ochs, E., 1979, Transcription as theory. In Ochs, E., and Schieffelin, B., (Ed.), Developmental Pragamtics. New York: Academic Press, 43-72.

Oetting, J., and Horohov, J., 1997, Past tense marking by children with and without specific language impairment. Journal of Speech and Hearing Research, 40, 62-74.

Oetting, J., Rice, M., and Swank, L., 1995, Quick incidental learning (QUIL) of words by school-age children with and without SLI. Journal of Speech and Hearing Research, 38, 434-445.

Ogiela, D., 1995, Pronoun case errors in normally developing and specifically language impaired children. Master's thesis, Purdue University.

O'Hara, M., and Johnston, J., 1997, Syntactic bootstrapping in children with specific language impairment. European Journal of Disorders of Communication.

Omar, M., 1973, The Acquisition of Egyptian Arabic as a Native Language. The Hague: Mouton.

Paradis, M., 1987, The Assessment of Bilingual Aphasia. Hillsdale: Laurence Erlbaum.

Paul, R. and Fisher, M., 1985, Sentence comprehension strategies in children with autism and developmental language disorders. Proceedings of the Symposium on Research in Child Language Disorders, 6, 11-19. Madison: University of Wisconsin, Madison.

Peters, A., 1983, The units of language acquisition. Cambridge: Cambridge University Press.

Pienemann, M., 1998, Language Processing and Second Language Development: Processability Theory. Amsterdam: Benjamins.

Pienemann, Manfred., and Hakansson, Gisela, 1999, A unified approach towards the development of Swedish as L2: a processability account. *Studies of Second Language Acquisition* 21, 383-420

Pinker, S., 1989, Learnability and cognition: The acquisition of argument structure. Cambridge, MA: MIT Press.

Plaza, M., and Le Normand, M. T., 1996, Singular personal pronoun use: A comparative study of children with specific language impairment and normal French-speaking children. Clinical Linguistics and Phonetics, 10, 299-310.

Plomin, R., 2002, Genetics of language and cognitive impairment: GLI (general language impairment) in addition to SLI (specific language impairment. Proceedings from SLI, Genes, Development and Cognitive Neuroscience. 18th-20th October, 2002. Department of Human Communication Science, University College London.

Prinz, P., 1982, An investigation of the comprehension and production of requests in normal and language disordered children. Journal of Communication Disorders, 15, 75-93

Rapin, I., and Allen, D., 1983, Developmental language disorders: Nosologic considerations. In U. Kirk (Ed.), Neuropsychology of Language, Reading and Spelling (pp. 155-184) New York: Academic Press.

Rapin, I., and Allen, D., 1987, Developmental dysphasia and autism in preschool children: Characteristics and subtypes. In Proceedings of the First International Symposium on Specific Speech and Language Disorders in Children (pp. 20-35). Brentford, UK: Association for All Speech Impaired Children: AFASIC

Rapin, I., and Allen, D., 1988, Syndromes in developmental dysphasia and adult aphasia. In F. Plum (Ed.), Language, communication, and the brain (pp.57-75). New York: Raven Press.

Rapin, I., and Wilson, B., 1978, Children with developmental language disability: Neurological aspects and assessment. In M. Wyke (Ed.), Developmental Dysphasia (pp. 13-41). London: Academic Press.

Ravid, D., D., 1995, Language Change in Child and Adult Hebrew: A psycholinguistic Perspective. Oxford University Press, New York Oxford.

Ravid, D., D., and Farrah, R., 2000, Learning about noun plurals in early Palestinian Arabic. First Language, 19, 187-206.

Ravid, D., Levie, R., and Ben-Zvi, G., 2003, The role of language typology in linguistic development: implications for the study of language disorder, 171-196.In Levy, Y., and Schaeffer, J., 2003, Language competence across populations: Toward a definition of specific language impairment. Mahwah, NJ, US: Lawrence Erlbaum Associates, Publishers.

Rees, N., 1973, Auditory processing factors in language disorders: The view from Procrustes' bed. Journal of Speech and Hearing Disorders, 38, 304-315.

Renfrew, C., 2001, The Renfrew Action Picture Test 4th Edition, Speechmark Publishing Ltd.

Rescorla, L., and Roberts, J., 2002, Nominal versus verbal morpheme use in late talkers at ages 3 and 4. Journal of Speech, Language and Hearing Research, Vol. 45, 1219-1231.

Restrepo, M. A., 1995, Identifiers of Spanish-speaking children with language impairment who are learning English as a second language. Doctoral dissertation, University of Arizona.

Rice, M., 1998, Family Histories of Children with SLI Who Show Extended Optional Infinitives, 419-432

Rice, M., and Bode, J., 1993, GAPS in the lexicon of children wit specific language impairment. First Language, 13, 113-131.

Rice, M., Buhr, J., and Nemeth, M., 1990, Fast mapping world-learning abilities of language-delayed preschoolers. Journal of Speech and Hearing Disorders, 55, 33-42.

Rice, M., Buhr, J., and Oetting, J., 1992, Specific-language-impaired children's quick incidental learning of words: The effects of a pause. Journal of Speech and Hearing Research, 35, 1040-1048.

Rice, M., and Oetting, J., 1993, Morphological deficits in children with SLI: Evaluation of number marking and agreement. Journal of Speech and Hearing Research, 36 (6), 1249-1257.

Rice, M., and Wexler, K., 1995b, Tense over time: The persistence of optional infinitives in English in children with SLI. Paper presented at the Boston University Conference on Language Development, Boston.

Rice M. and Wexler K., 1996, Toward tense as a clinical marker of specific language impairment in English-speaking children. Journal of Speech and Hearing Research, Vol. 39(6), 1239-1257

Rice, M., Wexler, K., and Cleave, P., 1995, Specific language impairment as a period of extended optional infinitive. Journal of Speech and Hearing Research, 38, 850-863.

Rice, M., Wexler, K., and Hershberger, S., 1998, Tense over time: the longitudinal course of tense acquisition in children with specific language impairment. Journal of Speech Language and Hearing Research, 41(6): 1412-31.

Rice, M., Wexler, K., Marquis, J., and Hershberger, S., 2000, Acquisition of regular past tense by children with specific language impairment. Journal of Speech, Language and Hearing Research, 43, 582 -594

Rinaldi, W., 2000, Language Difficulties In An Educational Context. Whurr Publishers: London and Philadelphia.

Ripley, K., Barrett, J., and Flemming, P., 2001, Inclusion for children with speech and language impairments: accessing the curriculum and promoting personal and social development. David Fulton Publishers Ltd, London.

Rispoli, M., 1994, Pronoun case overextensions and paradigm building. Journal of Child Language, 21, 157-172.

Roberts, J., Rescorla, L., and Borneman A., 1994, Morphosyntactic characteristics of early language errors: An examination of specific expressive language delay. Poster presented at Symposium on Research in Child Language Disorders, University of Wisconsin, Madison.

Roberts, S., 1995, Functional categories in the grammars of English- and German –speaking children with specific language impairment. Master's thesis, Purdue University

Rom, A., and Leonard, L., 1990, Interpreting deficits in grammatical morphology in specifically language impaired children Preliminary evidence from Hebrew. Clinical Linguistics and Phoniatrics 18, 169-179

Safi-Stagni, S., 1991, Agrammatism in Arabic. Perspectives on Arabic Linguistics III. Papers From The Third Annual Symposium on Arabic Linguistics. Edited by Bernard Comrie and Mushira Eid, 251-270. John Benjamins Publishing Company. Amsterdam/Philadelphia.

Schaeffer, J., 2003, Pragmatics and SLI, 135- 170. In Levy, Y., and Schaeffer, J.(Ed.), 2003, Language competence across populations: Toward a definition of specific language impairment. Mahwah, NJ, US: Lawrence Erlbaum Associates, Publishers.

Searle, J.R., 1969, Speech Acts. Cambridge University Press, Cambridge, Mass.

Serratrice, L., Joseph, K. and Conti-Ramsden, G., 2003, The acquisition of Past Tense in preschool children with specific language impairment and unaffected controls: regular and irregular forms Linguistics. Volume 41-42, 321-349.

Skinner, B.F., 1957, Verbal behaviour. Englewood Cliffs, NJ: Prentice-Hall.

Smith, B.R. and Leinonen, E., 1992, Clinical Pragmatics. London: Chapman Hall

Stark, R., and Tallal, P., 1981, Selection of children with specific language deficits. Journal of Speech and Hearing Disorders, 46, 114-122.

Stark, R., and Tallal, P., 1988, Language, speech, and reading disorders in children: Neuropsychological studies. Boston: Little, Brown.

Steckol, K. and Leonard, L., 1979, The use of grammatical morphemes by normal and language impaired children. Journal of Communication Disorders, 12, 291-302.

Sundberg, M., 1993, The application of establishing operations. *The Behavior Analyst,* 16, 211-214

Sundberg, M., L., 1987, Teaching language to the developmentally disabled. Prince George, BC: College of New Caledonia Press.

Sundberg, M., L., 1991, 301 Research topics from Skinner's book Verbal Behaviour. The Analysis of Verbal Behaviour, 9, 81-96.

Sundberg, M., L., Michael, J., and Partington, J., W.,1996, The role of automatic reinforcement in early language acquisition. The Analysis of Verbal Behaviour, 1, 9-13.

Sundberg, M., L., and Partington, J., W., 1982, Skinner's verbal behaviour: a reference list. The Analysis of Verbal Behaviour, 1, 9-13.

Tager-Flusberg, H., and Cooper, J., 1999, Present and future possibilities for defining a phenotype for specific language impairment. Journal of Speech, Language and Hearing Research, 42, 1275-1278.

Tallal, P., Curtiss, S., and Kaplan, R., 1988, The San Diego Longitudinal Study: Evaluating the outcomes of preschool impairments in language development. In S. Gerber and G. Mencher (Eds), International perspectives on communication disorders (pp. 86-126). Washington, DC: Gallaudet University Press

Tallal, P., Ross, R., and Curtiss, S., 1989b, Unexpected sex-ratios in families of language/learning-impaired children. Neuropsychologia, 27, 987-998.

Tallal P. and Stark R. E., Tallal P. and Stark R. E., 1985, The relationship between auditory and temporal analysis and receptive language development; evidence from studies of developmental language disorder. Neuropsychologia, 23, 527-533

Tissot, R., Mounin, G. and Lhermitte, F., 1973. L'agrammatisme. Brussels: Dessaert

Tomblin, J.B., Records, N.L., Buckwalter, P., Zhang, X., Smith, E. and O'Brien, M., 1997, Prevalence of Specific Language Impairment in kindergarten children. Journal of Speech, Language and Hearing Research, 40, 1245-1260.

Trauner, D., Wulfeck, B., Tallal, P., and Hesselink, J., 1995, Neurologic and MRI profiles of language impaired children. Technical report CND-9513, Center for Research in Language, University of California at San Diego.

Trousseau, A., 1865, Clinique medicale de L'Hotel-Dieu de Paris. Paris: Bailliere.

Väisse, L., 1866, Des sourds-muets et de certains cas d'aphasie congénitale. Bulletin de la Société d'Anthropologie de Paris, 1, 146-150

Valian, V., 1986, Syntactic categories in the speech of young children. Developmental Psychology, 22, 562-579.

van der Lely, H.K.J., 1992, Theory meets Therapy. College of Speech and Language Therapy Bulletin, 487, 9-12

van der Lely, H., 1994, Canonical linking rules: Forward versus linking in normally developing and specifically language-impaired children. Cognition, 51, 29-72

van der Lely, H., 1996, Specifically language impaired and normally developing children: Verbal passive vs. adjectival passive sentence interpretation. Lingua, 98, 243-272.

van der Lely, H.K.J., 1997, Narrative discourse in Grammatical specific language impaired children: A modular language deficit? Journal of Child Language, 24, 221-256

van der Lely, H., 2002, SLI and deficits in the computational syntactic system: A commentary on W. Fawley "Control and cross-domain mental computations: Evidence from language breakdown". Computational Intelligence, 18 (1), 39-42.

van der Lely, H., 2003, Do heterogeneous deficits require heterogeneous theories? SLI subgroups and the RDDR Hypothesis, in Levy, Y., and Schaeffer, J. (Eds), 2003, Language competence across populations: Toward a definition of specific language impairment (97-133). Mahwah, NJ, US: Lawrence Erlbaum Associates, Publishers.

van der Lely, H. and Dewart M., 1986, Sentence comprehension strategies in specifically language impaired children. The British Journal of Disorders of Communication, 21 291-306

van der Lely, H. and Harris, M., 1990, Comprehension of reversible sentences in specifically language impaired children. Journal of Speech and Hearing Disorders, 55, 101-117.

van der Lely, H. and Howard, D., 1993, Children with specific language impairment: Linguistic impairment or short-term memory deficit. Journal of Speech and Hearing Research, Vol. 36, 1193-1207

Van der Lely, h., and Stollwerck, L., 1996, A grammatical specific language impairment in children: An auto-somal dominant inheritance? Brain and Language, 52, 484-504

Van Hout, A., 1989, Aspects du diagnostic des dysphasies. ANAE, 1, 11-15.

Watkins, R., Rice, M., and Molz C., 1993, Verb use by language-impaired and normally developing children. First Language, 37, 133-143.

Webster, A. and McConnell, C., 1987, Children with Speech and Language Difficulties. London: Castle.

Wechsler, D., 1974, Wechsler Intelligence Scale for Children- revised. New York: The Psychological Corporation.

Wechsler, D., 1989, Wechsler Preschool and Primary Scale of Intelligence, Revised (New York: Psychological Corp.).

Weiner, P., 1974, A language-delayed child at adolescence. Journal of Speech and hearing Disorders, 39, 202-212.

Weinert, S., Grimm, H., Delille, G. and Scholten-Zitzewitz, R., 1989, Was macht sprachgestörten Kindern das Textverstehen so schwer? Heilpädagogische Forschung, Themenheft: Sprachentwicklungsprobleme/Leseprobleme, 15, 25-37.

Weismer, S. and Hesketh, L., 1996, Lexical learning by children with specific language impairment: Effects of linguistic input presented at varying speaking rates. Journal of Speech and Hearing Research, Vol. 39, 177-190

Wexler, K., Marquis, J., Hershberger, S., 2000, Acquisition of irregular Past Tense by children with specific language impairment. Journal of Speech, Language and Hearing Research, 43, 1126-1145.

Wheldall, K., Mittler, P. and Hobsbaum, A.,1987, Sentence Comprehension Test Revised Edition. The NFER-NELSON Publishing Company Ltd.

Wolfus, B., Moscovitch, M., and Kinsbourne, M., 1980, Subgroups of developmental language impairment. Brain and Language, 10, 152-171.

Worster-Drought, C., and Allen, I., 1929, Congenital auditory imperception (congenital word deafness): With report of a case. Journal of Neurology and Psychopathology, 9, 193-208.

Wren, C., 1980, Identifying patterns of syntactic disorder in six-year-old children. Proceedings from the Symposium on Research in Child Language Disorders, 1, 113-123. Madison: University of Wisconsin, Madison.

APPENDIX

Appendix 1

The developmental language disorder checklist

Name _____ Date of Birth _____ Present Age _____

Date _____ Assessor _____

Attention and Listening	Yes	No
Discrepancy between visual and auditory attention, either:		
a) Good visual focus but reduced listening skills.		
b) Good auditory focus but reduced listening skills.		
Staying within activity but not actively looking or listening "blank face".		
Highly distractible.		

Pragmatics 1: Eye Contact	Yes	No
Prolonged and inappropriate.		
Avoiding- with associated body movements e.g. head lowered, body turned away.		
Difficult to engage and sustain eye contact - e.g. tracks around facial area or looks at one specific area (such as chin, hair)		
Rarely establishes eye contact in play and communication		

Functional Language :	Yes	No
A. Verbal		
Very restricted initiation of communication with adults/peers.		
Very restricted response to communication from adults/peers.		
Majority of communication is adult focussed (and not to peers).		
Inappropriate e.g. laughing, shouting, noises		
Uses mostly echoics, mands and tacts with few intraverbals		

B. Non-Verbal	Yes	No
Very restricted initiation with adults/peers (e.g. pulls adult by hand).		
Inappropriate e.g. sniffing and touching clothes/hair of others.		
Breaks rules of proximity and personal space -comes very close.		
Using aggressive means of interaction e.g. pushing, hitting.		
Inappropriate or limited turn-taking with adults or peers.		
Inappropriate use of language.		
Does not maintain topic.		
Overuse of learnt language across situations (learnt repetitive phrases).		

Play 1: Level of Play	Yes	No
Large discrepancy between different types of play: good skills in construction and spatial but poor symbolic understanding of miniatures or large doll.		
Not following developmental pattern of symbolic play e.g. able to follow role play but lacks understanding of miniatures or large doll.		
Learnt and rigid play sequences with same play materials; shows distress if change is introduced.		
Repeatedly chooses same toy and refuses/protests if alternative suggested.		
Does not extend play ideas spontaneously or from peer's model.		
Unwarranted devotion to toys or characters (e.g. Power Puff Girls, Barney, Bakkar, Telly Tubbies).		

Play 2: Social Play	Yes	No
Discrepancy in high level of play skill and low level of social play e.g. well developed sequences with miniatures but unable to tolerate peers/adult involvement.		
Plays in parallel with peers but difficulty playing *with* peers or adults.		

Comprehension	Yes	No
Not following developmental pattern.		
Reliant on visual support e.g. pictures and gestures.		
Concept development in advance of linguistic level e.g. knows colours but does not understand verbs or function of objects.		
Good understanding in "here and now" with visual support but unable to follow abstract language outside immediate environment e.g. 'wh' questions.		
Literal interpretation of language and often related to own experience.		
Difficulty in generalising language concepts into new situations, e.g. comments that car is *under* the bridge but does not understand concept of *under*.		

Expression 1: Jargon	Yes	No
Use of non-communicative jargon.		
Uses mature language structures and vocabulary but continues to intersperse with jargon.		

Expression 2: Echolalia	Yes	No
Echoes long phrases and sentences, absence of spontaneous language		
Uses learnt phrases with spontaneous utterances, e.g. "You know something.."		

Expression 3: Morphology specific for Egyptian Arabic	Yes	No
Difficulty using discontinuous negative.		
Omits or substitutes subject verb agreement information for verbs.		
Reduced use of Tense or Aspectual markers.		
Uses numbers to express plurality.		
Reduced use of bound and free pronouns.		
Neologisms - substitution of real word with non-word		
Vocalic paraphasias where root is maintained but incorrect morphemes are inserted.		
Reduced MPU		
Absence/severely restricted use of a class of words e.g. verbs, in the presence of advanced linguistic structures e.g. "tomorrow ..."		

Expression 4: Syntax and semantics	Yes	No
Difficulty in sequencing and word order.		
Absence of conjunctions and narrative.		

Speech and Oral- Motor Skills	Yes	No
Disordered phonological development		
Lacks co-ordination of oral-motor skills e.g. drooling		
Inadequate breath support.		

Other Skills	Yes	No
Gross motor difficulties e.g. clumsy.		
Fine motor difficulties e.g. pencil grip.		
Spatial difficulties e.g. difficulty orienting puzzle pieces to fit.		
Distress at change of routine or change in use of materials.		
Reacts inappropriately to loud or quiet sounds.		
Dislikes getting dirty.		
Avoids or dislikes certain textures or surfaces, e.g. water, sand, and play-dough.		
Likes to jump, spin, whirl themselves or toys or objects.		
Likes to climb inappropriately, e.g. on furniture.		

Appendix 2

Winslow Verb Pictures Selected:

Verb	Verb	Verb
1. Blowing (man)	2. Brushing (washing) teeth (boy)	3. Opening (man)
4. Building (boy)	5. Patting dog (girl)	6. Drawing (girl)
7. Carrying (woman)	8. Pushing (girl)	9. Peeling (man)
10. Clapping (boy)	11. Licking (boy)	12. Eating (woman)
13. Combing (man)	14. Speaking (man)	15. Writing (man)
16. Drinking (man)	17. Tearing (woman)	18. Smelling (woman)
19. Jumping (girl)	20. Ironing (man)	21. Mixing (woman)
22. Lighting (woman)	23. Walking (boy)	24. Cracking (woman)
25. Painting (boy)	26. Crying (boy)	27. Playing (man)
28. Reading (man)	29. Crawling (boy)	30. Listening (woman)
31. Riding (boy)	32. Waving (girl)	33. Sewing (woman)
34. Sleeping (man)	35. Bouncing (girl)	36. Brushing hair (woman)
37. Smiling (boy)	38. Pouring (man)	39. Cutting (woman)
40. Washing (girl)	41. Sitting (girl)	42. Climbing (boy)

Appendix 3

The coding for information on the Egyptian Arabic RAPT

Coding key for age when word appears on Vocabulary List

□ = 1;00-2;00 years □ = 2;00-3;00 years □ = 3;00-4;00 years

□ = 4;00-5;00 years □ = 5;00-6;00 years □ = lexical item not on word list

Each tier represents the choice of lexical items for which one point, half a point or no points are given. The maximum possible Information score is 36.

Picture 1: A picture of a girl hugging her teddy bear		
Question in English: What is the girl doing?		
Question in Arabic: /el-bint betiʕmil ih/		
1 Point	½ Point	Nil
/maska/, /bitiħdun/, /biriʕab/ /diba/, /dabdub/, /duba/	/bitħib/, /bus/, /ʃajla/ /ʕarusa/, /nunu/, /babi/	

(Possible Total 2)

Picture 2: A picture of a mother removing or putting on her daughters boot		
Question in English: What is the mummy doing?		
Question in Arabic: /mama bi-tiʕmil ih/		
1 Point	½ Point	Nil
/bitlabis (-ha)/, /bitʔalaʕ-(ha)/ /el bint/, /bitma-ha/ /gazma/, /but/	/bitʃid/ /ʃandal/	/ʃurab/, /ʃibʃib/

(Possible Total 3)

Picture 3:		
Question in English: What happened to the dog?		
Question in Arabic: /eli ħassal lil kalb/		
1 Point	½ Point	Nil
/bitlabis/, /bitʔalaʕ/ /el bint/, /bitma-ha/, [illegible] /gazma/, /but/	/bitʃid/ /sandal/, /ʃibʃib/	/ʃurab/

(Possible Total 3)

Picture 4:		
Question in English: What is the man doing?		
Question in Arabic: /el ra:gil bi-ji-ʔiʕmil ih/		
1 Point	½ Point	Nil
/bi-ji-not/ /foʔ/ /ʕalla/ /əs-su:r/		

(Possible Total 5)

Picture 5:		
Question in English: What has the cat done?		
Question in Arabic: /əl-oTa ʕamalit ih?/		
1 Point	½ Point	Nil

(Possible Total 2)

Picture 6:		
Question in English: What has happened to the girl?		
Question in Arabic: /əl-ħassal lil bint?/		
1 Point	½ Point	Nil
/min/ /əs-selim/ /əs-salla:lim/		

(Possible Total 3)

Picture 7:		
Question in English: What has the big girl done?		
Question in Arabic: /əl-bint ek-kibi:ra ʕamalit ih?/		
1 Point	½ Point	Nil
/ʃayla/ /ʃa:lit/ /əl-wallad/ /ʔaxuha/ əl ʕagul /jeḥot/ /gawab/ /sandu?/	/maska/ /ʃa:litu/ /babi/ /waraʔ/	

(Possible Total 5)

Picture 8:		
Question in English: What is the man doing?		
Question in Arabic: /əl-ra:gil bi-yi-ʔiʕmil ih?/		
1 Point	½ Point	Nil
/əs-selim/ /ye-nazzil/ /min/ /foʔ/ /əs-Suṭḥ/		/hina:k/

(Possible Total 6)

Picture 9:		
Question in English: What is the boy doing?		
Question in Arabic: /əl-wallad bi-yi-ʔiʕmil ih?/		
1 Point	½ Point	Nil
/bi-yi-ʕayyat/ /zaʕla:n/ /əl kdb/ /gazmitu/	/misik/	

(Possible Total 4)

Picture 10:		
Question in English: Now take your time. Look at this picture and tell me everything that is happening?		
Question in Arabic: /xud waʔtak uli kulla ħaga bi-ti-ʔiħSal fil su:raʔ/		
1 Point	½ Point	Nil
/əs-sit/ /wiʕu/ /ki:s/ /əṭ-ʔaṬaʃ/ /əṭ-ʔaṬaʃit/ /wallad/ /ʃamu/	/baskət/ /sabat/	

Appendix 4

	Grammatical structures provided by children		
Picture number	Morphological structure elicited	Example of production	Morphological (Grammar) Score
1	/bi/ progressive Aspectual marker /-t-/ feminine marker /el/ definite article	e.g. /bi-t-ihdun/ /**el**-dibba/	1 1 1
2	/ha-/ or /bi-/ future marker 3rd person fem form of verb /-ha/ object clitic	/bi-t-labbis/ /bi-**t-labbis**/ /bi-t-labbis-**ha**/	1 1 1
3	/el-/ pronoun past tense preposition	/el-kalb/ /huwa/ /marbut/ /lil/ /fil/ /bil/	1 1 1 1
4	Progressive marker masculine Preposition Conjunction Preposition	/bi/ /bil/ /wə/ /ʕalla/	1 1 1 1
5	Past tense Feminine marker Definite article Dual Number	/miskit/ /-it/ /el-/ /fari:n/ /itni:n/	1 1 1 1 1
6	Past tense Fem. marker Co-ordinating conjunction Passive Fem. Agreement with noun bound to verb	/wiʔʕit/ /-it/ /we/ /ek-kassar/ /-et/	1 1 1 1 1
7	Fem. marker Conjunction	/ʃa:**lit**/ /ʕaʃa:n/	1 1
8	Present tense Conjunction Masc. marker Preposition	/ta:liʕ/ /ʕaʃa:n/ /**je**-gib/ /min/	1 1 1 1

9	Present progressive masc. Conjunction Definite article Past tense Masc. Possessive pronoun	/bi-ʕajjat/ /ʕaʃa:n/ /el-/ /ʔaxad/ /betaʕu/	1 1 1 1 1
10	Main clause subject: noun phrase Main clause verb with agreement any tense (Masc. or Fem.) Conjunction Subsidiary verb Bound pronoun related to object	/el-sit//el-wallad/, /tofa:ħ/, /ʃanta/ /waʔaʕit/ /bi-lim/ /ʕaʃan/ /we/ /ha-jlim/ /bi-lim/ /hajlimu-**hum**/	1 1 1 1 1