THE ACQUISITION OF ARABIC LANGUAGE COMPREHENSION BY SAUDI CHILDREN

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DECLARATION

The work presented in this dissertation is entirely my own work. This material has not been previously submitted to any other University for a degree.

DEDICATION

This thesis is dedicated with appreciation to

the memory of my father

and to my beloved mother.

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Praise be to ALLAH, the Gracious, the Merciful

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ABSTRACT

Studies of spoken Arabic language comprehension in children are few. This research obtained data on the developmental patterns, rate and order of acquisition of the comprehension of some morpho-syntactic structures for Saudi children as a basis for a criterion-referenced test. The structures tested were chosen from data collected by studying Saudi Child Directed Speech (CDS), similar Tests in English and from linguistic knowledge of Arabic structures.

The CDS sample was collected from 12 Saudi fathers conversing with their children (8 boys and 4 girls) aged 2;4 to 5;6 years. This data was analysed in terms of the vocabulary, structure and function used. Saudi fathers were found to use discourse function used by parents speaking other languages when addressing their children but in different frequencies. Fathers' language complexity was found to increase as their children got older.

The comprehension of morpho-syntactic structures by Saudi children was tested through a language comprehension test that was designed for the purpose of this research. The test consisted of sixty three pictures testing twenty-one morpho-syntactic structures and six miniature toys to test children's comprehension of three structures. The test incorporated a naming test to establish the dialect forms familiar to each child, a speech discrimination screening to screen children's hearing and a vocabulary pre-test to ensure that children have comprehension of the target lexical items used in the test. Test materials were designed in a way to suit the Saudi culture. The test was performed in Saudi on 120 Saudi children ranging between 3;0 and 6;0 years of age and were 60 boys and 60 girls attending three nursery schools in Riyadh. Subjects were grouped into six groups according to their age: 3;0 to 3;5, 3;6 to 3;11, 4;0 to 4;5, 4;6 to 4;11, 5;0 to 5;5, and 5;6 to 5;11 years of age. Ten boys and ten girls were tested in each age group. Results showed that gender did not affect children's results. Significant test sensitivity to age was found. Nearly half of the structures were sensitive to age while the other structures were not. An order of acquisition according to structures' difficulty was established. The age group at which every structure develops was judged by using a 60% passing criterion. The agreement between test and re-test was shown to be high, indicating that the test was reliable. A comparison was made between frequencies of structures found in the CDS study and age of acquisition in the comprehension test.

An error analysis of the tested morpho-syntactic structures was obtained by analysing children's performance on every item used. Children's errors on these items were interpreted on the basis of the competition model and several patterns differed from findings in other languages. Children were found to use previously reported comprehension strategies such as world

knowledge when interpreting some of the tested morpho-syntactic structures. The way children interpreted structures that require the comprehension of gender and number inflections is reported. Younger children were found to be guided more by their lexical knowledge, while older ones relied on both lexical and syntactic knowledge. While Saudi children were found to use well-established comprehension strategies such as world knowledge, they also demonstrated strategies for understanding gender and number inflections which have not been previously reported. Gender and number inflections were modified in some of the fathers' utterances in the CDS in a way that violates the rules of Arabic grammar.

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A KEY TO THE USED TRANSLITERATIONS

The International Phonetic Alphabet symbols (IPA) were used in this study to represent the Arabic utterances. The symbols used by Habis (in preparation) were adopted in this study.

IPA	Place of articulation	Voicing
ʔ	Glottal stop	Voiced
b	Bilabial stop	Voiced
t	Alveolar stop	Voiceless
θ	Dental fricative	Voiceless
ʄ	Palatal stop	Voiceless
ħ	Pharyngeal fricative	Voiceless
χ̣	Uvular fricative (emphatic)	Voiceless
d	Alveolar stop	Voiced
ð	Dental fricative	Voiced
r̩	Alveolar trill (emphatic)	Voiceless
z	Alveolar fricative	Voiced
s	Alveolar fricative	Voiceless
ʃ	Palatal-alveolar fricative	Voiceless
s̩	Alveolar fricative (emphatic)	Voiceless
t̩	Alveolar stop (emphatic)	Voiced
d̩	Lateral fricative (emphatic)	Voiced
ʕ	Pharyngeal fricative	Voiced
ɣ̩	Uvular fricative	Voiced
f	Labio-dental fricative	Voiceless
g̩	Velar stop (emphatic)	Voiced
k	Velar stop	Voiceless
l	Alveolar lateral	Voiced
m	Bilabial nasal	Voiced
n	Alveolar nasal	Voiced
h	Glottal fricative	Voiceless
w	Bilabial semi-vowel	Voiced
j	Palatal semi-vowel	Voiced
a	Low front long vowel	Voiced
æ	Low front short vowel	Voiced
ʊ	Back short vowel	Voiced
u	Back long vowel	Voiced
ɪ	Mid short vowel	Voiced
i	Mid long vowel	Voiced

A KEY TO THE USED ABBREVIATIONS

Abbreviation	Term
Adj	Adjective
ALT	Arabic Language Test
ANOVA	Analysis of Variance
B	Boy
BPVS	British Picture Vocabulary Scale
BT	Baby Talk
C	Complement
CM	Competition Model
Conj	Conjunction
CDS	Child Directed Speech
Det.	Determiner
F	Female or Feminine
G	Girl
GPGE	General Presidency of Girls Education
ICW	Information-Carrying Words
KR-20	Kuder-Richardson 20
LARSP	Language Assessment, Remediation and Screening Procedure
m	Month
M	Male or Masculine
MANOVA	Multivariate Analysis of Variance
MLU	Mean Length of Utterance
MOF	Ministry Of Finance
MOP	Ministry Of Planning
n	Number of subjects
NS	Not Significant
OMTLC	Object-Manipulation Test of Linguistic Construction
PLS	Zimmerman Pre-school Language Test
PPVT	Peabody Picture Vocabulary Test
Prep	Preposition
Pron	Pronoun
RDLS	Reynell Developmental Language Scale
S	Subject
SA	Arabic spoken in Saudi
SLI	Children with Specific Language Impairment
SPA	Saudi Press Agency
SVO	Subject-Verb-Object
T	Target sentence (or picture)
TROG	Test of Reception of Grammar
Tukey's HSD	Tukey's Honestly Significant Difference test
V	Verb
WIPI	Word Intelligibility by Picture Identification
y	Year

*In order to be able to use pronouns, the convention of calling the examiner *she* and the child *he* was adopted in this thesis.

*When reporting ages of children, the following form will be used (y.;m.d) where y. is years, m. is months and d. is days, while the form (y.) will be used for adults.

Chapter One

Introduction

There is a lack of studies that investigate children's acquisition of Arabic. Most of the few studies available are Masters or PhD dissertations that investigate certain aspects of expressive language development. Speech-language therapists are one of the groups who have been affected by this deficiency in language studies. The availability of such studies is important to speech-language therapists in two ways. First, they provide criteria to measure children's performance when assessing impaired children's language. Second, they provide a theoretical background for constructing language tests.

Language comprehension was defined by Crystal (1994) as "the ability to understand and interpret language, whether spoken, written, or signed" (p. 77). Language comprehension is clinically important. After testing 73 language-impaired children aged 6;3 to 13;1 years, Bishop (1979) concluded that the majority of them, including those classified as suffering from expressive disorders, have in fact impaired language comprehension.

Miller & Paul (1995) viewed language comprehension as an event that takes place privately within the mind of the listener and the decision as to whether a certain utterance has been comprehended or not can only be reached through the listener's response either with words or with actions. This makes the assessment of language comprehension a difficult task compared to the assessment of language production because procedures need to be designed to elicit the listener's responses. Another factor that adds to the difficulty of assessing language comprehension is that the literal comprehension, which is often assessed by current language assessment procedures, is only one level of the language comprehension process. The other level is the discourse comprehension which enables a child to go beyond the literal meaning of an utterance to understand, for example, the speaker's intentions.

When testing a child's language comprehension we are actually assessing one aspect of language development. Studies of language acquisition began mainly with expressive language but a fuller picture of a child's language can only be achieved by integrating information from both language comprehension and production. Language comprehension is a complex process and different aspects of the process can be assessed. In relation to sentence comprehension, Engen & Engen (1983) indicated that it is an important aspect of language comprehension and data on this aspect is essential for a comprehensive account of language development.

The main purpose of this research is to investigate the developmental patterns, rate and order of acquisition of the comprehension of some morpho-syntactic structures of spoken Arabic for Saudi children aged 3;0 to 6;0 years. The outcome of this study will be used as a basis for developing a clinical procedure for assessing language comprehension as such data is not currently available. In order to get appropriate data it is essential to construct and to apply a test that helps to identify structures that Saudi children are able to comprehend; to clarify the way children comprehended the studied structures and to classify these structures in terms of order of acquisition according to children's ages.

To establish those structures which should be included in the language comprehension study, it is appropriate to study adult language directed to young Saudi children (hereafter CDS). The aim of studying CDS is to get a natural sample that illustrates the level of syntactic complexity a Saudi child is expected to comprehend within the age range of the research. Data achieved from the CDS study will be the major source for the vocabulary items and the morpho-syntactic structures that will be used in the language comprehension test. Another aim of the CDS study is to establish the frequency with which certain structures are used in CDS and to establish variation with age. The other aim of the CDS study is to establish the variety of language used to children by their parents. This entails seeing if the language used

by parents to their children conforms to previous studies of CDS, in addition to conducting a quantitative appraisal to see if non-standard features of parent language with their children exist in the sample collected.

Data achieved from the language comprehension study, which includes data from the language test and the CDS study, will be used in the future to construct a clinical test for the comprehension of morpho-syntax for use by Saudi speech-language therapists (hereafter clinical test). This will be a criterion-referenced assessment and it will be used to assess comprehension abilities of Saudi children suffering from language disorders. Since subjects of the clinical test are children with language disorders and users of the test are Saudi speech-language therapists, it was considered important to consult speech-language therapists working in Saudi about their views regarding child language testing procedures used in Saudi at the current time and their expectations and priorities for a newly constructed language test for Saudi children with language disorders.

The Competition Model (hereafter CM) proposed by Bates & MacWhinney (1987, 1989) which explains the process and the acquisition of language comprehension was selected as the theoretical framework of the present study. The CM accounts for the roles of children's syntactic as well as semantic knowledge in language acquisition. Unlike most of the other theories, which tried to explain the process of language comprehension acquisition, the CM was designed to be applied to cross-linguistic data which means that it accounts for the variability in language acquisition between children speaking different languages, rather than universals. MacWhinney (1987) predicted the existence of a general processing mechanism that is able to take advantage of cues in the environment in order to map the forms of a language to the functions they serve. Thus language acquisition was considered by proponents of the CM (e.g. Bates & MacWhinney, 1989) to be cue-driven and they predicted that children pass through three phases in acquiring comprehension of their native language.

In the first phase, a very young child responds primarily on the basis of overall 'availability of cues' (i.e. the child will respond to the available cue even if does not lead to a correct response). After this initial phase, development appears to be controlled primarily by 'cue validity' which requires that the cue is both available and reliable (i.e. the child will respond to cues that are both available and lead to a correct response). The last phase occurs when children begin to notice the relatively rare situations in which two or more cues compete 'conflict validity', and children will favour those cues that win in such a conflict situation. Proponents of the CM believe that the validity of a cue decreases as the 'cue cost' increases. The cue cost is an information processing constraint that affects language processing and development, such as having the cue difficult to perceive or to assign (Bates & MacWhinney, 1989). Structures used for testing children's language comprehension in the current study were analysed in terms of the number and types of cues required for their comprehension (See Sections 1.2.1.5 and 2.2.3 for more details on the CM).

According to the aims of the current study stated above, there will be study questions which are related to the theoretical framework of the study (i.e. CM), the language comprehension test and other questions which are related to the CDS study. The following questions are related to the theoretical framework of the study:

1. Since monolingual Saudi children are assumed by the CM to use both syntactic and lexical cues when they are available to interpret Arabic sentences, do they use them together from an early age or do they start using one type of cue at an early age and use them interactively at a later age?
2. When only lexical cues are required to interpret a sentence, do monolingual Saudi children perform better with one class of lexical cue than with another? (i.e. nouns, verbs or adjectives).
3. How does the pattern of using semantic and syntactic cues change with age?

4. Do very young monolingual Saudi children respond on the basis of a cue availability regardless of its validity as anticipated by the CM?
5. Does the performance of monolingual Saudi children change with the different syntactic structures in relation to the use of syntactic and semantic cues?
6. Does monolingual Saudi children's performance deteriorate when the validity of a cue is decreased by increasing its cue cost as anticipated by the CM?
7. Do monolingual Saudi children show evidence of using comprehension strategies to understand Arabic structures? If so, do they use them in the same way as children speaking other languages such as English?

The questions related to the language comprehension test:

1. Is there an age-related sequence in the acquisition of the structures tested?
2. At what age do Saudi children acquire the tested morpho-syntactic structures in comprehension of spoken Arabic?
3. What is the order of acquisition of the tested structures according to age?
4. How do Saudi Arabic-speaking monolingual children differ from children speaking other languages (such as English) in relation to the age of acquisition of similar tested structures?
5. Which of the structures tested shows sensitivity to age within the age range investigated and which does not? A structure is said to be sensitive to age when it is able to detect age differences.
6. Do different methods of testing comprehension (i.e. using objects & instructions and pictures) produce similar results?
7. Do scores of boys differ significantly from scores of girls in the test?

The other study questions which are related to the CDS study are:

1. What is the frequency of each structure used by the sample of parents studied?
2. Does the frequency of use of structures change with the age of the child?

3. What is the frequency of vocabulary items (nouns, verbs, adjectives) in the corpus?
4. Does the frequency of vocabulary items change with the age of the child?
5. Does this corpus match the standard features of CDS?
   A) Does it show the same functions of utterances and in the same frequency as previous studies?
   B) Does it get more complex with age?
6. In relation to structures investigated in the CDS study and structures tested in the language comprehension test, do children find frequent structures used by fathers in the CDS study easy to comprehend when examined in the language comprehension test?

1.1 Factors affecting the choice of assessment developed

Currently therapists in Saudi speech and language therapy clinics see a variety of patients with speech, language and voice disorders. Data from the largest two clinics in Riyadh revealed that most patients are children with language disorders. Data from the speech-language therapy clinic at King Faisal Specialist Hospital, for example revealed that 47.2% of the patients seen by the two therapists in that clinic in the period from 1983 to 1995 were children with language disorders (see Section 2.2.6 for the definition of language disorders). The other 52.8 of the clients were suffering from other speech and language disorders such as stuttering or voice disorders. (See Appendix 1 for the actual data).

Due to the unavailability of an Arabic language test for children at the present time, clinicians in Saudi Arabia use American language tests translated into Arabic for assessing children, such as the Peabody Picture Vocabulary Test (hereafter PPVT, Dunn, 1965) and the Zimmerman Pre-school Language Test (hereafter PLS, Zimmerman *et al.*, 1969). These testing procedures are standardised on English-speaking American children which make them inappropriate for Saudi children because they were designed for a different language and culture. Another reason that they are inappropriate is that translating the test from English to Arabic does not take into account possible differences between the two languages

in rate and pattern of acquisition. A third reason for these tests being of limited clinical value is that they are aimed at ranking a testee into a language age rather than indicating the strengths and weaknesses of the child's language comprehension which is what is needed to plan effective intervention.

There are trials in different parts of the Arabic-speaking countries to establish a test of children's language. Most of these trials take place in Egypt, such as the test developed by Rifaie (1994) called the Arabic Language Test (hereafter ALT). This test, which is the result of a PhD project, is a norm-referenced test that examines the following aspects of language: receptive and expressive vocabulary, receptive and expressive syntax, conceptual understanding, pragmatics, prosody, and spontaneous speech. However, because it is so broad, relatively little information is provided on each aspect and also the variety of Arabic used in the test is restricted to the Egyptian dialect of Arabic.

As mentioned before, data obtained from the current study will be used in future to construct a criterion-referenced clinical test for Saudi children's language comprehension. The clinical test was chosen to be a criterion-referenced test because such tests are characterised by the ability to describe regularities of performance and identify the specific language abilities a child does and does not possess. This is important in clinical practice as it identifies weak aspects of the child's language that require therapeutic intervention. Because of this, criterion-referenced tests are useful in that they can guide therapy. Test results can be used to indicate where to start the rehabilitation programme because it is possible to describe the achievements of a child and those aspects yet to be mastered. These were features identified by Saudi speech-language therapists as desirable for a language comprehension test for children.

The current research will be one of the first attempts to fill the gap in children's language studies on Arabic-speaking children and on Saudi children in particular. This will be done by studying both language comprehension when tested by a structured test in monolingual Arabic-speaking children, and by studying CDS which will provide evidence of the syntactic complexity of Arabic a Saudi child is expected to comprehend at different ages prior to entering full time education.

When researching in a very conservative Islamic culture, like the Saudi culture, several points need to be taken into account. From the point of view of this research, the first and most important is that places where one might recruit children for research are nursery schools. Nurseries in Saudi Arabia are educational and not simply for child-care. Another point about nurseries there is that they are run by women, and men are therefore not permitted access to them. This makes the job of a male researcher somewhat difficult. The only way for a male researcher to get around this problem is to employ a female assistant to collect data for him. There are inevitable dangers with this approach. However, disadvantages can be reduced to the minimum if the employed woman receives sufficient training. Another important consideration in relation to the current research is that only fathers can be used as conversational partners for studying CDS as they are more accessible than mothers. (See Section 3.2.1.2).

Another point to consider is that materials used in the research should be appropriate to the culture in terms of the people's appearance and dress, to the religion and to the life style. Using inappropriate materials might make children uncomfortable, unco-operative and uncertain. The best example that demonstrates this is that dogs are not kept as pets by families and so they are not commonly seen in Saudi Arabia. Consequently, it will not be appropriate to include a picture of a dog in test materials. Using materials which are religiously inappropriate may upset the child's parents. An example that illustrates a religious

point that needs to be considered is that people are ordered to use their right hand when drinking or eating as one of the teachings of Islam. Thus, a test picture that shows someone eating or drinking should consider this point.

Arabic is spoken in many countries in the Middle East and North Africa. As regards the Arabic dialects spoken in Saudi Arabia, they vary according to the region and so they can be called regional dialects. Differences between the spoken dialects are more evident in the semantics, phonology, and intonation rather than the morphology and syntax levels. Classical Arabic is used in schools' text books and in the information media (TV - radio - news-papers). The CDS data was used to establish the variety used by fathers to their children.

With regard to Arabic syntax, it is similar to English in that it consists of a noun phrase and a verb phrase. At the syntax level, there are some differences in order such as that nouns precede adjectives in Arabic, unlike English where adjectives come first. If an Arabic speaker wants to identify a red car he will start with the noun first then the adjective, so the sentence will be *car red.* Differences between Arabic and English are more evident in morphology and especially in the use of inflections. The Arabic language uses more inflections and the dual is distinguished from the plural. Nouns in Arabic have a masculine or feminine gender which will determine the form of verb, adjective, etc. used making an agreement between the different parts of the sentence. For example a mother will say to her son /kɪl/ asking him to eat, while she will say to her daughter /kulæɪ/ asking her to eat. From the point of view of language addressed to children, this will determine forms according to the addressee.

1.2 Structure of the thesis

This thesis consists of eight chapters of which this Introduction is the first. The following chapter, Chapter 2, reviews relevant literature and introduces the theoretical framework of the study. This is inevitably extended because of the wide range of topics involved. The first

section in Chapter 2 presents a general background about the people of Saudi Arabia, the type of Arabic spoken there, pre-school education and the speech-language therapy services in Saudi Arabia. In the second section literature relevant to language acquisition and specifically the theoretical framework is presented, while the final section concentrates more specifically on issues directly related to comprehension assessment.

Chapter 3, which is the Methods Chapter, is divided into 3 sections. The first section includes an overview of the questionnaire distributed to Saudi speech-language therapists. The second section explains the methods used in the CDS study, while the final section presents the methods used in constructing and using the language comprehension test.

Chapter 4 presents the results of both the CDS study and the language comprehension study. These results are discussed in Chapter 5 which also contains the discussion of the patterns of language comprehension identified in the structures studied by error analysis.

Procedures required to upgrade the research materials into a clinical procedure for language comprehension are explained in the Epilogue, which is Chapter 6. In this chapter some modifications that need to be made to overcome limitations of the current study will be provided.

The thesis concludes with a summary and discussion of the major findings of the present research (Chapter 7). In addition, the strengths and weaknesses of the procedures used in the research will be presented. This final chapter will also include recommendations for future research.

Chapter Two

Review of Literature

2.1 Saudi Arabia, the country and the language

2.1.1 General background and demographic information about Saudi Arabia

The kingdom of Saudi Arabia occupies about 87% of the Arabian peninsula (870,000 sq. miles) and it is located in the south west part of Asia. Saudi Arabia shares extensive boundaries with many countries (Figure 2.1). In the north, it borders Jordan, Iraq and Kuwait. In the east, it borders the Arabian Gulf, Qatar, United Arab Emirates and Oman. The southern boundary is shared with Yemen Arab Republic. The Red Sea borders Saudi Arabia on the west (Kluck, 1985).

Saudi Arabia is divided geographically into five regions: the central, the northern, the southern, the eastern and the western regions. Saudi dialects vary according to these five regions. Administratively, the country is divided into thirteen districts (Table 2.1) with a group of cities and villages in every district.

The climate of Saudi Arabia is generally hot with a mean summer temperature in most regions of 40 °C. with the exception of the southern region which has a mean temperature of 25 °C. during summer. In winter, the temperature drops but rarely reaches freezing point except in the northern region (Kluck, 1985). This affects the life style which in turn will be reflected in the materials used for any language test.

As regards the population of Saudi Arabia, the first census was performed in 1974 and the recorded population of Saudi citizens at that time was 7,012,642 (The Ministry of Finance,

hereafter MOF, 1979). The latest census was held in 1992 and yielded a total population of 16,930,625 out of which 4,624,734 (27.3%) are non-Saudi citizens as indicated by Table 2.2 (MOF, 1993). Thus, the native population of Saudi Arabia which is 12,305,891 is distributed into the thirteen administrative districts as indicated by Table 2.1 This high number of non-Saudis is due to several reasons. First, jobs that require manual labour such as mechanics and road sweepers are usually performed by non-Saudis (Kronemer, 1997). Second, jobs which are usually done by women such as nurses and house workers are also performed by non-Saudi women and third, professional jobs such as physicians and teachers are sometimes carried out by non-Saudis. Another observation that can be noticed in Table 2.1 is the disappearance of Bedouins which is the result of government policy of settling them by providing housing and other facilities.

Table 2.1 The distribution of the Saudi population in the thirteen administrative districts (1974 & 1992) (MOF, 1979 & 1993).

Administrative district	Population (1974)	Population (1992)
1. Riyadh	1,287,388	2,613,228
2. Makkah	1,754,108	2,780,458
3. Eastern Province	769,648	1,898,462
4. Asir	681,261	1,149,618
5. Medinah	519,295	836,764
6. Jaizan	403,106	734,078
7. Qasim	319,496	611,462
8. Hail	259,979	346,180
9. Tabuk	193,763	401,256
10. Baha	158,905	289,890
11. Najran	147,980	242,066
12. Northern Frontier	127,745	178,389
13. Jauf	96,968	224,040
Border Bedouins	293,000	Nil
Total	7,012,642	12,305,891

Table 2.2 Total population of Saudi Arabia according to 1992 census. (The Ministry of Planning hereafter, MOP, 1995).

	Male	Female	Total
Saudi nationals	6,215,448	6,090,443	12,305,891
Non-Saudi	3,255,429	1,369,305	4,624,734
Total	9,470,877	7,459,748	16,930,625

Figure 2.1 A map of Saudi Arabia including major cities and borders.

More than 5 million Saudi citizens (41% of the total population) live in the ma in 9 cities of the country as shown in the following table.

Table 2.3 Saudi cities with the largest population according to 1974 and 1992 census. (MOF 1979 & 1993).

City	District	Number of citizens	
		1974	1992
Riyadh	Riyadh	666,840	1,800,032
Jeddah	Makkah	561,104	999,124
Makkah	Makkah	366,801	550,196
Taif	Makkah	204,857	320,464
Medinah	Medinah	198,186	432,681
Dammam	Eastern province	127,855	303,535
Hufuf	Eastern province	101,381	185,597
Tabuk	Tabuk	74,825	241,111
Buraydah	Qasim	69,940	198,631
Total		2,371,789	5,031,371

As regards the number of people in every age group, the only information that could be obtained was the number of Saudi children whose age is between 1;0 and 9;0 years, which was 3,826,643 (31% of the total population) and the number of Saudi families is 2,797,144. This result is based on the latest census which was held in 1992 and was received from the Ministry of Planning upon an enquiry. (See Appendix 15 for the letter received from the MOF in relation to the requested data from the national census). The Saudi Press Agency (hereafter SPA) indicated in a recent article that the number of Saudi families in Riyadh city is around 157,000 (SPA, 1997).

2.1.2 Religion and culture of Saudi Arabia

The religion of Saudi Arabia is Islam which is the religion of all Saudi citizens. The two holy cities of Makkah and Medinah are situated in the western part of the country and millions of Muslims come to visit these two holy cities from all around the world every year. Islam has five fundamentals which are the profession of faith, praying five times a day, charity giving, fasting during the holy month of Ramadan and performing the pilgrimage to Makkah. The whole life of a Muslim is controlled by Islam, even small things that may appear unimportant

to non-Muslims such as using the right hand to eat or drink. Thus, the culture of Saudi Arabia is affected very much by Islam. It affects the way citizens behave and the way they look. From around the age of 13, Saudi women cover their whole body when men are present except for their relatives (i.e. a father, a grandfather, a husband, a brother, an uncle, a son or a grandson). Women in Saudi are not allowed to drive and some families employ non-Saudi drivers. Most families employ non-Saudi women house workers (hereafter house workers) in their homes to do the house work and in some families these house workers take care of the children while the mother is absent. However, statistical data regarding the number of house workers is not available. The only available statistic in that respect is the number of non-Saudi women which is 1,369,305 (Table 2.2). In addition to house workers, this number includes wives of non-Saudis, nurses, women teachers. With regard to the language used by house workers, it is broken Arabic since almost all house workers come from non-Arabic-speaking countries, although a few families use English with the house workers.

Being a wealthy country, almost every male aged 20 years or over owns a car. A study was conducted in Riyadh City and the results which were announced by SPA indicated that the average annual income of a family in Riyadh is around 120,000 Saudi Riyals (around £20,000). Almost all houses have a TV and a video and recently some families started to receive outside channels through satellites, although this is not encouraged by the religious authorities.

One of the teachings of Islam is that all human beings are equal and most honoured of them, in the sight of Allah (God), is he/she who is the most righteous. This indicates that a Muslim is encouraged not to feel that he/she is different if in a higher economic, social or educational position than the next person, although of course differences between people do exist in terms of their wealth, education and social status. However, ranking people according to their socio-economic status is not applicable since they themselves are instructed by their religion to reject such a practice.

2.1.3 Speech-language therapy services in Saudi Arabia

Speech and language therapy in Saudi Arabia is a newly developing profession. The department of Speech and Hearing at the College of Applied Medical Sciences was established in 1983. In 1988 the first two students graduated from that department. The department continued to educate students until it was closed in 1992 for three years. It was reopened in 1995 to female students only. Students spend five years on this course. The first two years are spent in studying English and science courses such as biology and chemistry. For three years students then take courses in speech-language therapy and audiology, with the first being the major field of study. After graduation every student has to spend a year of internship where he/she has to work under clinical supervision in different speech and language therapy and audiology clinics. After completing the year of internship, the student then has the choice of working as a speech and language therapist or as an audiologist. The number of graduates from this program who work currently as speech and language therapists is about 8 men and 15 women (the exact number is not known). Two women and two men have subsequently obtained a Masters degree in speech and language therapy from the U.S.A. Three speech-language therapists are studying for a PhD currently, two of them in the U.S.A. and one in the UK, while the rest of the speech-language therapists hold a bachelors degree only.

Speech and language therapy clinics are present in four cities in Saudi: five in Riyadh, three in Jeddah, two in Dammam and one in Buriydah. There is a large private centre in Jeddah for the assessment and rehabilitation of speech and hearing disorders and there are specialists from different nationalities working in this centre. All these clinics are accommodated in government hospitals as a branch of the ENT departments with the exception of the private centre. The number of staff members in each clinic is variable; an average is between 2-3 therapists. There are non-Saudi therapists working in some of these clinics. This includes phoniatricians from Egypt and speech-language therapists from Jordan and the U.S.A. The

Egyptian phoniatricians and the Jordanian speech-language therapists are native Arabic speakers; however, the American speech-language therapists do not speak Arabic and work with Saudi patients through translators.

Therapists in Saudi speech and language therapy clinics see different varieties of patients with speech, language and voice disorders. According to data from the largest two clinics, children with language disorders represent a majority of the patients seen in these two clinics. (See the Introduction for the actual data and Section 2.2.6 for a definition of language disorders).

One of the great difficulties that faces speech-language therapists working in Saudi Arabia in particular and in the Arab world in general is the unavailability of appropriate materials to use with children. Most of the currently used assessment materials were designed for use with English-speaking American children. This makes them inappropriate linguistically, even though they are translated, because of the differences between Arabic and English in rate and pattern of acquisition. Moreover, such materials are not suited to Saudi children's experiences and often conflict with the tradition and the religion. This applies to testing as well as intervention procedures.

2.1.4 Pre-school education in Saudi Arabia

It is not known precisely when pre-school education was launched in Saudi Arabia but until 1965 pre-school education was offered by the private sector only (Katab, 1996). From that time on, pre-school education has been offered both by government agencies and the private sector. The General Presidency of Girls' Education (hereafter GPGE) is the department in charge of pre-school education in Saudi Arabia. Pre-school education includes both nursery and kindergarten schools. Nursery schools accept children from the age of 3;0 to 5;0 years, while kindergarten schools accept children from the age of 5;0 to 6;0 years. (Both schools will be called nursery schools in this research for the sake of simplification). Children who

are 6;0 years and over are accepted in elementary schools. While boys and girls are mixed in nurseries, they are separated in the elementary schools where boys are taught by men only and girls are taught by women only. The number of children who enrol in nurseries is very low compared to the number of children who enrol in elementary schools. In 1995, for example, the total number of children who were studying in nurseries was 84,299 pupils (Table 2.4), while 2,168,729 pupils were studying in elementary schools in the same year (the ratio is 1:26 children) (MOP, 1995). Of course elementary schools have 6 levels, while nurseries have 3 levels only; but this does not account for the large difference between the two numbers. When the last point is considered, it seems that the ratio of children who enrol in nurseries to those who enrol in elementary schools is 1:13 which indicates that a small proportion of children enrol in nurseries.

In 1995, the number of children attending nurseries in the city of Riyadh was 15,483 which represents about 18% of the total number of children studying in Saudi nurseries (Katab, 1996).

Table 2.4 Nursery schools and pupils in 1995 (MOP, 1995).

The agency running the kindergartens	Schools	Pupils		
		Boys	Girls	Total
Kindergartens run by government agencies	437	22718	19651	42369
Kindergartens run by private agencies	358	23178	18752	41930
Total	795	45896	38403	84299

Katab (1996) attributed the low number of children enrolled in nurseries to the fact that most Saudi families are not aware of the importance of this stage of education. This forces most families who are interested in putting their children into nurseries to turn to the private sector which charges high tuition fees. Nursery education is not compulsory which is another reason. The other reason is that most Saudi mothers are housewives who prefer to take care of their very young children themselves.

Teachers in nursery schools were responsible for implementing their own designed activities and tasks until 1984 when a programmed curriculum was set for nursery schools. This curriculum was dictated by the GPGE and it included activities such as religious education, Arabic language, simple arithmetic activities, science education, developing children's artistic skills, physical education, health and social education (Katab, 1996). There are varied activities in nurseries, including individual ones such as drawing as well as those shared by a group of children, such as play activities.

As regards the effect of attending nurseries on children's educational capabilities, Badawood (1986) studied 100 girls who were attending the first level in an elementary school in Riyadh. Only half of these girls had attended nurseries before entering the school. She compared girls' scores in reading and writing courses and found that girls who attended nurseries before the elementary school performed significantly better than girls who did not ($p<0.01$). It can be inferred from Badawood's results that children drawn from nursery schools may be relatively advantaged in linguistic and educational terms, at least until they are 6;0 to 7;0 years (the age when they are in the first level of elementary schools).

2.1.5 Structure of Arabic spoken in Saudi Arabia

Looking at the structure of the Arabic language spoken in Saudi Arabia is important since the aim of this research is to study Saudi children's comprehension of language. In this section, more concentration will be given to the structures present in the Arabic language since children's comprehension will be studied in relation to some morpho-syntactic structures. Arabic written forms will be represented to the reader by using the International Phonetic Alphabet (IPA) as indicated in the key to transliterations presented at the beginning of the thesis. An English translation will be provided every time an Arabic word or a sentence is written.

An early study was performed by Abboud (1964) who analysed the speech of three adults speaking the accent of Hail city which is situated in the northern region of Saudi Arabia. Results of Abboud's study will be used in the present study to explain the structure of Arabic spoken in Saudi Arabia (hereafter SA). When using a reference other than Abboud's, the name of the reference will be given in the text.

Arabic sentences can be divided from an intonation point of view into declarative and interrogative sentences, whereas they can be divided on the basis of their grammatical form into nominal (substantive) sentences which begin with either a noun or a pronoun such as /ʔal-walad rˤæħ/ *the boy went* and verbal sentences which begin with a verb such as /safarˤ ʔa-lwalad/ *the boy travelled.*

A word is the minimum segmental free form. Words belong to one of the following classes or parts of speech, 1) nouns, 2) adjectives, 3) verbs, 4) pronouns and 5) tools (pronouns and particles).

Nouns in SA have three inflectional categories which are number, definiteness and gender. With regard to number inflections there are three-fold number distinctions which are singular, dual and plural. The singular form of the noun is the base form and is the stem to which dual and plural affixes (suffixes or infixes) are added. Nouns are the only part of speech in SA that take a dual number distinction. The inflection for dual nouns is the suffix /-ʔin/ added to the noun stem. Nouns show a two-fold definiteness distinction - definite and indefinite - signalled by the prefix /ʔæl–/. In SA there are two genders: masculine and feminine. Inanimate nouns are still treated as masculine or feminine.

Adjectives in SA are composed of a stem and an inflectional affix. Adjectives are inflected for degree, number, definiteness and gender. There are two morphological forms for the degree: the

positive and the comparative-superlative distinction. As with nouns, adjectives have a two-fold definiteness distinction which - definite and indefinite - and two genders, masculine and feminine. With regard to number, there is only a two-fold distinction which is singular/plural. The suffix /-ʔa/ is added to the stem form of singular adjectives to make them feminine, whereas adjectives are not inflected for gender in the plural form.

When there is a noun and an adjective present in the same phrase, they must agree in four aspects: analysis, number, gender and definiteness. Agreement in analysis means that both the noun and the adjective are either indicative, accusative or prepositional. Adjectives modifying dual and plural nouns are inflected with one plural form regardless of the duality or gender of the noun.

Verbs are inflected for mode-aspect and voice (Abboud, 1964). As regards the mode-aspect, they show a three-fold mode-aspect distinction: perfect (past), imperfect (present) and imperative. The subject bound to the perfect and imperfect verbs indicates the categories of person, number and gender, whereas the subject bound to the imperative indicates number and gender only. With reference to person, three categories are distinguished in the Arabic spoken in Saudi Arabia. These are first, second and third person. As regards voice inflection, there are the imperative and the agentless passive. It should be noticed that intransitive verbs such as /safær/ *he travelled* and auxiliaries such as /ṣar/ are inflected for active but not for passive voices.

Pronouns have three inflectional categories: person, number and gender. With regard to person, they show a three-fold person distinction: first, second and third. They show a two-fold number distinction: singular and plural. Second and third person pronouns show a gender distinction, whereas first person pronouns show no gender distinction.

Pronouns are either free or bound. Free pronouns are those that can stand alone to give a meaning and they are presented in the following table.

Table 2.5 Arabic free pronouns along with their inflections.

Person	Gender	Number			
		Singular		Plural	
First	------	/ʔæna/	*I*	/ħɪna/	*We*
Second	Male	/ʔænt/	*You*	/ʔæntum/	*You*
	Female	/ʔæntj/	*You*		
Third	Male	/hu/	*He*	/hum/	*They*
	Female	/hi/	*She*		

Bound pronouns, as the name implies, are linked to either a noun, a verb or a preposition. They come as suffixes of the noun as indicated in the following table.

Table 2.6 Arabic bound pronouns attached to nouns along with their inflections.

Example	Translation	Person	Gender	Number
/kɪtab-ɪk/	*Your book*	2nd	M&F	Singular
/kɪtab-i/	*My book*	1st	M&F	Singular
/kɪtab-ænæ/	*Our book*	1st	M&F	Plural
/kɪtab-æh/	*His book*	3rd	M	Singular
/kɪtab-hæ/	*Her book*	3rd	F	Singular
/kɪtab-hum/	*Their book*	3rd	M&F	Plural
/kɪtab-kum/	*Your (pl.) book*	2nd	M&F	Plural

Bound pronouns come as prefixes or suffixes of verbs as presented in the following table.

Table 2.7 Arabic bound pronouns attached to verbs along with their inflections.

Example	Translation	Tense	Person	Gender	Number
/daṛab-ni/	*He hit me*	Past	1st	M&F	Singular
/dæṛæb-næ/	*He hit us*	Past	1st	M&F	Plural
/dṛub-æh/	*He hit him*	Past	3rd	M	Singular
/dæṛæb-hæ/	*He hit her*	Past	3rd	F	Singular
/dæṛæb-hum/	*He hit them*	Past	3rd	M&F	Plural
/dæṛæb-k/	*He hit you*	Past	2nd	M&F	Singular
/dæṛæb-kum/	*He hit you (pl.)*	Past	2nd	M&F	Plural
/tæ-ktɪb/	*She writes*	Present	3rd	F	Singular
/jæ-ktɪb/	*He writes*	Present	3rd	M	Singular
/næ-ktɪb/	*We write*	Present	1st	M&F	Plural
/jæ-ktb-un/	*They write*	Present	3rd	M&F	Plural
/ʔɪ-ktɪb/	*Write*	Imperative	2nd	M	Singular
/ʔɪ-ktbi/	*Write*	Imperative	2nd	F	Singular
/ʔɪ-ktb-u/	*Write (pl.)*	Imperative	2nd	M&F	Plural

Table 2.8 Arabic bound pronouns attached to prepositions along with their inflections.

Example	Translation	Person	Gender	Number
/li/	*For me*	1st	M&F	Singular
/lænæ/	*For us*	1st	M&F	Plural
/lɪk/	*For you*	2nd	M	Singular
/lɪki/	*For you*	2nd	F	Singular
/lukum/	*For you*	2nd	M&F	Plural
/læh/	*For him*	3rd	M	Singular
/læha/	*For her*	3rd	F	Singular
/luhum	*For them*	3rd	M&F	Plural

The fifth class of the word is 'tools' which are divided into the following subclasses: prepositions, linkers, subordinators, negators, interrogators, limiting particles, adverbials and modals (Abboud, 1964).

1. Prepositions. They are divided into two groups: pure prepositions such as /mɪn/ *from* and /ʔɪlæ/ *toward* and free prepositions such as /fuq/ *on* and /gɪdam/ *in front of.*
2. Linkers, such as /wæ/ *and*, /ʔæw/ *or*, /lakɪn/ *but.*
3. Subordinators, such as /jum/ *when*, /ʔɪðæ/ *if.*
4. Negators: to negate a verbal sentence, the negators /mæ/ or /læ/ *no* are put before the verb, whereas to negate a nominal sentence, the negator /mahu/ *not* for masculine nouns or /mahi/ for feminine nouns is put before the noun. The negative transformations, according to Omar (1973), are not as complicated as they are in English.
5. Interrogators. Interrogation can be done in SA by asking questions that require yes/no answers (yes/no questions) or by using wh-questions. Yes/No questions are of two types: the simple declarative sentence with a rising intonation or the indirect questions. Wh-questions are similar to English wh-questions such as /wɪʃlun/ *how*, /win/ *where*, /mɪtæ/ *when* and /leɪʃ/ *why*. The *yes-no* type of interrogation does not involve syntactic transformations and is acquired early, apparently without errors or stages of development.

Question words have relative freedom of occurrence and do not require inversion of word order (Omar, 1973).

6. Limiting particles, such as /kɪl/ *all*, /ʔæj/ *any* and /ʃwæi/ *a little*.
7. Adverbials. These are an uninflected group and they are divided into two categories: adverbs that modify verbs such as /halħin/ *now* and adverbs that modify both verbs and adjectives such as /mærˌæh/ *completely* (Gamal-Eldin, 1961).
8. Modals, such as /lazɪm/ *must* and /jɪmkɪn/ *may*.

At a clause level, SA has two simple clauses: equational and verbal clauses. Equational clauses consist of a subject and a predicate. An interesting feature of Arabic is that some sentences are without a subject: the subject is hidden but the speaker and the listener know the identity of the subject. This is a feature of 'pro-drop' languages which, according to Goodluck (1991), tend to be those languages which have a rich set of inflectional endings on the verb. (See Abboud, 1964 for a detailed description of the different positions of the subject and predicate in SA clauses).

At the phrase level, SA has five types of phrases: noun, adjective, verb, prepositional and relative phrases. The relative pronoun /ʔæli/ *that* is used to join two clauses and it is not affected by either the gender or number of the subject used in the two clauses.

As a language rich in morphology, Arabic-speaking children are expected to have some difficulty in comprehending certain morphemes. Omar (1973) observed that morphology in Arabic is the last aspect of a language to be mastered compared to other languages such as English, where syntax has a more important role in communication than morphology. Studies of expressive language found that English-speaking children learn the basic morphology by about 4;0 to 5;0 years (Brown, 1973), whereas in a language with a more complex inflectional system such as the Russian system of cases, morphology is not fully mastered until age 7;0 to 8;0 years (Slobin 1966).

2.2 Language acquisition

Language acquisition is an ongoing process that starts from birth. When reviewing language acquisition in this thesis, the comprehension side of the language acquisition process will be dealt with. At the beginning of this section, theories of language acquisition are reviewed briefly. Then the language comprehension in normal children is considered in three sub-sections. A theoretical framework is presented next, followed by the development of the comprehension of specific syntactic structures. Comprehension strategies are reviewed in the fifth section, while the sixth section discusses language comprehension in children with language disorders (See section 2.2.6 for a definition of language disorders). Studies that have investigated the acquisition of Arabic as a first language are presented next, followed by an explanation of factors that aid comprehension. The final section describes CDS.

2.2.1 Theories of language acquisition

A study of language acquisition should address the issue of how language develops. This question has created great controversy in the previous fifty years. Owens (1996) stated that part of the problem in trying to answer such a question is the complexity of both language and communication behaviour. Owens added that although one theory predominates, portions of each are used to explain different aspects. Among the attempts to explain the process of language acquisition, four theoretical approaches have received more attention than the others. These are the behaviourist, the cognitive, the social/ communicative and the psycholinguistic approaches to language acquisition.

2.2.1.1 Behaviourist hypothesis

According to Skinner (1957, cited in Owens, 1996) and his followers, language is a set of verbal behaviour learned through a process he called 'operant conditioning'. This process involves changes in voluntary behaviour resulting from the events that follow. According to

Skinner, reinforcing a behaviour increases the probability of this behaviour's recurrence, whereas punishing the behaviour decreases the probability of its recurrence.

Another important factor thought by behaviourists to play an important role in child's acquisition of language is imitation. According to them longer sentences are learned through imitation. By hearing and imitating enough examples, the child learns word associations rather than grammatical rules (Owens, 1996).

Behaviourists tend to emphasise the dominance of the environment and view the child as a passive receiver rather than as an active participant in the language learning process (James, 1990). Later researchers on social/communicative hypothesis (Section 2.2.1.4) have been influenced by the work of behaviourists like Skinner in setting up their hypothesis when they attempted to explain the complex process of language acquisition within the environmental context in which that process occurs (Owens, 1996).

This approach to language acquisition has been criticised for the following:

1. Imitation may account for little syntactic learning because children are found to be unable to imitate structures that they have not yet learned (Kaufman, 1993).
2. The value of imitation as a language-learning strategy has been questioned because of its infrequent use by children above 2;0 years of age (Moerk, 1974).
3. Children produce many sentences that they could never have heard adults produce (Kaufman, 1993).
4. Children's exhibit an inappropriate generalisation of morphological rules which implies that they learn through rules rather than learning through imitating parts of adult utterances (Mogford & Bishop, 1993).

5. Children who cannot imitate because of neurological or physical impairment still learn to understand language and to communicate which rules out the role of practice (Kaufman, 1993).
6. Parents tend not to correct their children's grammatical errors which means that syntactic acquisition could not be attributed to parental reinforcement (James, 1990).
7. By emphasising production, Skinner minimised the role of comprehension and underlying cognitive processes (Owens, 1996).

2.2.1.2 Cognitive hypothesis

This hypothesis falls between the nativist (Section 2.2.1.3) and the behaviourist hypothesis (Section 2.2.1.1). It is similar to the nativist hypothesis in its emphasis on the role of innate knowledge in language acquisition. However, in this hypothesis it is assumed that this innate knowledge is cognitive rather than linguistic ability (James, 1990). According to Piaget (1962, cited in Kaufman, 1993), there is no need to have an innate language acquisition device to explain the development of language. Rather, language emerges as a result of the child's construction of cognitive operations and structures through his/her early sensorimotor interaction with the world. Proponents of the cognitive hypothesis treat language as one of several cognitive abilities and they claim that language development is dependent on general cognitive development. The cognitive hypothesis is similar to the behaviourist hypothesis in its emphasis on the role of the environment. However, they do not view the child as a passive recipient of input from the environment. Rather, it is the interaction between the child's internal cognitive structures and the linguistic and non-linguistic environment that is responsible for language acquisition.

Many proponents of the cognitive hypothesis have tried to link language development with Piaget's sensorimotor stages (James, 1990). Language development was found to be related to cognitive development; but this does not mean that cognitive development is a

prerequisite for language development or vice versa. There are findings in language development in exceptional circumstances that challenge the Piagetian view. The first is children with William's syndrome whose knowledge of linguistic structure is much more advanced than their other cognitive abilities. (See Bellugi *et al.*, 1993 for more details). The second is children with severe motor disorders who cannot interact physically with the environment. Such children are expected, according to the cognitive theory of language acquisition, not to develop normal language. However, Bishop (1993) cites many instances of individuals where language development was found to be normal in spite of the severe physical handicap. An example is the study of Bishop *et al.* (1990) who applied the Test of Reception of Grammar (hereafter TROG, Bishop, 1989) on 24 anarthric quadriplegic subjects aged between 10;0 and 18;0 years (12 were congenitally anarthric and were never able to produce articulate speech and the other 12 were severely dysarthric with unintelligible speech). It was ensured that anarthric and dysarthric subjects were free from hearing, vision, or cognitive impairments. Results of the speech impaired subjects were compared to 24 individually age-matched controls handicapped by cerebral palsy but with normal speech. Comparison showed that grammatical competence of the speech impaired subjects was no worse than that of the handicapped subjects with normal speech. This was taken as evidence against the cognitive theory since these speech impaired subjects had not had a chance of normal expression; even so, their results were similar to those handicapped subjects who had normal speech.

2.2.1.3 Linguistic theory of language acquisition (nativist hypothesis)

Linguists, particularly Noam Chomsky (1957, cited in Shewan & Pepper, 1984), hypothesised that the human brain contains a mental plan to understand and generate sentences. Nativists believe, according to Owens (1996), that children are born with a mechanism that contains information about linguistic structures (Language Acquisition Device, LAD) and rules that are universal to all languages (Universal Grammar). Thus,

children are born with the ability to learn any language, and they will learn the particular language or languages to which they are exposed. Proponents of this approach hold that much of the structure of language is universal and innate in the child, only those few aspects of structure that are language-specific depend on input for their acquisition (Hoff-Ginsberg & Shatz, 1982). Fletcher (1987) explained this point by stating that nativists did not totally discount the role of the linguistic environment in which the child grows up but they minimised its importance. Caplan & Chomsky (1980) modified the nativist hypothesis by proposing that language acquisition depends on input to activate a few basic parameters but that once a particular line of development is established, the full richness and detail of language follow the blueprint of the genetic program. Thus, according to them, input is viewed primarily as a triggering device that activates the innate language mechanism. Nativists argue, as explained by Kaufman (1993), that by 4;0 to 5;0 years, children have acquired a language system very similar to that of the adult.

Chomsky distinguished between two types of universals: formal and substantive universals. Substantive universals are the building blocks of linguistic rules (i.e. the vocabulary in which linguistic rules must be stated), whereas formal universals are restrictions on the types of operations linguistic rules perform and on the way in which linguistic rules interact. The hypothesis of language universals has been further elaborated by Chomsky (1981) as specifying parameters along which languages may vary. Menyuk (1971) pointed out that the presence of: topic+modifier construction, the negation, the question and the imperative constructions are considered universal aspects of all languages.

With regard to the theory of transformational generative grammar, Chomsky (1957, cited in Shewan & Pepper, 1984), identified three levels of transformations which were: level 1-syntax simple such as active, affirmative, level 2-syntax sentences contain one optional transformation, either the negative or the passive and level 3-syntax sentences contain two

transformations, both the negative and the passive. According to the universal grammar hypothesis, such features of transformations are supposed to be found in Arabic. A finding that Arabic negative sentences are more difficult for Saudi children to comprehend, for example than affirmative sentences can be taken as evidence in favour of both the universal grammar and the transformational generative grammar hypothesis.

This approach to language acquisition was criticised by Schlesinger (1977) for treating language learning as if it occurred independently of cognitive development. Schlesinger points out that it is very difficult to ascertain from Chomsky's model precisely what children are born knowing, as opposed to what they come to know and how this knowledge eventually gets linked to words and phrases. Another criticism of this approach is that Chomsky's theoretical grammar is based on adult data which is different from child language. Looking for adult structures in child speech may result in an under-estimation of children's knowledge and capabilities (James, 1990). Bates *et al.* (1984) argued that researchers in child language generalise facts about English children's language to other languages which led to the claim of universal processes in language acquisition. They supported their argument by a study in which they asked 40 American English-speaking and 40 Italian-speaking children aged 2;0 to 5;0 years to enact 54 spoken sentences. They found that Italian children relied primarily on semantic cues, while American children relied on word order. After comparing children's interpretation of sentences, they used their data as evidence against the existence of a universal hypothesis about language structure.

2.2.1.4 Social/Interaction hypothesis

This approach views language as emerging primarily out of the social interactions of the child with his or her caregivers (Kaufman, 1993). According to the proponents of this approach, such as Bruner (1975), the major functions of language are social and communicative. Bruner emphasised that proponents of this approach are interested in how

language is used. Thus, the child's acquisition of linguistic form and rules grows out of interactions with others, especially with parents. Supporters of the communicative/social hypothesis do not rule out the possibility of innate cognitive or linguistic knowledge. Moreover, they agree with nativists in that language structure follows certain rules that make it unique from other behaviour patterns (Bohannon & Bonvillian, 1997). However, they do not focus on such knowledge as the primary factor in language acquisition. Social/interactionists share with the behaviourists their emphasis on the role of the environment in producing language structures (Bohannon & Bonvillian, 1997).

One major tenet of the social/interaction approach to language acquisition is the 'negotiation of meaning' during the conversation process between the speaker and the listener, particularly between the adult and the child with reference to language acquisition. Wells (1981) clarified this point by reporting that negotiation of meaning is a collaborative activity. This collaborative activity, according to him, is characterised by first, an ordered sequence of speaking and listening turns; second, the meaning expressed in each turn is related to that expressed in the preceding and following turns and third, the meaning agrees with the objects and actions in the conversation situation. Wells further argued that:

> "collaboration in the negotiation of conversational meaning is both a major part of what the child has to learn and also a necessary condition for that learning to take place" (1981, p. 26).

Proponents of this approach observed that CDS is made simpler in form than adult language directed to adult (Section 2.2.9). Thus, they argued that the simplicity of CDS has an important role in language acquisition. Adults' speech to children, particularly mothers who have been studied most often, is considered by social interactionists as important as the child's innate linguistic knowledge in language acquisition (Moerk, 1974; Bohannon & Bonvillian, 1997). Moerk, for example (Section 2.3) claimed that mothers are very sensitive language teachers. However, in a statement that supported the children's innate knowledge

hypothesis, she states that "in spite of apparent differences in teaching approaches, the outcome for most children is very similar" (p. 115).

The complexity of adults' speech to children increases as children grew older (Moerk, 1974; Pan *et al.*, 1993 cited in Snow, 1995 & Phillips, 1973). However, Bohannon & Bonvillian, (1997) stressed that this change in complexity of adults' speech is not due to any conscious effort on the part of the adults to give specific language instruction; rather, it is an effort to facilitate comprehension. With reference to the present research, CDS then plays an important role since most of the vocabulary items and the morpho-syntactic structures which will be used in testing the acquisition of language comprehension will be sampled from CDS performed by Saudi fathers.

In a recent chapter, Snow (1995) discussed different aspects of CDS such as being fine tuned to children's linguistic ability, the effect of children's developmental delays such as hearing impairment on CDS and the universality of CDS. As regards the universality of CDS, Snow stated that studies that investigated CDS provided a huge amount of data for different languages and cultures. All these studies, according to that researcher, seem to agree on certain shared features particularly in the domains of lexicon, phonology, phonetics and prosody. She added that the extent of CDS use varies from culture to culture and from language to language.

The social/interactionist position alone does not adequately explain language acquisition because it does not deal with how the child associates symbol with referent or how language structure is acquired (Owens, 1996). As regards symbol-referent relationship, Owen indicated that when a referent is experienced, it is interpreted on the basis of the concept and the appropriate symbol is applied (given that the concept is formed from past experiences). It has been argued that parents use special language when speaking to their children for conversation rather than teaching purposes as claimed by social/interactionists (for example

Cross, 1977). Another criticism of the social/interactionists' approach to language acquisition is that most of their explanations rest on untested assumptions (Bohannon & Bonvillian, 1997). The assumption that CDS is simple in form was questioned by Newport *et al.* (1977) claiming that imperatives and questions which form most of CDS are more complicated than active and declarative sentences.

2.2.1.5 Competition model (CM)

The CM arose out of the information processing paradigm and it was proposed by Bates & MacWhinney in 1978 and was most clearly explained at the 20th Annual Carnegie Symposium on Cognition in 1985 (Bates & MacWhinney, 1987). A human information processing system, according to Bohannon & Bonvillian (1997), is a mechanism that encodes stimuli from the environment, interprets those stimuli, stores them in memory and allows information to be retrieved.

According to Bates & MacWhinney (1987, 1989) the CM is a performance model that does not have the status of a theory. Although CM tries to account for cross-linguistic data within a unified framework, the framework itself cannot be rejected in any single critical experiment (Bates & MacWhinney, 1989). They added that "a model must instead be evaluated in terms of 1) its overall coherence, 2) its heuristic value in inspiring further research and 3) its performance compared with competing accounts (p. 36). This model is proposed to account for what is variable (not universal) in language acquisition across languages and possibly within individual learners of the same language. More specifically, Bates & MacWhinney (1989) pointed out that their model is designed to capture facts about the comprehension, production and acquisition of language by real human beings.

The major tenet of the CM is the direct mapping between form and function. Bates & MacWhinney (1987) predicted the existence of a general processing mechanism that is able

to take advantage of cues in the environment in order to map the forms of a language to the functions they serve. An example that explains the mapping between form and function is the preverbal position of the noun (a form) which can be used by the listener as a cue to the actor of the sentence (a function). The way users of different languages assign the role of the actor was studied extensively by proponents of the CM and the results of these studies were used as evidence to support the model.

The principle of direct mapping between form and function, as explained by Bates & MacWhinney (1989), emphasises the mixed nature of input to the language processor which implies that the language processor can make use of compound cues that cross traditional linguistic boundaries (e.g. segmental phonology, supra-segmental phonology, morphology, the lexicon and positional frames). Another point that needs to be emphasised is that the direct mapping principle does not require that the relationships between form and function stand in a one-to-one relationship. Rather, direct mapping means that it is possible for languages to integrate on a single level cues that refer to different data types. When applying this principle to sentence comprehension, for example, the proposed mechanism (the parser) is able to consider compounds or configurations of lexical semantic cues (e.g. animacy), morphological cues (e.g. agreement markers), word order cues (e.g., preverbal position) and intonational cues (e.g. contrastive stress).

Bates & MacWhinney (1987) mention three levels of mapping between form and function. These are: vertical correlation between forms and function, horizontal correlation between forms themselves or horizontal correlation between functions themselves. They add that in language comprehension, a dynamic control of the mapping of form onto function is assumed, while in language production function is mapped onto form.

Bates & MacWhinney (1989) view cue validity as the major predictive construction in the CM. They consider that cue validity is an objective property of the cue itself, a property of the perceptual environment relative to some 'organismic state'. Because of this, they argue that cue validity can be measured directly in samples of spoken or written language and used to derive predictions concerning ease of language processing by adults and/or order of language acquisition by children. They divide cue validity into three components: availability, reliability and conflict validity. Availability represents the extent to which a cue is there when you need it, while reliability represents the degree to which a cue leads to the correct interpretation when you count on it. In cases where two cues or more conflict, cue conflict can be defined as the number of competition situations in which that cue wins (i.e. leads to a correct interpretation), divided by the number of competition situations in which that cue participates. With reference to sentence comprehension, Bates & MacWhinney (1989) pointed out that using availability and reliability as guides, the child can correctly interpret the overwhelming majority of the sentences in his language. However, there often remains a residual set of sentences where full learning depends on attention to particular conflicts between cases which are only rarely encountered.

Proponents of the CM such as Bates & MacWhinney (1989) view language acquisition as a process of acquiring coalitions of form-function mappings and adjusting the weight of each mapping until it provides an optimal fit to the processing environment. The learner in the CM is not seen as passive (as in the behavioural theory) since the learner's goal, expectations and functional readiness play a role in determining what is learned (Kaufman, 1993). Again Bates & MacWhinney (1987 and 1989) claim that they offered some strong predictions about language acquisition across natural languages, claiming that cue validity will determine the order in which grammatical devices are acquired. With reference to cue availability, Bohannon & Bonvillian (1997) indicate that this accounts for the fact that children will learn the particular language they are exposed to (i.e the one available to them).

Cue cost is a major tenet of the CM. Cue cost is an information processing constraint that affects language processing and development (Bates & MacWhinney, 1989). Two major types of cue cost, or processing limitations, were identified by them as perceivability and assignability. A cue is perceivable if the listener can detect it easily. Bates & MacWhinney (1989) gave the plural verb in French as an example that illustrate how a cue can be difficult to detect. In French the singular verb *mange* (eat) is given the same pronunciation as the plural verb *mangent* (eat pl.) even though the difference between the two occasions of the verb is expressed clearly in written French. Such a perceivability problem causes the cue (plural inflection on the verb) to be inaudible which in turn decreases its validity. Assignability, on the other hand, refers to "the amount of material that must be held in memory before a meaning assignment can be made" (Bates & MacWhinney, 1989, p. 58). They added that memory load increases when integration must be delayed until more information is received. A good example that illustrates how assignability works is noun-verb agreement (Bates & MacWhinney, 1989) In noun-verb agreement the child must store in memory at least two components, which are the noun that needs to agree with the verb and the verb itself. Assignability in this case becomes more difficult in pro-drop languages such as Arabic and Hebrew where the subject of the sentence is often not explicitly marked by a subject noun phrase (Sokolov, 1989).

The CM deals with cross-linguistic data, a point in favour of the model since most of the other theories of language acquisition are English-centred. In fact proponents of the CM believe that different languages employ different grammatical cues in wide and varied ways to assign grammatical functions (Sokolov, 1989). This feature of the CM, accounting for cross-linguistic data, allowed it to be tested on several languages such as English, Italian, Turkish and Hungarian (e.g. Bates *et al.*, 1982 and 1984). Being able to deal with cross-linguistic data allows the CM model to account for the difference in language acquisition between different languages. For example Bates *et al.* (1984) found that English-speaking

children rely on word order (a syntactic cue) for interpreting reversible active sentences, while Italian-speaking children rely on animacy (a semantic cue). Another point in support of the CM was mentioned by Bohannon & Bonvillian (1997) and it is the statistical properties (availability and reliability) of syntactic forms which determine the rate of acquisition. Thus, CM predicts that cues that consistently signal particular meanings should be learned first.

Bohannon & Bonvillian (1997) pointed out that since the CM is recent, there is little contrary evidence as yet against this model. They then gave the following criticisms of the model. First, the model endows the child with a too-powerful learning mechanism. And second, the role of social context in which language cues are used is underspecified. Kaufman (1993) gave another criticism of the CM which is that additional constraints have had to be added to the model in order to account for cross-linguistic variations that have proved to be exceptions to their predictions.

2.2.2 Language comprehension in normal children[1]

Before discussing language comprehension in normal children, it is worth indicating what is meant by normal language development. Lees & Urwin (1991) discussed this issue and reported that there are many approaches for describing normal language development but two are the most common: using 'age-related' and 'skills-related' methods. In an age-related method, a child is assumed to have mastered certain skills by a certain age. One disadvantage here is that it assumes that a child will reach a certain level in all skills by a certain age. The other approach, a skills-related method, is the one used by many researchers for describing language development (Lees & Urwin, 1991). One of these methods is Mogford & Bishop's (1993) which outlines the child's performance in the different language units (i.e. phonology, grammar, semantics and pragmatics). According to this approach a child is said to have

[1] Unless otherwise stated, the language investigated is some variety of English

normal language development if he does not show an impairment in any of these four language units. (See Section 2.2.6 for more details on the issue of language impairment). One must acknowledge individual differences between children in language acquisition as several studies witnessed the presence of such differences. (See for example, Goldfield & Reznick's (1990) study in Section 2.2.2.3 for individual differences between children in the semantic domain of language).

Language comprehension applies to the comprehension of both spoken and written language. Nevertheless it is the spoken language side which is addressed in the current research. A researcher wishing to study language comprehension needs to be aware of particular points which are:

- the type of comprehension under investigation (contextualised or decontextualised level of comprehension; see Section 2.2.2.1 for more details).
- children, especially young ones, are not expected to understand utterances in the way adults do. The reason for this, according to Bridges *et al.* (1981), is that they use their own strategies to derive meaning from what they hear (see Section 2.2.5 for more details on comprehension strategies). Such meaning does not always correspond with what an adult would understand from a given utterance.
- language comprehension is not an all-or-none ability but rather a developmental process by which a young child, for example, will use certain abilities to interpret a spoken message, while an older child may use different and probably more sophisticated abilities to interpret the same message.
- the way a message is interpreted by a certain child might be different from the way the same message is interpreted by another child of the same age speaking the same language (Bridges *et al.*, 1981).
- unlike language production which can be studied simply by recording and then analysing the child's speech, language comprehension is not a directly observable behaviour,

which means that its assessment will require setting up situations that allow for testing the comprehension of the required structure. Testing situations need to be set up because in real world there may be occasions in which a child appears to comprehend certain structures by using comprehension strategies when he is not able to accurately decode the linguistic message (Golinkoff & Hirsh-Pasek, 1995). Later the decoding of the literal linguistic message is balanced with information from the discourse context. This might be one reason in language acquisition why language production was studied first and in greater detail than language comprehension, although the number of language comprehension studies has increased since 1968 when Carrow stated that "only a limited number of studies have been made of children's comprehension of linguistic structure..." (1968, p.101).

Another point that makes studying language comprehension a difficult task is the use of comprehension strategies (Miller & Paul, 1995). An investigator wishing to study children's language comprehension must be aware that a child will use any available cue, either linguistic or non-linguistic, to assist him in understanding the presented stimulus. In natural language situations, cues that aid in language comprehension are frequently available since it is rare that speakers try to confuse the young child by talking about something totally new or by putting the syntactic information in conflict with the contextual cues that the child is witnessing (Hirsh-Pasek & Golinkoff 1991). Thus, young children's use of comprehension strategies is a natural process. A researcher, therefore should not treat them as a noise that needs to be strictly controlled in order for comprehension to be studied appropriately, but a legitimate object of study.

A question that might be posed (since there are difficulties encountered when studying language comprehension and expressive language is easier to study) is why we do not rely on children's expressive language data to get an idea about a child's linguistic capabilities? This

can be answered in four parts. The first is the contention that a complete picture of a child's language can only be achieved by integrating information from both language comprehension and language production (Section 2.2.2.2). Thus, if one is interested in a child's ability to communicate, he/she must be able to describe how that child functions in both the receptive and expressive modes of the speech chain. The second part of the answer is to consider the argument raised by Mogford & Bishop (1993): that through language comprehension data, an investigator can study structures that are rare in spontaneous speech, such as 'neither...nor'. This is because a researcher will not need to wait until a structure of interest is spontaneously produced by the child, as pointed at by Golinkoff & Hirsh-Pasek (1995). It can also be argued that language comprehension and production are separate abilities where one can be presented in the absence of the other, as in anarthric patients who have no speech yet intact comprehension abilities (Bishop, 1993). Finally, by studying language comprehension we may achieve an earlier and different capability than language production (Straight, 1986). The last point is applicable if we accept the argument that language comprehension develops earlier than language production although this is a controversial issue (see Section 2.2.2.2). The previous points were put forward by Golinkoff & Hirsh-Pasek (1995) when they gave three purposes that the study of children's language comprehension may serve. First, comprehension data yield a more accurate picture of the content of the child's emerging language system; second, comprehension permits a better understanding of language acquisition and third, comprehension assessment enables an examiner to test certain structures while controlling the other factors that may interfere with the demonstration of linguistic knowledge.

2.2.2.1 Comprehension definition

Language comprehension (hereafter comprehension) is sometimes called understanding, listening or receptive language When talking about language comprehension one must be certain whether the 'contextualised' or 'decontextualised' levels of comprehension are being

pinpointed. In contextualised comprehension (also called linguistic or inferential), a child uses all information available in the communicative situation to interpret a verbal stimulus, such as when asked to shut the door in a room where only one door is open. Decontextualised comprehension, on the other hand, refers to the comprehension of isolated linguistic messages when cues from the environment are either removed, controlled or not present. This forces the child to rely solely on his linguistic knowledge to deal with a verbal stimulus, such as asking the child to make the girl feed the boy in an acting-out task. Most language comprehension tests investigate decontextualised comprehension by trying to control the extra-linguistic factors that may aid comprehension. In a few studies such as the one performed by Strohner & Nelson (1974) (see Section 2.2.5) cues from the environment were not only removed but also conflicted with linguistic cues. Children in their study were asked, for example, to act out the improbable sentence *the elephant was chased by the mouse*.

Language comprehension can be viewed as a process of developing a hypothesis about what the speaker means. When the listener hears and/or sees an incoming message, he/she will use all the possible resources to develop such a hypothesis. Two points need more clarification in the previous definition. To achieve comprehension, the following resources need to be potentially available: phonological knowledge, semantic knowledge, syntactic knowledge, pragmatic knowledge, world knowledge, prior knowledge and cognitive abilities. Bishop (1997, p. 27) emphasised this point by stating that different subskills, as she called these resources, are involved in comprehension such as "the ability to discriminate between speech sounds, to recognise vocabulary, to decode complex sentences, to reason verbally, to remember strings of words, to understand what another person's intention is in making an utterance". The use of such subskills depends on their availability to the child and their appropriateness for the message being heard or seen. A young child, for example, may not possess sufficient syntactic knowledge to enable him to interpret a spoken sentence, therefore he will use (an)other resource(s) for the interpretation of such sentence such as his world or

semantic knowledge to make a hypothesis (Hirsh-Pasek & Golinkoff, 1991). So, if asked to point to *a ball*, for example, syntactic knowledge is not needed in this situation. Another point that needs to be mentioned about the resources is their relative importance at different stages of development. World knowledge, for instance, is more important to a young child than syntactic knowledge.

The second point that needs clarification in the above definition of language comprehension regards the message that needs interpretation. This could be verbal or non-verbal, as in a receptive mode messages are not always verbal. An example of a non-verbal message is a father who nods his head in response to his son's request 'can I play football in the backyard?'. However, it is syntactic comprehension that needs to be defined since it is the main focus of the present research.

The process of syntactic comprehension was viewed by Golinkoff & Hirsh-Pasek (1995, p. 459) as the process that leads to a mental model. This model is constructed through the use of "information from their perception and representation of events in the world, from social interaction, from the prosodic envelope in which sentences are spoken and from the propositions which comprise sentences". To interpret a sentence appropriately, according to proponents of the CM (e.g. Bates & MacWhinney, 1989), a young child must use cues that are valid (i.e. both available and reliable, see Section 2.2.1.5). This model of language comprehension (the CM) anticipates that cue validity will determine the order in which grammatical devices are acquired.

2.2.2.2 Comprehension and production

The relationship between comprehension and production is important to consider in order to see which of them develops first (as the one which develops earlier is expected to give a more accurate picture of the child's linguistic capacities) and to know whether or not a

judgement can be made about one of them by knowing about the other. Being able to make a judgement about one of them by knowing the other will save time and effort since information about production, for example, can be generalised to cover comprehension. Inversely, by knowing that these two abilities, comprehension and production, are not directly related, each of them needs to be assessed separately.

It is worthwhile mentioning that some of the language comprehension studies consider the contextualised level of comprehension, while the majority of them consider the decontextualised level of comprehension (Section 2.2.2.1). The procedure used for studying comprehension depends largely on the level of comprehension being assessed. Another point to be considered when reviewing language acquisition research is that two different approaches are used for grouping children being studied. The first is to group them according to their chronological age which is the most widely used approach. The other is to use children's expressive language to group them according to their Mean Length of Utterance (hereafter MLU). The MLU measure of language development was first proposed by Brown (1973) when he identified the stages of expressive language development. A few other studies have used both approaches for grouping their subjects such as the studies conducted by de Villiers & de Villiers (1973, see Section 2.2.2.3) and Layton (1976, see section 2.2.2.2). As regards the use of MLU in predicting children's language development, it was argued by Brown (1973) and de Villiers & de Villiers that MLU is a much better predictor of children's grammatical development than is their chronological age. From another point of view, Klee & Fitzgerald (1985) pointed out that although MLU is one of the most widely used indices of children's grammatical development, it did not correlate significantly with age in the experiment they performed. In this they analysed 40 minutes of the spontaneous speech of 18 children aged between 2;0 and 3;0 years. A poor correlation was found between children's MLUs and a grammatical analysis of their speech using Language Assessment, Remediation and Screening Procedure (hereafter LARSP). One of their findings was that

MLU varied by as much as 2-3 stages even within a single 40-minute sample of conversation which implies, as they stated, that children's MLUs are situation-dependent.

The relationship between comprehension and production in language acquisition is a controversial topic especially when considering the issue of which of them develops first. When investigating the production/comprehension relationship, both the lexical and syntactic domains of language need to be investigated.

The relationship between comprehension and production in the lexical domain seems to be less controversial. Most investigators agree that comprehension of single words precedes their production (Goldin-Meadow *et al.*, 1976; Benedict, 1979; Snyder *et al.*, 1981; Harris *et al.*, 1995). Benedict (1979) made a longitudinal study of 8 English-speaking children across the age range 0;9 to 1;8 year. She investigated the early lexical development of these children and found that comprehension preceded production in their early lexical development. She found that comprehension began to develop around 0;9 months and reached the 50 words level at the age of 1;1 year, while production started to develop at an age of 1;0 year and reached a 50 words level at an age of 1;6 year which means, according to her results, that production of single words lags behind their comprehension by about 0;5 months. She also found that for individual children, when the child is able to produce 10 words, he actually comprehends between 30 to 182 words with a mean of 60.22 words. A recent study was implemented by Harris *et al.* (1995) who observed the development of comprehension and production in 6 English-speaking children for 18 months from the time they were 0;6 months-old. A comparison of comprehension and production results yielded a superiority of comprehension over production. Snyder *et al.* (1981) used intensive maternal interview to obtain data on the words comprehended and produced by 32 1;1 year-old children and reached the conclusion that receptive vocabulary can increase at a surprising rate without parallel development in expressive speech. It can be inferred from the previously mentioned

studies that comprehension and production at the lexical level are separate rather than related processes.

The relationship between comprehension and production in the syntactic domain of language has received more attention and has generated more controversy than that of the lexical domain. Clark *et al.* (1974) expressed this problem by stating that the comprehension and production issue remains an unsolved problem in the theory of language development. While most researchers have claimed that comprehension of grammatical structures emerges before their production (Fraser *et al.*, 1963; Shipley *et al.*, 1969; Menyuk, 1971; Baldie, 1976; Layton, 1976; Layton & Stick, 1979; Cocking & McHale, 1981; Tweney & Petretic, 1981; Straight, 1986; James, 1990; Golinkoff & Hirsh-Pasek, 1995; Owens, 1996), other researchers have maintained that their data show the opposite to be true, with production emerging before comprehension (Chapman & Miller, 1975; Roberts, 1983). Yet other researchers found that the relationship between comprehension and production differs depending upon the particular form being tested (Ehri, 1976; Charney, 1980).

Most studies have concentrated on comparing children's comprehension and production of certain grammatical structures presented in picture forms. An early and highly influential study was performed by Fraser, Bellugi and Brown (1963) who compared comprehension, imitation and production of 10 grammatical contrasts using two pictures in 12 English-speaking children aged 3;1 to 3;7 years. Fraser *et al.* used two sentences to test every grammatical contrast. In the comprehension task, every child was asked to point to the correct picture out of two pictures presented: a target and a distracter. Having only 2 pictures to select from increases the possibility that the child will get the correct answer by chance. In the imitation tasks, the two sentences representing the grammatical contrast were spoken by the examiner and the child was asked to repeat them. In the production task, two different pictures representing every grammatical contrast were shown to the child and the sentences

representing the contrast were spoken twice to the child. The child was then asked to name every picture and his response was recorded. Fraser *et al.*'s results indicated that most of the children performed imitation better than comprehension tasks, while production of the tested grammatical contrasts was the most difficult task for the children to perform. They viewed the process of sentence imitation as "a perceptual-motor skill not dependent on comprehension" (p. 133). Testing language through imitation assumes that imitation involves rote memory for relatively short sentences; but the child is forced to use his linguistic knowledge to repeat longer sentences (Siegel & Broen, 1976).

Fraser *et al.*'s work was replicated by many researchers (e.g. Nurss & Day, 1971; Baldie, 1976). Nurss & Day (1971) used the same procedure used by Fraser *et al.*; however, Nurss & Day tested more subjects (147 English-speaking children compared to 12 children in Fraser *et al.*'s study) and selected subjects with three differing socio-economic status (50 children were higher socio-economic status whites: 57 children were lower socio-economic status blacks and 40 children were lower socio-economic status whites). The other difference between Fraser *et al.*'s study and Nurss & Day's study is that subjects of Nurss & Day were older (a mean age of 4;4 years compared to 3;4 years for Fraser *et al.*'s subjects). Results of Nurss & Day's study were similar to those of Fraser *et al.*'s study in that comprehension and imitation were easier than production; however, Nurss & Day found that results of comprehension and imitation were equal compared to Fraser *et al.*'s finding that imitation was easier for their subjects to perform. The difference between the two studies was attributed by Nurss & Day to their subjects' socio-economic status as well as their older age compared to those of Fraser *et al.* In relation to the socio-economic status, Nurss & Day found that the higher status group performed significantly better than the lower status group in all three tasks (i.e. comprehension, imitation and production). As regards the effect of the child's social class on his language performance, Puckering & Rutter (1987) pointed out that there is consistent evidence that social class-related differences in patterns of language usage

do exist, they added however that the extent of this difference varies according to language context and task demands. This difference in performance can be attributed to the way children with higher socio-economic status are socialised which could be different from that of children with lower socio-economic status.

A major study was carried out by Layton (1976) with the following aims: first, to investigate the acquisition of selected linguistic structures by normal pre-school English-speaking children; second, to determine whether comprehension was easier to perform than production or the opposite and third, to standardise the Object-Manipulation Test of Linguistic Construction (hereafter OMTLC). To achieve his aims, Layton tested comprehension and production of selected linguistic structures in 100 English-speaking children aged 2;4 to 4;8 years. Subjects were grouped according to their chronological age and MLU. As regards chronological age, children were grouped according to a 0;6 month interval which yielded 5 groups of 20 children each, 10 boys and 10 girls, whereas MLU grouping yielded 7 groups with the following mean MLUs: 2.6, 4.33, 5.4, 6.36, 7.43, 8.1, 9.25 morphemes varying in number of subjects between 10 and 21. Subjects had to have no known emotional, intellectual, or sensory deficits as reported by the teacher or the parent. They also had to have a PPVT (Dunn, 1965) mental age score that was no more than 0;6 months below their chronological age. However, subjects were selected without regard to racial or socio-economic background. Layton did not indicate the reason for not considering socio-economic background, although studies done in America around that time used to consider such factors (e.g. Nurss & Day's 1971 study). Structures tested in Layton's study were: reversible active such as the boy hits the girl; reversible passive such as the horse is kissed by the cow; singular/plural inflected for nouns such as boy/boys; singular/plural inflected for verbs such as the deer jump/the deer jumps; possessives such as daddy's boy; reflexivisation such as himself, herself; comparatives such as small/smaller; superlatives such as smallest; negative/affirmative statements such as the cup is not broken; negative affix statements such

as the cup is unbroken and negative contractions such as aren't. Layton used three items to represent every structure and comprehension of the items was tested by asking children to act out sentences that represented the structures being tested. Production of the following structures: active, passive, possessives and singular/plural inflection for nouns and verbs was tested by asking children to describe an action performed by the examiner, whereas production of the other structures - negatives, comparatives, superlatives and reflexivisation - was tested by the use of cloze technique. In cloze technique, the examiner provides a portion of the desired sentence and requires the subject to complete it (e.g. *this truck is big, but this truck is...*). As far as the relationship between the results of the comprehension and production are concerned, Layton found that the comprehension of the tested constructions preceded their production for all age groups. The same finding was reached when children were grouped according to their MLUs.

The finding that imitation tasks are easier for children to perform than comprehension tasks was challenged by Miller & Yoder (1973) who found that many English-speaking children cannot imitate sentences they are capable of comprehending. It must be noted here that imitation in test situations, which is repeating a sentence presented by the examiner, is different from the imitation that was claimed by behaviourists to facilitate language acquisition (Section 2.2.1.1). The use of imitation in children's language tests is based on the assumption that children will imitate only those forms which they know (Bernstein, 1989).

Proponents of the second position argue that comprehension does not precede production. Chapman & Miller (1975) argue that the child's comprehension abilities are less advanced than his production abilities especially in respect to the ordering of subject and object. Chapman & Miller tested comprehension and production of 15 English-speaking children. Children were grouped according to their MLU into three groups; 1.78, 2.38 and 2.94 morphemes with 5 children in every group. In the comprehension task, children were asked

to act out 24 reversible present progressive sentences such as the dog is chasing the boy/the boy is chasing the dog using 6 toys. In the production task, sentences were acted out by the examiner and the child was asked to describe what had happened. Chapman & Miller's main finding was that children scored better on production tasks compared to comprehension tasks, which is the opposite of the findings of the previous studies (e.g. Fraser *et al.*, 1963 and Nurss & Day, 1971). Chapman & Miller explained the findings in the other studies which claimed that comprehension is better than production with regard to word order by suggesting that children were responding correctly because they relied on a lexical semantic strategy such as the animate noun being the subject and the inanimate having object status (Section 2.2.5).

James (1990) argued that it does not seem possible for children to produce grammatical structures that they are not able to understand. She supported her argument by reporting that there is other information, in addition to linguistic cues, contained in sentences that facilitate children's understanding such as cues from the situation and non-verbal cues from the listener. She insisted that Chapman & Miller's experiment was so structured that children relied on linguistic cues only and did not take into account other factors. This led her to establish the relationship between production and comprehension as follows: comprehension of language → production of language → comprehension of language based on linguistic cues only.

With regard to the factors that account for the discrepancy between results of comprehension and production, Golinkoff *et al.* (1987) argue that these are due to the domain of inquiry (lexical, morphological, or syntactic), the tasks used to assess language comprehension and the age of the subjects. Straight (1986) provided some other factors such as the superiority of sensory development over motor development, the greater difficulty people have in recall as

opposed to recognition and the availability of various non-linguistic (pragmatic or semantic) strategies that aid in the comprehension of the verbal stimuli.

The gap between comprehension and production is narrower than is generally assumed according to Clark *et al.* (1974). An important point was raised by Fraser *et al.* (1963) who noted that when saying that comprehension precedes production, this means that some structures are ordinarily understood before any structures are produced. Carrow (1968) clarified this point by emphasising that comprehension occurs before production of the same grammatical structure, and not that all structures are comprehended before any structures are produced. The difference between comprehension and production seems to decrease with age according to Goldin-Meadow *et al.* (1976); however they claimed that production still lags behind comprehension as it does throughout the first period.

The question that arises here, particularly relevant to a clinical study, is whether one can make an assumption about language comprehension through language production data or the opposite? It was noted from the previous discussion that the relation between the two modalities of comprehension and production is not so simple that one can generalise information about one of them to the other. Miller & Paul (1995) emphasised this point when they reported that one cannot make assumptions about language comprehension on the basis of a child's production, or vice versa. The point they make very clearly is that comprehension and production do not always correspond to each other, even in an individual child. Consequently, in order to get a complete picture of a child's language competence, each modality of language will have to be assessed independently. Lahey (1988, pp 369-375) reviewed several studies that showed that comprehension training for children with language impairment does not necessarily generalise to productive use which can be considered as a support to the claim that comprehension and production do not correspond to each other.

2.2.2.3 The stages of development of language comprehension

As mentioned earlier, language comprehension develops gradually in children from the stage of showing little evidence of understanding speech (although interested and attentive to the speaker), to the stage where the child demonstrates comprehension abilities similar to those of an adult, with intermediate stages. When saying that the child passes through different stages in developing language comprehension, one should not think of this as climbing up a ladder, step by step, with no link back. The case with a complex process like language comprehension is different from other developmental skills. For example, a child may interpret one utterance relying on subskills that he has acquired at a later stage, while at the same time interpreting another utterance relying on subskills that he has acquired at an earlier stage. Different factors determine the way in which a child interprets a stimulus, such as the structure of the stimulus being presented, the child's linguistic abilities and the context in which the stimulus was presented. When context is mentioned throughout the study, it refers to the physical surroundings, social relationships, the nature of events and the prior utterance(s) of discourse, (as pointed out by Milosky 1992). Thus when saying that a child has advanced from one stage to another, it is not assumed that the child has abandoned completely all the subskills he has acquired and used in the previous stage. (See comprehension definition for examples of the subskills). Instead, it is assumed that the child continues to use some of the previously acquired subskills, abandons some of them completely, uses some more efficiently, modifies some, uses some on few occasions and acquires some new subskills. Let us consider the proposed stages for the acquisition of language comprehension by young children. The age reported for advancing from one stage to another is an average age proposed after reviewing the literature related to children's acquisition of language comprehension as considerable individual differences do exist between children. There are different factors that may account for such individual differences, such as differences in intellect, personality and learning style; ethnicity and the language of the home; socio-economic status; family structure; birth order (Wells, 1985),

genetic inheritance, nutrition, gender, overall emotional and physical health and the prenatal condition (Owens, 1996). Owens added that the effects of these factors vary with age and many of these factors can be interrelated.

An attempt to synthesise an account of the acquisition of language comprehension that takes account of current theories will be presented next. These theories vary in many ways such as being English-centred or cross-linguistic and deal with different psycholinguistic levels of language comprehension, such as focusing on the semantic side or the syntactic side of language comprehension.

Stage I: Pre-comprehension of single words

From the first minute of an infant's life he is exposed to many language forms. These forms might be addressed directly to the child or to someone else in the communicative situation. Although CDS is expected to be simple (see Section 2.2.9 for more information on CDS), it rarely consists of one-word utterances (Woodward & Aslin, 1990, cited in Jusczyk & Aslin, 1995). Thus the comprehension of single words was used as a landmark that denotes the increase in children's language comprehension capabilities.

Infants from a very young age seem to have the ability to discriminate any speech sound. As they get older this ability declines and they become sensitive to the speech sounds of their native language and exhibit difficulty in discriminating non-native distinctions (Trehub, 1976). Infants and adults' ability to discriminate non-native speech sounds was tested by Trehub by presenting Canadian infants with two sounds (/za/ and /ʒa/) from another language (namely Czech). Infants aged 0;6 to 0;8 months demonstrated an ability to discriminate these non-native speech sounds, while the adult subjects demonstrated a poor ability in discriminating the two speech sounds. The same infants were re-examined two months later (i.e. aged 0;8 to 0;10 months) using the same task and their discrimination

abilities were as poor as that of the adults who were tested earlier in this study. This study's results imply that infants are born with the ability to discriminate all speech sounds and this ability continues until they are around 0;8 months of age when they start to be particularly sensitive to the speech sounds of their native language. Results indicate that this speciality that infants' demonstrated in discriminating the speech sounds of their native language has occurred within a relatively short period of time (two months) suggesting that this ability in discriminating other languages' speech sounds is not a gradual process. This also emphasises the role played by input in shaping infants' speech perception abilities to their native language.

Infant-mother interaction at this age is concerned with the here and now (Snow, 1972) which means that the mother will talk about what her infant can see and hear. This interaction often occurs in strings of successive utterances referring to the same object, action or event (Kaye, 1977). Social interactionists such as Bruner (1975) claim that this semantic similarity between successive utterances and the negotiation of meaning that occurs between the adult and the child (see Section 2.2.9) is an important factor that helps in facilitating the development of the infant's receptive lexicon. Another factor that facilitates children's lexicon at this early stage is referencing (Harris *et al.*, 1988). Referencing is defined by Owens (1996) as "the noting of a single object, action or event and is signalled by either indicating or marking" (pp. 181-182). In 'indicating', the adult comments on objects, action or events that are attended by the child, while in 'marking', the adult tries to attract the infant's attention to an object, action or event, such as shaking an object or exaggerating an action (Owens, 1996).

As mentioned earlier, adults refer to objects, actions or events that are in the infants' perceptual field; however such referencing consists of sentences or sentence fragments for the most part and rarely contains single word utterances. Thus one is interested to know the age at which infants are able to recognise single words when produced in fluent speech (i.e.

not produced individually) as this ability is a prerequisite for comprehending single words. This ability was tested by Jusczyk & Aslin (1995) in two experiments. In the first experiment they divided 24 American infants aged 0;7.15 months (range: 31 to 35 weeks of age) into two groups of 12 children. They familiarised the first group with the words *feet* and *bike* and the second group with the words *cup* and *dog*. Familiarisation was performed by saying the word to each infant for a period of 30 seconds. After each infant was familiarised with the pair of words, 24 sentences were said to him. These 24 sentences consisted of 6 sentences testing for of the four words. Thus infants in the first group heard 12 sentences containing *feet* and *bike* with which they were familiar (e.g. *his bike had big black wheels*) in addition to 12 sentences containing *cup* and *dog* with which they were not familiar (e.g. *the happy red dog was very friendly*). Infants' recognition of a word was assessed by comparing his mean listening time to the 12 sentences containing the familiar words to his mean listening time to the 12 sentences containing the unfamiliar words. An infant's head turning to the examiner upon hearing the stimulus was used to measure listening time. Across all infants, mean listening times to sentences containing the familiar words was 8.29 seconds, while it was 7.04 seconds for those containing the unfamiliar words, and the difference between the two was statistically significant. In the listening preference experiments such as the one mentioned above, certain assumptions were made prior to the experiment. One assumption is that one can tell what a child attends to by his visual behaviour and that length of attention can be used as an indication of comprehension.

The above experiment was replicated in another with 24 younger infants aged 0;6 months (range: 22 weeks, 6 days to 27 weeks, 2 days). Infants in this experiment had a mean listening time of 8.45 seconds for sentences containing the familiar words, while it was 7.97 seconds for those containing the unfamiliar words and the difference between the two was not significant. The implication of this finding is that between 0;6 and 0;7 months of age, an infant becomes able to recognise familiar words embedded in sentences.

A psycholinguistic view of the stages of language comprehension from the age of 0;4 months to 3;0 years was hypothesised by Golinkoff & Hirsh-Pasek (1995). Their explanation focuses on what aspects of the linguistic code are processed but seems to ignore communication aspects of comprehension development which encompass semantic and pragmatic development. The first stage, which they called 'acoustic packaging', extends from the age of 0;4 to 0;9 months. In this stage the child uses the perceived acoustic units he/she hears as a guide to segmenting and processing non-linguistic events. They claim that language at this stage may be processed more acoustically than linguistically. By this they mean that a child will associate the sounds he/she hears in the environment to certain events from an acoustic rather than linguistic point of view. Thus meaning is linked to certain acoustic features rather than phonological patterns. This stage, which links acoustic stream to events, prepares the child for the following stage in which he will use the acoustic information gained in the previous stage to segment complex, non-linguistic events into linguistically relevant units (i.e. the child is beginning to acquire the phonology of his native language).

Golinkoff & Hirsh-Pasek proposed two prerequisite abilities that need to be available for an infant to use acoustic packaging. First, he must recognise the link between elements of the acoustic stream and events, that is forming image-schemas of world events. Second, he must attend to the acoustic information in the incoming language stream, that is extracting acoustic correlates of linguistic units from the speech stream. The first prerequisite implies that infants construct mental models based on their representations of the perceived world of objects, actions and events which means that the social context in which the speech occurs is important. With regard to the second prerequisite, they reported several studies in which infants prefer to listen to a CDS with natural pauses between clauses (of around 1 second) rather than listening to speech were these pauses where interclausal (inserted inside the clauses). One of these studies was performed by Jusczyk *et al.* (1992) who found that 16 infants with a mean age of 0;9.3 months were sensitive to pauses between phrases (NP and

VP), while 16 infants with a mean age of 0;6.5 did not show such sensitivity. Infants have shown this sensitivity by listening longer to passages in which pauses were inserted at major syntactic boundaries than when pauses were inserted at non-boundary positions. When the younger infants were tested about three months later (their mean age was 0;9.6 months) they were more sensitive to pauses inserted at major syntactic boundaries than when pauses were inserted at non-boundary positions. This implies that infants as young as 0;9 months of age become sensitive to prosodic changes in the utterances they hear.

The way these two prerequisites work, according to Golinkoff & Hirsh-Pasek, is that the child will form images for the perceived world of objects, actions and events. Acoustic correlates will be linked to these images. This will result in acoustic packaging of these objects, actions and events. They then emphasised the role of the input when they proposed that the repetition of some of the 'acoustic chunks' (a link between an acoustic stream and an event) will allow the child to map them into 'routines'.

Testing the validity of this hypothetical stage is not an easy task. Golinkoff & Hirsh-Pasek admitted that "little evidence exists on how acoustic packaging works in detail" (p. 440). An example that demonstrates this stage is the infant's reaction to his mother's voice even if she is out of sight. An infant might have mapped this acoustic signal (the mother's voice) to an image such as "someone I know".

In this stage, Golinkoff & Hirsh-Pasek assume that infants are not expected to show comprehension of single words and this occurs in the following stage that they propose. There is evidence from studies that investigate infants' comprehension of single words that this can be demonstrated as early as 0;7.7 months (Harris *et al.*, 1995). (See the next stage for more details). It is possible that while children carry on assigning acoustic streams to events, they start comprehending a few single words using strategies other than those described by

Golinkoff & Hirsh-Pasek (See the next stage for more details). An example of such a strategy is referencing in which an infant assigns a word to its referent. The amount of information achieved from input, mainly in the form of referencing, is supposed to act as a source that aids infants in referencing. This is supported by the findings of Jusczyk & Aslin's (1995) study mentioned earlier: that by around 0;7.7 months, infants are able to recognise single words in adults' fluent speech if the infants were familiar with these words. A word was considered familiar to the infant in Jusczyk & Aslin's study if it was spoken to the infant prior to their experiment for a period of 30 seconds. However familiarising infants with the words using this procedure is not a naturally occurring process.

After having developed the ability to recognise a set of acoustic chunks, the infant's job in the stages proposed by Golinkoff & Hirsh-Pasek (1995) is to segment these acoustic chunks into smaller units (words and phrases). They proposed that infants will not perform segmentation until they are 0;9 months of age and argue that children segment these acoustic chunks into smaller units by the aid of prosodic changes such as pausing, syllable lengthening and pitch. Their evidence for the segmentation process was the results of different experimental studies (e.g. Jusczyk *et al.*, 1992 & Cutler, 1994). Jusczyk *et al.*, for example, found that infants whose mean age was 0;9.3 months were sensitive to pauses between phrases (NP and VP). What is claimed so far is that children will use prosodic changes to segment the stimulus they hear into smaller units, and the claim that a child will use his knowledge of prosody to aid him in comprehending the relation between these units is not considered. What has not been explained by Golinkoff & Hirsh-Pasek is the way children who speak languages that do not rely heavily on prosodic changes will solve the segmentation problem. The argument raised by Cutler (1994) in that respect is that language-specific exploitation of rhythmic structure is established after the first year of life. For example, infants learning English will use stress rhythm in segmentation, whereas infants learning French use syllable rhythm and so on. Another point that was not accounted for in

Golinkoff & Hirsh-Pasek's (1995) discussion is the infants' lexical knowledge at this stage (around 0;9 months of age) when they were found to comprehend as many as 12 words when they were 0;9 months of age (Harris *et al.*, 1995). These early acquired words are expected to occur frequently in the speech addressed to infants (Barrett, *et al.* 1991). Therefore, one can assume that some of the utterances spoken to infants will include these early learned words. This in turn will enable the infant to segment such utterances with the aid of his lexical knowledge into words he knows and words he does not know.

Stage II: The acquisition of word-meaning comprehension

Gleitman (1994) pointed out that for a child to acquire a new word he has to achieve knowledge of the concept that the word expresses; extract recurrent phonological patterns from incoming speech, and map the concept to its phonological patterns. Thus, when a new word is learnt, a permanent long-term representation has been formed in a mental lexicon whereby this word's meaning is linked to a sound pattern (Bishop, 1997).

It is of interest to know the age at which children comprehend their first words and the rate at which they acquire new words in comprehension. Harris *et al.* (1995) followed the development of language comprehension in 6 English-speaking children for 18 months from the time they were 0;6 months-old. They reported that one of their subjects (Katherine) comprehended her first word when she was 0;7.7 months-old and during the age range 0;8 to 0;9 months all 6 children tested understood at least one word. Harris *et al.* relied on diaries recorded by parents, an examiner observation and a test of language comprehension. As regards the latter this was performed once a new word was identified as appearing in comprehension. The results of Harris *et al*'s work showed that by the end of their first year, children were able to understand between 10 and 68 words with a range of 27 words. As children get older, their comprehension abilities increase. Benedict (1979) found that by 1;6 years, English-speaking children reached a cumulative comprehension total of 50 words, and

they were gaining an average of 22 words each month (Section 2.2.2.2). As regards the order in which the different types of words were comprehended, Miller *et al.* (1980) studied 48 English-speaking children aged 0;10 to 1;9 year and found the following order: 1) person's name (present in situation), 2) object's name (present in the situation) and 3) action verb.

Before presenting some of the hypothesis which tried to explain the way children acquire the meaning of words, it is worth indicating the relationship between the meaning of a word and the word's referent. Pan & Gleason (1997) expressed the relationship between the two by stating that "the word is a sign that signifies a referent, but the referent is not the meaning of the word" (p. 123). They added that the arbitrary relationship between the referent and the sign for it (the word) is symbolic. There are a few words in which the relationship is not arbitrary such as the name of the *cuckoo bird* as it represents the sound that the bird actually makes.

Several hypotheses have been proposed to explain the process of early lexical development. One of the earliest attempts was Clark's (1973) 'semantic features hypothesis'. One of the main assumptions of this hypothesis is that the meanings of words are made up of features or components of meaning, and children learn these meanings gradually by adding more and more features to their lexical entries (Clark, 1973). The feature of a dog, according to the semantic feature hypothesis, will be +animal, + alive, +four legged and +bark. Children will acquire the more general features such as +animal first and then acquire the more specific ones such as +bark. The semantic feature hypothesis explained overextensions that are demonstrated by most children by proposing that when acquiring the more general features, the child may overextend a word he has just acquired to other words that share the same general features. Thus a child may call a cat *a dog* since it shares the first three features with the dog, but when he acquires the more specific feature (i.e. +bark) he will recognise that a cat is different from a dog.

Another theory that tried to explain the early acquisition of referential words is the 'prototype theory' (Rosch, 1973). A prototype of a concept is a word that has more of the qualities of the concepts than others (Pan & Gleason, 1997). *A chair*, for example, is a prototype of *furniture*, whereas *a candle* is a poor exemplar of *furniture*. Novel concepts are candidates for being labelled with a concept if they are sufficiently similar to the stored prototype(s) (Griffiths, 1986). This means that the child will classify a new concept into a certain prototype if this new word is similar to the prototype. Since the prototypes theory, as stated by Barrett (1995), explains the meaning of referential words, it gives an explanation to some of the ways children treat referential words. Underextension of referential words (e.g. when the child understands that the word *ball* means a blue beach ball only) was attributed in this theory to the fact that words may only be used to refer to referents which bear a high degree of similarity to the prototype. This theory was criticised by Barrett (1995) for not explaining the acquisition of the meaning of word types other than referential words such as social-pragmatic words (e.g. bye-bye).

A theory that tried to explain the acquisition of context-bound as well as social-pragmatic words was proposed by Nelson (1983) and is known as the 'event representation theory'. A word is said to have a context-bound use when its meaning is restricted to a specific context only. An example that illustrates context-bound use has been given by Barrett *et al.* (1991) when Jacquie (one of their subjects) used the word *down* in the context of a particular game in which she fell or jumped down on to floor cushions. Barrett (1995) reported that according to the event representation theory, young children build up a knowledge of the frequently recurring events that take place in their everyday environment, even before they acquire their first word. The child uses this knowledge to form 'scripts' for predictable interactional sequences. A script, according to Nelson (1986), is an ordered sequence of actions appropriate to a particular spatial-temporal context and organised around a certain goal. She added that scripts specify the actors, actions and props used to carry out those goals within

specified circumstances. Thus, a script of an event is what the person expects to happen in that event. Within a script there may be alternative paths that are taken if the circumstances differ (Nelson, 1986).

Barrett (1995) described four types of information contained in the events acquired by the child according to the event representation theory. The first is the sequence in which the event occurs. The second is the people who are involved in the event. The third is the objects which may be involved in the event and finally, the specifications of people and objects that may be represented as slots. These slots were described by Nelson (1986) as categories of event information such as actors, actions and props that are filled in according to the requirement of a particular event. According to this theory, the first acquired words are either built into or mapped onto these event representations which the child has already formed. This child's first words, according to this theory, are typically context-bound which means that they are tied to the events which occur regularly in social-interactive situations (Barrett, 1995). The decontextualisation (i.e. using the word in a much wider range of situations instead of using it for a specific situation only) of these context-bound words occurs when children analyse these event representations into their basic components. This also explains the rapid increase in some children's vocabulary around their second year of life (Nelson, 1986) since children will break down some context-bound words into further meanings.

One criticism of event representation theory is that it accounts for the acquisition of context-bound and social pragmatic but not referential words. There is strong evidence from studies that observed early lexical development such as Harris *et al.* (1988), that children's first acquired words can be tied to a particular context (context-bound words) and they can be nominals that are used in at least two different behavioural contexts (referential words). Two other criticisms of the event representation theory were pointed out by Barrett (1995). The first is that not all children show the sudden increase in vocabulary size in their second year

of life. Goldfield & Reznick (1990) followed the early lexical development of 18 children for eight months from the time they were 1;2 years. One of their study's main findings was that 13 children (72%) showed a sudden increase in their vocabulary, while the rest of the children (28%) evidenced a more gradual word-learning. The second criticism to event representation theory according to Barrett (1995) was that the process of decontextualisation is not a sudden process that occurs in the second year of life, simultaneously affecting all of the context-bound words which are in the child's vocabulary. The evidence for this criticism came from Barrett *et al.*'s (1991) work which followed the changes that occur in the use of 40 early acquired words by 4 children from the time they were 0;6 months until they were 2;0 years. These words fell into three categories: 22 were context-bound, 14 were nominals and 4 were non-nominals (e.g. *more*).

A competent model that tried to explain the development of both referential as well as context-bound words was developed by Barrett (1983, 1995) and Barrett *et al.* (1991). This model of early lexical development was called by Barrett 'the multiroute model' and it combines the prototype as well as the event representation theories. Thus it postulates that there are two principle routes in early lexical development, one of which is followed by context-bound and social-pragmatic words, while the other is followed by referential words. The process of early lexical acquisition, as viewed in the multiroute model, was described in detail by Barrett (1995) and is summarised in the following paragraphs.

Context-bound and social-pragmatic words are initially mapped onto event representations, and words acquired in this route will be used in the context of the represented events. Words acquired in the other route (i.e. referential words) are initially mapped onto mental representations of prototypical referents, and these are the words which will be used by children at a very young age to refer to objects, actions, properties or states. If the meaning of a referential word has been overextended to include another word in its initial use, the multiroute

model suggests that this overextension will be rescinded when the child identifies the features which differentiate the prototype of the word from the prototype of the other categories which fall within the same semantic domain. If the word *cat*, for example, was used as a prototype for animals, the child will recognise that *a cat* is different from *a dog* when he identifies those features which differentiate the prototype of the word *cat* from *a dog*, *a sheep*, etc.

The multiroute model seems to be the most appropriate hypothesis for explaining the early lexical development in both comprehension and production, although most of the research done so far has been to do with the expressive side of the language. Being capable of explaining both referential and context-bound words is a point that strengthens this model. Another feature that adds strength to this model is its ability to explain several phenomena that occur in early lexical development such as overextension, decontextualisation and underextension. And finally this model considers the role of input in shaping early lexical development. This appeared very clearly when Barrett (1995) reported that most of the early acquired words are in fact words that were produced by parents in regularly occurring social-interactional routines. These words will be initially perceived by the child as tied to the particular context they were used in by the parents. Although the multiroute model was tested in several studies (e.g. Harris *et al.*, 1988 and Barrett *et al.*, 1991), further testing is required, especially in languages other than English.

Stage III: Comprehension of simple sentences

Golinkoff & Hirsh-Pasek (1995) pointed out that any explanation of children's sentence comprehension must describe how children become sensitive to the types of units and relations contained in these sentences. That is, to understand novel sentences children must first find the units that compose these sentences, which is the first step, and the following step involves finding relationships between these units.

Phase III-A: Finding sentence units:

As regards the way children become sensitive to the types of units of a language, Golinkoff & Hirsh-Pasek (1995) suggest that children begin to know that 'open class' words that carry content, such as nouns and verbs, are different from 'closed class' words whose membership is limited and semantically rich, such as pronouns and conjunctions. The fact that closed class words are universally small (in number) compared to open class words was attributed by Morgan *et al.* (1996) to four factors: 1) they tend to occur with a very high frequency; 2) they are often readily predictable from surrounding syntactic context; and 3) they tend to be morphologically simple. The last point should be regarded with caution since prepositions in Arabic, for example, are not morphologically simple. Most of the time they must agree with the sentence object in both gender and number; this agreement necessitates inflections and more phonemes to be added to the closed class words.

Once word classes are determined, the child's subsequent job is to classify open class words (content words) into their types (i.e. nouns, verbs, adverbs or adjectives). This process is called 'distributional analysis' and two processes have been proposed to solve this problem: acoustic markers and function morphemes. The way acoustic markers work is through syllable number and stress. In English, for example, on average nouns have more syllables than verbs and nouns often receive first syllable stress. This claim needs to be tested in other languages such as Arabic where syllable number and stress do not differentiate systematically between word types. This view was expressed by Morgan (1996) who pointed out that such acoustic markers occupy much less prominent roles in the phonological systems of many languages than is the case in English.

The other proposed way that enables children to classify content words into: nouns, verbs, adjectives or adverbs is through their knowledge of function morphemes. Using this approach the child can infer, for example, that *the cat* and *the idea* are members of the same class,

because both can immediately follow the function morpheme *the* (Gerken, 1996). English verbs, for example, may end in the inflections (-ing or -ed). Given that knowledge, the child will distinguish any word that ends with *-ing* or *-ed* as a verb (Maratsos, 1982). This hypothesis may work with some verbs, however it may not help with verbs which do not have an inflectional ending, such as irregular verbs. To classify such verbs and other items which could not be classified by the only use of function morphemes, the child must use other cues such as the lexical meaning of the word. Most verbs, for example, indicate an action, a strategy that might be used by children to classify verbs. Thus both the knowledge of word meaning and children's ability to perform distributional analysis (by the use of function morphemes or acoustic markers or both) interact with each other to enable the child to classify novel words into their word classes. In languages such as Arabic and Hebrew, the derivation of the word can be used as a cue to its word class. The root /ktb/ *write* in Arabic, for example, can be expanded into a past verb /katæb/, a present verb /jæktʊb/, an imperative /ʔʊktʊb/, a noun /kɪtab/, an instrument /katɪb/ and so on.

Phase III-B: Finding sentence relations

A child's job after identifying the units of a sentence is to find the relations contained in the sentence. Thus his job is to find whether or not words are related and if so the kind of relation that exists. This relation can be a very simple one, such as the one that exists in simple commands (e.g. *close the door*) or a complex one that requires knowing who did what to whom, which is the case in reversible active sentences (e.g. *the man is chasing the boy*) or even a very complex one that requires knowing who did what to whom in the absence of supporting cues such as in reversible passive sentences (e.g. *the boy was chased by the man*). Within the CM (Bates & MacWhinney, 1989), language acquisition is viewed as "a process of acquiring coalitions of form-function mappings, and adjusting the weight of each mapping until it provides an optimal fit to the processing environment" (p. 59). Thus, language acquisition was considered by them to be cue-driven and valid cues (both available and

reliable) in the input will be acquired first (Sokolov & Snow, 1994). (See Section 2.2.1.5 for more details on the CM). This was also emphasised by Bates & MacWhinney, (1989) who argue that cue validity will determine the order in which grammatical devices are acquired. Accordingly, children from the beginning will attend to the cues that are appropriate to their language. The cue that is both available and reliable in Italian, for example, is animacy, while it is word order in English (Bates *et al.*, 1984). As emphasised in Section 2.2.1.5,what distinguishes the CM from other theories is that it aims to be cross-linguistic, unlike the other theories which seem to be centred on the English language.

The cues claimed by Bates & MacWhinney (1989) to drive language acquisition might be linguistic, such as the syntactic, semantic and prosodic cues, or non-linguistic, such as the probable semantic relationships among the words and information from the immediate non-linguistic context which were mentioned by Chapman & Miller (1975). It has been found that non-linguistic cues are employed by young children more than older ones (Chapman, 1978; Wilcox & Palermo, 1982 and Bridges, 1984). At least three reasons may account for this finding. First, younger children's mastery of linguistic cues is less efficient compared to older children (Chapman, 1978 and Bridges, 1984). Secondly, the input directed to young children is mostly related to the here and now (Snow, 1972) which allows children to use information from the context to support their comprehension. And thirdly, CDS addressed to younger children is simpler than that addressed to older ones (Phillips, 1973 and Pan *et al.*, 1993, cited in Snow, 1995). The last two reasons will make the young child's initial use of non-linguistic cues valid because it is available (as the CDS mostly concerns the here and now) and reliable (as the CDS directed to them is simpler compared to that addressed to older ones which will support the child in making accurate judgements about the language he hears).

Children's use of such non-linguistic cues is determined by their availability and their appropriateness to the linguistic utterance being heard. Some utterances spoken to the child

are so simple that their meaning is evident even to a child who has got a minimal linguistic knowledge. An example already cited is asking a child to shut the door in a room where a door is open. Clearly if the child only knows the meaning of the word *door*, it is most likely that he will anticipate that he has been asked to close that open door. That child will demonstrate that he was attending to a salient word in the utterance if he closes the door when asked to touch the door. On other occasions, the young child needs to use all the available cues to interpret the meaning of an utterance, such as asking him to bring his father's glasses which the father left in the toilet. A study by Sachs & Truswell (1978) has shown that children as young as 1;4 years respond to some unusual two words commands such as *kiss horsey*. This result suggests that children as early as 1;4 years of age can rely on their linguistic knowledge to understand two words meaning relations. It is not known whether children younger than 1;4 years demonstrate such an ability as this particular child was the youngest in Sachs & Truswell's study.

As children grow older their reliance on linguistic cues increases, while on the other hand their reliance on non-linguistic cues decreases (Chapman, 1978 and Bridges, 1984). This can be attributed, under the CM's explanation, to the weakness of the non-linguistic cues' validity. This weakness has resulted from the decrease in both the availability of the non-linguistic cues and their reliability. As far as the availability is concerned, CDS will not be centred on the here-and-now, as was the case when children were very young, which in turn means that some contextual cues will not be available. The same thing can be said about reliability of the non-linguistic cues as the complexity of CDS increases, making most judgements based on the use of non-linguistic cues alone unreliable.

As mentioned earlier, children's reliance on linguistic strategies increases as they get older. The way children use their linguistic knowledge to interpret verbal messages has been viewed in various ways by the different approaches that tried to explain the process of

language acquisition. Some theorists such as Chomsky (1965, 1981) proposed that children are born with a mechanism that contains information about linguistic structures and rules that will enable a child to interpret sentences. Some other theorists such as Pinker (1984, 1987) approached this problem by claiming that the child uses the part of language that he knows to interpret the part that he does not know, a process which is known as 'bootstrapping'. Yet other researchers suggested that various cues (e.g. syntactic, semantic and prosodic) compete and converge together to achieve sentence interpretation (Bates & MacWhinney, 1989).

The world's languages use two devices for representing meaning relations such as who does what to whom. These devices are word order and inflectional markings (Hirsh-Pasek & Golinkoff, 1991). Languages such as English have a rigid word order so they use it to convey meaning, while in languages such as Turkish, word order is freer and meaning relations are conveyed through inflections (Slobin & Bever, 1982). In Arabic, meaning relations are conveyed by both inflections and word order (Taman, 1993). In a language such as English, it is important to know whether the child masters word order or not because "children who are attentive to word order probably construct different mental models of events than do children who are insensitive to word order" (Golinkoff & Hirsh-Pasek, 1995, p. 445). The comprehension of word order will be presented here because it will illustrate the way different approaches to language acquisition view the sentence comprehension process. Deciding whether children comprehend word order or not can be done, for example, by testing children's comprehension of reversible active sentences.

The age at which English-speaking children are able to use word order to derive meaning relations was investigated by Hirsh-Pasek *et al.* (1985, cited in Hirsh-Pasek & Golinkoff, 1991). They found that children as young as 1;5 years had some knowledge of word order. This study tested 48 children aged 1;4 to 1;6 years. Children in this study were seated in front of two screens with each of them showing an action. Reversible active sentences were then

presented and the child's visual fixation time was taken to evaluate his response to the sentence presented. A study that tested for the comprehension of word order considering children's MLUs is de Villiers & de Villiers' (1973) study. Using a variety of verbs, they required 33 English-speaking children aged between 1;7 and 3;2 years to act out six reversible active and six reversible passive sentences. Subjects were grouped according to their MLUs into 6 stages: early stage I (MLU 1.00-1.50), late stage I (MLU 1.50-2.00), stage II (MLU 2.00-2.50), stage III (MLU 2.50-3.00), early stage IV (MLU 3.00-3.50) and late stage IV and stage V (MLU 3.50-4.25). Their results indicated that it is not until late stage I (MLU 1.5-2.00 and children in this group aged between 1;7 and 2;3 years) when children were correct on acting out 75% of the reversible active sentences. The results of their research was supported by later work by Roberts (1983), who found that it is not until late stage I (MLU=1.50-2.00) again that children will comprehend active sentences relying on word order alone. A brief account of the way the comprehension of word order in reversible active sentences was explained by each of the theories that tried to interpret sentence comprehension will now be presented.

Linguistic theory

According to proponents of this approach to language acquisition, children are born with a language acquisition device that contains information about linguistic structures and rules that are universal to all languages. Thus, according to this approach, much of the structure of language is universal and innate in the child, only those few aspects of structure that are language-specific depend on input for their acquisition (Hoff-Ginsberg & Shatz, 1982). Input works as a triggering device that activates the innate language mechanism (Caplan & Chomsky, 1980).

According to linguistic theorists, children approach the word order problem through applying their innate syntactic knowledge. Thus when faced with a reversible active sentence, an

English-speaking child, for example, will apply a SVO sequence considering the first noun the subject with the second noun as the object of the action.

Bootstrapping hypotheses

Let us now consider the correlational and semantic bootstrapping hypotheses will be presented as an example of the bootstrapping hypotheses.

Correlational bootstrapping hypothesis

Proponents of this hypothesis such as Maratsos & Chalkley (1981) argue that in addition to using function morphemes to find sentential units, young children do use them to help in sentence comprehension itself. One of the initial studies was performed by Katz *et al.* (1974) who showed that children aged between 1;5 and 2;0 years were able to distinguish proper from common nouns by the absence of the article before a word. Children were presented with a pair of dolls (human) and a pair of blocks (non-human). When their subjects were told "give me Kev", they tended to hand a doll, whereas when they were told "give me a Kev" they tended to hand a block. Stronger evidence that supports this hypothesis was presented by Gerken & McIntosh (1993). They asked children aged 1;9 to 2;6 years to point to a picture of a named noun once by presenting the noun preceded by a grammatical article such as *find the dog for me* and the second time by presenting the noun preceded by an ungrammatical auxiliary such as *find was dog for me*. Gerken & McIntosh found that children with MLUs over 1.5 morphemes per utterance were better able to identify the correct picture in grammatical than ungrammatical sentences. Gerken (1996) suggested that given children's knowledge of the role played by function morphemes from this early age, children might be able to distinguish between words and phrases of different types by the use of function morphemes (e.g., noun, noun phrase, etc.) which he considered an early stage of syntax acquisition. The use of function morphemes on its own cannot explain how children reach into sentence meanings because it is often misleading. The following example which was

given by Pinker (1987) illustrates how misleading the use of function morphemes to interpret sentences can be. Generalising the meaning of the verb *can* from *John ate fish* and *John can fish* could lead to *John can rabbits*.

Semantic bootstrapping hypothesis

In this theory which was elaborated by Pinker (1984) the child is assumed to know prior to acquiring a language, the overall structure of the grammar, the formal nature of the different sorts of rules it contains and the primitives from which those rules may be contained. Pinker proposed that linguistic entities such as nouns and verbs are not evident in parental input (i.e. parents do not say to the child this is a noun and this is a verb). These grammatical entities will become known to children, as proposed by Pinker, when they are linked to identifiable semantic classes in CDS. That is when speaking to an infant, parents refer to people and physical objects using nouns, that they refer to physical actions and changes of state using verbs, that they communicate definiteness using determiners and so on. The child then will know that a subject is an agent of an action while an object is a patient of an action. However, this hypothesis does not claim that all subjects must be agents, but claims that all agents must be subjects (Pinker, 1987). The syntax-semantics correspondences were explained by Pinker (1984, p. 40) as follows: "the categorisation of words can be inferred from their semantic properties and their grammatical relations can be inferred from the semantic relations in the event witnessed".

The way this hypothesis approaches the word order problem is through applying an agent-action-patient sequence. When faced with a reversible active sentence, an English-speaking child, for example, will consider the first noun the agent while the second will be the patient of the action. Thus, children under this hypothesis solve the word order problem relying on their semantic knowledge.

The competition model

Sentence comprehension in the CM is cue-driven (Bates & MacWhinney, 1989). When presented with a sentence, cue validity determines the way this sentence will be comprehended. As mentioned earlier (Section 2.2.1.5), cue validity is a product of both cue availability and cue reliability. According to the CM (Bates & MacWhinney, 1989), different cues, syntactic, semantic and prosodic, interact in interpreting a sentence and the parsing system engages in an ongoing updating of assignments of nouns to case roles. They then gave the following example to explain their position. When parsing a sentence such as *the dogs are chasing the cat*, the assignment of *dogs* as the agent is first prompted by its appearance as the initial noun. This will be supported by the fact that the verb phrase *are chasing* agrees with *dogs* in number. A further support is having the singular noun *cat* appear post-verbally. All these cues will interact together supporting the child to know that *dogs* is the subject while *cat* is the object of the sentence. The cues available will depend on the language being heard. Some languages use certain cues more than others. Italian, for instance, uses animacy more than English, which uses word order (Bates *et al.*, 1984). Word order cue is so strong in English that English speaking adults in Bates *et al.* (1982) assigned the role of the actor to *the eraser* in the sentence *the eraser kicked the horse*, while Italian-speaking adults were affected by an animacy cue and assigned the role of the subject to *the horse*.

So far children are able to extract appropriate meaning from the input they hear if the cues they use to encode the input are not violated. However, CDS often contains sentences such as passives and negatives that could not be explained by the cues they possess so far. Children are then expected to acquire more complex grammar and Golinkoff & Hirsh-Pasek (1995) propose three reasons which encourage children to do so. First, children need greater grammatical competence to talk about more complex events; second, they make mistakes in comprehension (e.g. in comprehending passive sentences) and third, children find a mismatch between the input they hear and the primitive mental models they have constructed so far.

Stage IV: Comprehension of complex sentences

In this stage children begin comprehending sentences even when they do not correspond directly to environmental context. Golinkoff & Hirsh-Pasek (1995) reported that passive sentences in English illustrate children's ability to go beyond input redundancies to use clause-internal structure. They pointed out that children who can comprehend the reversible passives are using their syntactic knowledge as opposed to their semantic knowledge. This is because passives violate the initial sequence used by children (the initial sequence is SVO according to linguistic theory, and agent-action-patient according to the semantic bootstrapping hypothesis). This might be the main reason for using passive sentences to illustrate children's syntactic comprehension in studies with English-speaking children.

English passive sentences violate the initial sequence used by children to interpret sentences (see above). Thus, at least one of the cues helping in sentence interpretation is violated causing a sentence such as *the boy was chased by the dog* to be treated by the young child as a boy chasing a dog. Another example that illustrates a violation of the interactive system to sentence interpretation is the experiment performed by Strohner & Nelson (1974) who asked their subjects to act out improbable sentences such as *the mouse chased the elephant*. Clearly, the previous sentence violates the semantic system causing one of the cues to sentence comprehension to be disrupted, which in turn disrupts the comprehension of that sentence. The CM's explanation for the difficulty of such sentences is that in such a case the different cues will be set in competition and the child's response depends on the cue that he relies on more than the other cues. Therefore, in the previous example, syntactic and semantic knowledge were set into competition with the child's world knowledge. The child will give a wrong answer if his world knowledge wins the competition. During this stage (Stage IV) children will rely on their syntactic knowledge even if cues from the other systems (prosodic, context and semantic) are missing, such as in the case of passive sentences. However this does not mean however that the child is not using information from other sources, but if

information from other sources conflicts with the syntactic information (as is the case in reversible passive sentences), the child is going to rely on syntactic information alone and ignore the other extra-syntactic cues.

Children comprehend the reversible passive alone (as a syntactic structure) around the age of 3;0 years (Lempert, 1978). However, when other cues such as the semantic or world knowledge cues (see Section 2.2.4.4) are put into competition with the syntactic cues, children are unlikely to comprehend reversible passives until around 5;0 years, as found by Strohner & Nelson (1974). Having other cues converge and not conflict with children's syntactic knowledge, a child aged around 3;0 years is expected to understand passive sentences (Lempert, 1978 and Golinkoff & Hirsh-Pasek, 1995).

2.2.3 Theoretical framework for the current study

The definition of language comprehension presented in a previous section (Section 2.2.2.1), viewed language comprehension as a process in which all the possible resources interact together to interpret the meaning of an incoming message. Therefore, different cues are involved in the comprehension process. Some of these cues are linguistic (inherent in the message itself such as semantic and syntactic cues) while others are non-linguistic, such as context and world knowledge. As mentioned earlier in Section 2.2.2.1, the use of these cues is determined by several factors such as the age of the child, the context in which the message was presented and the linguistic content of the message itself (Hirsh-Pasek & Golinkoff, 1991)

The CM proposed by Bates & MacWhinney (1987, 1989) which explains the process and the acquisition of language comprehension will be selected as the theoretical framework of the present study. The CM accounts for the roles of children's syntactic as well as semantic knowledge in language acquisition. Unlike most of the other theories which have tried to explain

the process of language comprehension acquisition, the CM tries to explain the variability in language acquisition between children speaking different languages, rather than universals.

According to the CM (e.g. Bates & MacWhinney, 1989) children pass through three phases in acquiring language comprehension of their native language. In the first phase a very young child responds primarily on the basis of overall availability (corresponding roughly to frequency, albeit frequency from the point of view of those meanings that are of interest to the child). After this initial phase, development appears to be controlled primarily by cue reliability. The last phase occurs when children begin to notice the relatively rare situations in which two or more cues compete (conflict validity), and children will favour those cues that win in such a conflict situation. Hence conflict validity dominates the last phase of language learning. Bates & MacWhinney added that by using availability and reliability as guides, the child can correctly interpret the overwhelming majority of the sentences of his language. However, there often remains a residual set of sentences where full learning depends on attention to particular conflicts between cues which are only rarely encountered. When the child interprets a sentence, the availability and reliability of the cues involved in the sentence are determined by the child's own judgement. Such judgement is expected to be different from that of an adult native speaker, especially for younger children. The evidence for this claim comes from several studies carried out by Bates & MacWhinney to obtain the order of importance of cues to actor assignment across different languages and the results of these studies are presented in their work (pp. 44-45). Italian-speaking adults, for example, used the cues in the following order: SV agreement > Clitic agreement > animacy > SVO > Stress, while Italian-speaking children used the cues in the following order: Animacy > SVO > SV agreement > Clitic agreement. English-speaking adults, on the other hand, used the cues in the following order: SVO > VOS, OSV > Animacy, Agreement > Stress, Topic, while English-speaking children aged between 5;0 and 7;0 years used the cues in the following order SVO > Animacy, Agreement > NNV, VNN, Stress. Yet English-speaking children under the age of

5;0 years used a slightly different order: SVO > Animacy > Stress, SOV, VSO > Agreement. In addition to showing that children's use of cues is different from that of adults speaking the same language, Bates & MacWhinney's results indicate that children's use of the cues is compatible with the structure of their native language.

With reference to the current research, according to the CM, younger children attend to the available cues whereas older ones attend to the most reliable of these available cues. As mentioned earlier, it is the child's judgement about the availability and reliability of the cues that determines his responses. One of the cues that very young children use is to attend to (a) content word(s) in the sentence they hear. This was reported by Wetstone & Friedlander (1973) who gave 20 English-speaking children commands with normal and scrambled word orders. Their subjects ranged in age from 2;0 to 3;1 years, and ranged in their MLU from 1.30 to 4.80 morphemes. They found that up through MLU stage III, (according to Brown's expressive language stages), children responded equally well to normal (e.g. *can you throw me the ball?*) and scrambled sentences (e.g. *ball the can throw you?*). They suggested from their results that children in the earlier MLU stages picked out the key words and assigned the most logical interpretation to the sentence as a strategy for comprehending the sentence. Thus if a young child is asked to point to *a blue ball* when a blue ball and a blue cup are presented to him, it is most likely that he will respond correctly after attending to the keyword *ball* and we can not judge whether he understand the adjective *blue* or not. The only way to assure that the child has responded correctly in attending to both words (i.e. *blue* and *ball*), is to present before him a red ball in addition to the blue ball and the blue cup.

In the previous example the child will only need to use his semantic knowledge to respond to the presented sentence. Another example in which semantic knowledge alone will make the child respond correctly is by asking the child to point to a girl eating an apple when there are four possible pictures: a girl eating an apple, a girl eating a banana, a girl cutting an apple and

an old woman eating an apple. Although semantic knowledge will be sufficient to lead the child to the correct answer, he must attend to three parts of the sentence (i.e. the nouns *girl* and *apple* and the verb *eat*). Thus, all three semantic cues are available (attend to one keyword, attend to two keywords or attend to three keywords), however only one cue is reliable and will lead to a correct answer (i.e. attend to three keywords).

As mentioned earlier, Bates & MacWhinney (1989) proposed three phases which children pass through in acquiring language comprehension of their native language. These three phases are: using the available cues; using the valid cues which are both available and reliable and using the cues that win the competition when two or more cues compete together. A test situation needs to be set up to assess children's ability to select the most valid cue that will lead to the correct answer among some available cues. In a test situation that uses picture selection, for example, pictures presented to a child need to be set up in such a way the correct selection by the child is reached only if the child encodes the cues presented and is able to exclude some cues and accept others. In a simple sentence such as asking the child to point to a blue ball when a blue ball and a blue cup are presented, using one cue such as the lexical meaning of the noun will lead to a correct answer. Children who will attend to any available cue are expected to respond correctly to such a simple sentence. The child will need to use not only the available cue to achieve a correct response but also the reliable one when the situation gets a bit more complex and both a blue and a red ball are presented from which to select.

The current study was heavily centred on morphological cues as opposed to word order cues as in studies of English-speaking children. This is because Arabic is a morphological language where inflections can be used by listeners as an aid in interpreting sentences. Arabic nouns are inflected for number, gender and definiteness, while verbs are inflected for number, gender and person (see Section 2.1.5). Thus if asked about a group of boys playing,

instead of saying *they are playing* as an English speaker might say, an Arabic speaker will need to say one inflected word which is /jæ-l?æb-un/ play (inflected for gender, number and person). The person and gender are indicated by the prefix /jæ-/, while number is indicated by the suffix /-un/. Asking an Arabic-speaking child to interpret the inflected word /jæ-l?æb-un/ *they (boys) are playing* is a situation that shows how syntactic and semantic cues need to compete and converge to interpret a sentence as suggested by the CM (Bates & MacWhinney, 1989). However, to make sure that both the syntactic cue (number inflection on the verb) and semantic (lexical meaning of the verb *play*) are used, other alternatives need to be available. These alternatives need to be designed in a way that will lead to an answer, although not the correct one, if the child uses only one of the cues. Thus the pictures that need to be shown to the child are: a picture of a group of boys playing (the target that will show that the child is using both the semantic and lexical cues), a picture of a group of boys eating (a distracter that will show if the child is relying on his syntactic knowledge only since it represents the number inflection on another verb *eating*), and a picture of a boy playing (a distracter that will show if the child is relying on his semantic knowledge only in attending to the lexical meaning of the verb *play*). Chapman (1978) pointed out that most strategies used by children, especially younger ones, are characterised by the comprehension of individual words which Chapman called 'lexical understanding'. According to the CM, younger children at first will attend to the available cue, which is mostly the lexical cue as it is the most salient one, while older children are expected to attend to the most reliable cue, which is the combination of semantic and syntactic cues. Whether children will pass through a stage where their responses are guided by the syntactic cue only needs to investigated in this study. Studies of Hebrew (e.g. Sokolov, 1988 and Sokolov, 1989), a language which is similar to Arabic in that it is a morphological language, often tested for the validity of the CM by asking their subjects (children and adults) to assign the role of the actor or the patient in sentences. Thus, the effect of single cues (such as number inflection on a verb) has not been investigated.

To achieve comprehension of the more complex sentences, more cues should interact together to lead to comprehension. In order to show comprehension, the child needs to show that he has utilised all cues to interpret the sentence presented. As indicated earlier, the study was set in a way that indicates what type of cue(s) were used by the child to interpret the sentence presented. The example given in Table 2.9 illustrates a more demanding situation in which three cues need to interact to lead to the correct answer.

Table 2.9 The possible cues used by the child to interpret the sentence the men (pl.) are eating (pl.)

Sentences illustrated by the picture	Lexical meaning of the noun	Plural inflection on the noun	Plural inflection on the verb
The men (pl.) are eating (pl.)	+	+	+
The man is eating (sing.)	+	-	-
The men (dual) are eating (pl.)	+	-	+
The boys (pl.) are eating (pl.)	-	+	+

As the above table shown, the child needs to use all three cues (two syntactic and one semantic) to interpret the sentence *the men* (pl.) *are eating* (pl.) correctly. A child who selects the second picture is possibly relying on a keyword, since neither the noun nor the verb are inflected for number. A child who selects the third picture is possibly not attending to the plural inflection cue on the noun, whereas a child who selects the fourth picture is attending to the number inflection on both the verb and the noun however he is ignoring the semantic cue since the picture shows boys instead of men. Situations that require an agreement between two parts or more of the sentence, such as the agreement in number and gender in Arabic, increase the load on memory. This in turn increases the cue cost making the cue more difficult to perceive (Bates & MacWhinney, 1989). (See Section 2.2.1.5 for more details).

Some studies that investigated syntactic comprehension tried to manipulate the non-linguistic cues that may aid in comprehension in a way that made them conflict with the syntactic cues. The best example that illustrates such a procedure is the study performed by Strohner & Nelson (1974) when they asked their subjects to enact improbable sentences such as *the*

elephant was chased by the mouse (see Section 2.2.5). Their younger subjects tended to enact the probable but the incorrect action by having the elephant chase the mouse. The possible explanation for their younger subjects' performance under the CM is that the two cues (the syntactic cue and the non-linguistic one) conflict which resulted in having the most available cue for the younger children (the non-linguistic cue) win the competition. It must be stressed here that it is not the aim to have cues conflict with each other in this study, but rather to make sure that if cues are used interactively, they will lead to the correct answer.

2.2.4 Development of comprehension of specific syntactic structures

2.2.4.1 Nouns inflected for number

Comprehension of singular/plural nouns contrast such as *balls/ball* was tested by Carrow (1968). A picture-pointing task was administered and results showed that 5;0 year-olds comprehended the contrast, although 4;0 year-olds passed the item when the singular noun was given as a stimulus *ball/balls*. An earlier age was reported by Layton (1976) who found that singular/plural nouns contrast was mastered between 3;0 and 3;6 years. The difference between these is that Carrow tested the singular/plural nouns contrast with an appropriate verb inflectional endings, whereas Layton tested the comprehension of singular and plural nouns alone by asking the child, for example to give him the *ball/balls*. Another difference is the material used for testing. While pictures were used in Carrow's study, objects were used in Layton's (Section 2.2.2.2).

As mentioned when the structure of Arabic was explained (Section 2.1.5), nouns in Arabic take three number inflections; plural, dual and singular. Omar's (1973) Arabic language comprehension test included two items testing for the comprehension of singular and plural nouns (Section 2.2.7.1). In the first item children were presented with two pictures, a picture of a group of boys and a picture of a single boy, and the child was asked to point to *boys* and to a *boy*. In this item two factors might have interfered: a guessing factor since two pictures only

were presented and a learning effect since the child will be asked twice about the same picture. In the other item that tested for the comprehension of singular and plural nouns in the same, the following command was said to the child, *give me the picture of the boy - boys*. All children passed these two items except child 1 (age 2;8 years) who failed both items and child 2 (age 3;0 years) who failed the second item only. This indicates that singular and plural nouns are comprehended around 3;0 years; however the limitations of Omar's study must be considered.

2.2.4.2 Singular and plural verbs

Fraser *et al.* (1963) tested singular/plural contrast in two situations: first, when it is marked by inflection and second, when it is marked by *is* and *are*. With regard to the first case, they tested children's comprehension of sentences such as *the boy draws* and *the boys draw* and for the second case they used sentences such as *the sheep is eating* and *the sheep are eating.* They found that both structures were difficult to comprehend for their subjects who ranged in age from 3;1 to 3;7 years. Fraser *et al.* did not report the scores achieved by every age group; but the reported results indicate that plural verbs marked by *is* and *are* were easier for their subjects to comprehend compared to plural verbs marked by inflections.

Another study that tested for the comprehension of singular/plural verbs is Carrow's (1968) study. She found that singular/plural marked by *is* and *are* is not understood until the age of 6;6 years when the plural was given as a stimulus; however, 4;0 year-olds understood the contrast when the singular was given as the stimulus *is/are*. As regards singular/plural marked by inflection, Carrow found that 3;0 year-olds comprehended sentences such as *the cat plays*; however, sentences such as *the boys jump* were not comprehended until the age of 5;0 years. Carrow's finding that plural verbs marked by *is/are* are more difficult for children to comprehend than plural verbs marked by inflections contradicts Fraser *et al.*'s result mentioned earlier.

Layton's (1976) study included a section that tested for the comprehension of singular/plural verbs marked by inflections by asking children to manipulate sentences such as *the girls sit* and *the girl sits*. Layton found that this structure was one of the most difficult structures for his subjects to comprehend when only 10 children (50%) of the oldest group's subjects (whose mean age was 4;6 years) were able to comprehend it (Section 2.2.2.2). Results of the previous two studies imply that comprehension of verbs inflected for number occurs late in English-speaking children's language development.

2.2.4.3 Modification

One adjective or more can be used to modify a noun such as *the car is red.* Comprehension of modification was tested by Carrow (1968) who presented sentences like *a big cat/a small cat* to 40 English-speaking children aged from 2;6 to 6;6 years. Children of all age groups were able to comprehend the tested sentences. Adjectives such as *big/small* which were used by Carrow and other studies to test comprehension of modification are called 'dimensional adjectives'. Dimensional adjectives include the words used to describe the opposite ends of an object's dimension, such as *big/little*, *tall/short*, *long/short*, *high/low*, *thick/thin*, *wide/narrow* and *deep/shallow*. James (1990) reported that the first pair of these dimensional adjectives learned by young children was *big/little*, which was comprehended between 2;0 and 3;0 years. This pair was followed by *long/short* and then *tall/short*.

Another form of modification that is used in language comprehension tests is when two adjectives are used to modify a noun phrase and they are called 'double adjectives', such as the sentence *the tall thin man.* The age at which English-speaking children first comprehend double adjectives was found by Carrow (1968) to be 4;6 years. Children in Carrow's study were asked to point to one of two pictures in response to sentences such as *a large blue ball.* Another study of children's comprehension of double adjectives is Ehri's (1976) study which tested 40 English-speaking children aged 4;0 to 8;0 years on their comprehension of 24

coordinated adjectives (double adjectives joined by a coordinator *and)*. The procedure used by Ehri was to ask children to select objects by giving two of their features (e.g. *select any objects that are long and soft*). She found that older children (aged 6;0 to 8;0 years) performed better and were able to identify 22.48 (93.6% of the sentences tested) of the coordinated adjectives tested, while the younger groups (aged 4;0 to 5;0 years) were able to identify 9.33 (38.9% of the sentences tested) coordinated adjectives only. She pointed out that children sometimes focus upon each of the double adjectives separately. There are slight differences between the previous two studies. The first is that materials used were pictures in Carrow's study, while they were objects in Ehri's study. The second difference is that a cordinator *and* was used between the two adjectives in Ehri's study, whereas the two adjectives were not joined by *and* in Carrow's study. The third and final difference between the two studies is that at the age of 4;6 years, Carrow found that at least 60% passed the coordinated adjectives structure, while in Ehri study children aged 6;0 to 8;0 have shown a comprehension for 94% of the coordinated adjectives tested.

2.2.4.4 Active and passive verbs

Bridges *et al.* (1981) indicated that tests of children's comprehension of syntax have largely been constructed on the basis of the comprehension of contrasts between grammatical constructions, such as that between active and passive sentences. As mentioned earlier in this thesis, active and passive sentences were also used to test children's use of comprehension strategies. Active and passive sentences are usually assessed by saying a sentence and requiring the child either to manipulate objects or point to pictures.

It is well known that in English grammatically complex sentences such as passive sentences develop later than active sentences. A child who is using the first noun as the agent cue will interpret an active sentence correctly, while he will make mistakes in interpreting passive sentences which violate the cue (see Section 2.2.1.5). Similarly, non-reversible sentences are

expected to be easier to comprehend compared to reversible sentences. To interpret a reversible sentence correctly, as explained by James (1990), the child must understand the syntactic relations in the sentence. That is, to understand a reversible active sentence in English, a child need to be aware that the first noun in the sentence (the subject) is the agent of the action and the second noun (the object) is the recipient of the action. When it comes to the reversible passive sentence, the situation is more complex. A child must have some knowledge of the syntactic rules, because in a passive sentence, the first noun (the subject) is not the agent but is the object of the action. Reasons for the superiority of active sentence scores compared to passive have been studied extensively in the literature. (See Precious & Conti-Ramsden, 1988, p. 239 for a discussion).

A third category of passive, in addition to the reversible and the non-reversible categories, is the agentless passive. This later category of passive is supposed to be more simple than the other two forms of passive. The reason for that, according to Hayhurst (1967), is the omission of the actor in that category of passive. Generally speaking, comprehension of the passive varies from verb to verb, states Lempert (1978). She found that comprehension of the passive occurs for certain verbs such as *push* or *bump* slightly earlier than other verbs such as *hit* or *follow*. This led her to conclude that comprehension of the passive is a gradual process beginning at about 3;0 years of age.

With regard to the age at which children master the comprehension of active and passive sentences relying on their syntactic knowledge, different researchers have found that English-speaking children use word order to interpret reversible active sentences when they were around 3;6 years old (Fraser *et al.*, 1963; Chapman & Miller, 1975). Earlier ages for the comprehension of active reversible sentences were reported by Strohner & Nelson (1974) who found that 3;0 year-olds got 80% of reversible active sentences correct (Section 2.2.5) and Carrow (1968) who found that 3;0 year-olds got at least 60% of reversible active

sentences correct. As regards studies which use children's MLU for grouping them, de Villiers & de Villiers (1973) and Roberts (1983) found that active sentences are mastered by children whose MLU is between 1.50-2.00 morphemes. For example de Villiers & de Villiers found that 75.5% of their late stage I subjects (MLU 1.50-2.00) (age range 1;7 to 2;0 years) were able to act out reversible active sentences correctly (Section 2.2.2.3).

As we have seen, the age at which children comprehend reversible passive alone (as a syntactic structure) occurs early in children's life around the age of 3;0 years (Lempert, 1978). However when other cues, such as the semantic or world knowledge cues, are put into competition with the syntactic cues, children are unlikely to comprehend reversible passives until a later age (around 5;0 years as found by Strohner & Nelson, 1974). The semantic factors that may add to the difficulty of the comprehension of passives are: using difficult verbs, as it was found that actional verbs such as *cut* are comprehended better than experiential verbs such as *believe* (Lempert, 1978 and Sudhalter & Braine, 1985); asking about less probable events such as *the elephant was chased by the mouse* (e.g. Strohner & Nelson, 1974) or having an animate patient being acted on (Chapman & Miller, 1975).

Beilin (1975, pp 30-36) reviewed Sinclair & Ferriero's (1970) study which investigated the comprehension, imitation and production of passive and active sentences in 174 French-speaking Genevan children aged 4;2 to 7;8 years. For comprehension, children were asked to act out reversible and non-reversible active and passive sentences using five French verbs which were to break, to spill, to wash, to push and to follow such as the boy spills the bottle. Passive sentences were of two types: full passive and agentless passive where the agent is deleted. For imitation, children were asked to repeat a sentence spoken by the examiner. For production, children were asked to describe an action performed by the examiner. Sinclair & Ferriero found that production was the most difficult task to perform of the three tasks tested, while results of comprehension and imitation were similar. While younger children's

comprehension was better than their imitation, older ones' imitation was better than their comprehension. As expected, reversible sentences were more difficult to comprehend than non-reversible sentences. Similarly, agentless passive was easier to comprehend than full passive.

In another study Hakuta (1977) studied the comprehension of active and passive sentences in Japanese-speaking children. Hakuta described Japanese as a language with a relatively free word order even though the basic order of elements in a simple sentence in Japanese is Subject-Verb-Object (hereafter SVO). The SOV as well as the OSV order apply to both active and passive sentences. Subjects of Hakuta's study were 48 Japanese-speaking children aged 2;3 to 6;2 years. Children in this study were required to act out 12 different reversible active and passive sentences such as the active sentence *tiger* (O) *giraffe* (S) *licked* and the passive sentence *tiger* (S) *giraffe* (O) *licked.* Results showed that it is not until age 5;1 years that children interpreted reversible passive sentences correctly, while an earlier age (3;9 years) was found for reversible active sentences.

The active form in Arabic is similar to that of English in that both the reversible and the non-reversible actives are present. The agentless passive is the only form of passive that is present in Arabic. Thus, one is interested to know whether Arabic-speaking children's performance on agentless passives sentences is similar to that of their English-speaking peers or not.

2.2.4.5 Prepositions

Studies of prepositions have revealed that the earliest prepositions understood by children are *in, on* and *under* (when used in a literal sense) which will be comprehended around 2;0 years. Prepositions like *behind, in front of* and *beside* are comprehended between 4;0 and 5;0 years (James, 1990). Clark (1973) required 70 English-speaking children aged 1;6 to 5;0 years to act out 24 instructions with eight instructions for each of the three prepositions *in, on* and *under*. Instructions containing the prepositions *in* were the easiest to perform and they were

performed correctly by 94% of the younger age group (mean age 1;9 year), whereas instructions containing the preposition *on* were performed correctly by 72% of the second group (mean age 2;3 years). The most difficult preposition of the three to perform was *under* which was performed correctly by 98% of the third age group (mean age 2;9 years). A similar finding was reported by Carrow (1968) who tested English-speaking children aged 2;6 to 6;6 years and found that the prepositions *in, on* and *under* were understood by all age groups including the youngest age group aged 2;6 to 3;0 years. Omar (1973) tested Arabic-speaking children's comprehension of 4 prepositions by asking her subjects to place the stone *beside, in* or *under* the cup and to give her the stone which is *on, under* or *beside* the cup (Section 2.2.7.1). Her results indicated that almost all children tested were able to carry out these commands correctly which was taken by Omar as evidence that these prepositions are comprehended before 3;0 years of age.

When assessing children's comprehension of prepositions, one must be aware that children may use their world knowledge in responding instead of their linguistic knowledge. Clark (1973) identified three stages which children go through in comprehending the meaning of prepositions *in, on* and *under*. The first stage is when children are 2;0 years and they rely on non-linguistic strategies to interpret the meaning of these three prepositions, so when children are asked to put something *in, on* or *under* another object, they will at first consistently put it *in* the object if it is a container. If it is not a container, then they will put it *on* the surface of the object. Thus, they will be always correct for the preposition *in.* The second stage is when children are 2;0 to 3;0 years, they show a partial comprehension of the locative words by responding to *in* and *on* most of the time, with *under* responded to correctly up to half of the time. The third stage when all locatives are linguistically interpreted correctly occurs after 3;0 years of age.

Carrow (1968) tested for the comprehension of three other prepositions which were *by, between* and *in front of.* The ages at which these three prepositions were comprehended by 60% of Carrow's study subjects were 3;0, 3;6 and 4;0 years respectively. The comprehension of other prepositions such as *behind* and *beside* was reported in the literature. Cox (1979) compared the comprehension of the prepositions *behind* and *in front of* and her results showed that *behind* was understood earlier than *in front of.* In a study of Spanish-speaking children, Conner & Chapman (1985) tested 40 children aged 3;6 to 5;5 years comprehension of the prepositions *in front of, behind, beside* and *under.* They found that children's performance was better for *under* then *in front of* and *behind* which were performed with equal accuracy, and performance on *beside* was the poorest.

In an extensive study, Kuczaj & Maratsos (1975) studied the comprehension of the locatives *front, back* and *side* by English-speaking children. Children tested were 45 who were divided into three groups of 15 each with the following age ranges: group I - 2;6 to 3;1 years, group II - 3;2 to 3;8 years and group III - 3;3 to 4;1 years. Children were required to perform five different tasks to show their comprehension of the locatives *front, back* and *side.* What is relevant to the current study is the fronted-objects task where children were given a small toy doll and were asked to put it *in front of, at the back of* and *on the side of* each of 8 small toys such as *a spoon* and *a truck.* Results showed that not until age group III were children able to perform the task with reasonable accuracy. The percentage of group III children who showed comprehension of *front* and *back* was 87% compared to 76% for the locative *side.*

2.2.4.6 Negations

Gaer (1969) tested the abilities of 96 English-speaking children aged 3;0 to 6;0 to comprehend four grammatical structures varying in two grammatical dimensions: complexity and transformational type. The structures were active, negative, passive and questions, and they were tested by asking children to point to the correct picture out of two pictures

presented, a target and a distracter. Gaer found that children achieved the following percentage of correct responses in the structures tested: active was passed by 79% of 4;0 year-olds, question was passed by 73% of 4;0 year-olds, passive was passed by 69% of 5;0 year-olds and negative was passed by 50% only of 6;0 year-olds. This result indicates that the negative was the poorest of the four structures to be comprehended. Gaer attributed his subjects' poor performance on negatives to a plausibility problem by which the child may be confused on sentences tested such as *the boy is not throwing the cow down the hill* whether to answer *yes he is not throwing it* or *no he is not throwing it*. Wason (1965) suggested that negations will be understood better if they are less plausible. Affirmative/negative contrast is one of the structures tested in Fraser *et al.*'s (1963) study (Section 2.2.2.2). Children in this study were asked to point to one of two pictures, a target and a distracter, in response to sentences like *the girl is cooking/the girl is not cooking*. Affirmative/negative contrast was the easiest to comprehend among the other contrasts tested when 17 out of the 24 sentences presented were comprehended correctly by the study subjects. Affirmative/negative contrast was also tested by Carrow (1968) using sentences such as *the boy is carrying/the boy is not carrying* represented in pictures. This contrast was comprehended by all age groups in Carrow's study including the youngest age group (aged 2;6 to 3;0 years).

The previous studies test for affirmative/negative contrast when verbs are negated. A study that tested this contrast when adjectives are negated is Layton's (1976) study which used an object-manipulation task to test 100 English-speaking children aged 2;4 to 4;8 years for their comprehension of this contrast. The procedure he used was to place two objects in front of the child, for example a broken cup and an unbroken cup, then he said to the child "Here is a cup that is broken and here is a cup that is not broken" without pointing to the appropriate object. The child was then asked to point to the cup that was not broken and the cup that was broken. Results showed that 68% of the children with a mean age of 2;6 years comprehended this contrast correctly. Children's performance improved as the group's mean age increases

which can be shown by the performance of the group with a mean age of 4;0 years where 94% of the children tested were able to act out this contrast correctly.

As regards Arabic language, affirmative/negative contrast was found by Omar (1973) to be comprehended by almost all her subjects except child 2 (age 3;0 years) which means that this contrast is comprehended around the age of 3;0 years in Arabic-speaking children. The two items used for testing this contrast were pointing tasks; in the first the child was asked to point to the picture of the child who *is sitting/is not sitting*, whereas in the second item the child was asked to point to the picture of the girl who *is/is not drawing water* (Section 2.2.7.1).

2.2.4.7 Comparatives & Superlatives

Comparatives *tall/taller* were found by Carrow to be comprehended by 60% of her 5;0 years-old subjects. A study was carried out by Layton & Stick (1979) to investigate the comprehension of comparatives and superlatives in English. This study addressed the following question: at what age level are comparatives first comprehended? In their study, they tested the ability of 100 English-speaking children ranging in age between 1;8 and 4;6 to manipulate objects in response to sentences presented by the examiner. They used OMTLC test (developed by Layton, 1976, see Section 2.2.2.2) which includes a section testing comparatives and superlatives. The following table indicates their subject s' results on comparative comprehension tasks:

Table 2.10 The percentage of correct responses for comparative/superlative comprehension task by age (Layton & Stick, 1979).

	Age				
Task	**2;6**	**3;0**	**3;6**	**4;0**	**4;6**
Comparative	68%	74%	84%	84%	92%
Superlative	60%	74%	75%	83%	97%

Arabic-speaking children were found by Omar (1973) to comprehend the comparative form late in their childhood (around 5;0 years). The item used for testing this structure was to ask

children to point to the picture representing the sentence *the girl is smaller than the boy.* Omar attributed her subjects' poor performance in this structure to using the adjective *smaller* instead of *larger* for comparison.

2.2.4.8 Commands

The comprehension of different command structures ranging from simple to complex commands was assessed by Carrow (1968). her results indicated that English-speaking children as young as 2;6 years, which was the youngest group in the study, were able to understand simple commands such as *stand up* as well as more complex ones such as *bring me the car that is on the chair.* When she used sentences with two commands such as the sentence *put the car under the table and bring me the book*, younger children were not able to carry them out; although 4;6 year-olds were able to carry out sentences containing two commands correctly.

Another early study of English-speaking children's comprehension of commands is the study conducted by Shipley *et al.* (1969). They used six toys to test 11 children's comprehension of commands differing in structural format and semantic content. Their subjects ranged in age from 1;6 to 2;9 years and a sample of every child's natural speech was used to rank children according to their verbal maturity into two groups. The first group was composed of 7 subjects whose median utterance length ranged from 1.4 to 1.85 words, and the second group was composed of 4 children whose median utterance length ranged from 1.06 to 1.16 words. One of this result's findings was that children responded best to verbal commands that were slightly above their production level. Their main finding was that children in the first group comprehended commands better when they were presented in well formed commands (adult form) such as *throw me the ball*, whereas children in the second group comprehended one or two-word commands better (child form) such as *throw ball.* Tweney & Petretic (1981) questioned Shipley *et al.*'s findings and

argued that children at the one- and two-word stages comprehend commands better when they were in the adult form.

2.2.4.9 Possessives

Brown (1973) states that children using two-word utterances understood the possessor-possession relationship. In a study of the acquisition of possessives' comprehension, Golinkoff & Markessini (1980) examined comprehension of possessives for 30 English-speaking children ranging in age from 1;7 to 5;5 years. A sample of every child's speech was used to group children according to their MLU (see Section 2.2.2.2 for the relationship between MLU and language development) into five groups of 6 each and the mean MLUs for the five groups were: 1.28, 1.69, 2.57, 3.44 and 4+ morphemes respectively. They used two-noun possessive phrases to test three types of possessives which were: 1) alienable possessives (where possessive words can be easily removed from the owner, e.g., *boy's book*); 2) intrinsic possessives (where possessive words are obligatory possessed by the owner, e.g., *boy's leg*) and 3) reciprocal such as *boy's daddy*. They indicated that for English-speaking children to comprehend alienable and intrinsic possessives, they need only semantic and cognitive knowledge; however, reciprocal possessives require syntactic knowledge as well as semantic and cognitive knowledge. The reason they gave for alienable and intrinsic possessives not requiring syntactic knowledge is that children using their semantic and cognitive knowledge know that it is most likely for inanimate objects to be possessed by people rather than the opposite. The case is different with reciprocal possessives because they require attention to word order since both nouns have the same probability of being possessed by the other noun. Results indicated first, that even younger children may have detailed notions of which objects are likely to serve as possessors and which as possession and second, that word order may not be used to comprehend possessive phrases until considerable linguistic development has occurred. This study showed that by a strict 75% criterion, all but three of the youngest children with the lowest MLU (1.28 morphemes)

apparently understood the basic concept of possession. The performance of children was relatively similar for intrinsic and alienable possessives, with intrinsic ones being slightly better comprehended, and reciprocal ones being the most difficult of the three to comprehend. Results showed that children whose MLU was 2.75 morphemes were able to get 96% of the intrinsic possessives correct and to get 80% of the alienable possessives correct. As regards reciprocal possessives, children were not able to get a satisfactory result until their MLU was 4+ morphemes when they were able to get 88% of them correct.

One of the structures tested in Layton's (1976) study is the possessives. Layton presented four objects before the child representing the following family member: daddy, mummy, a baby and a girl. After objects were identified to the child, a brief demonstration was presented and then the following command was given to the child: "The daddy belongs to the boy, show me the boy's daddy" (p. 193). Results showed that 76% of the children tested in the 3;0 years age group acted out possessive commands correctly, whereas 89% of 4;0 year-olds comprehended this structure (Section 2.2.2.2).

2.2.4.10 Personal pronouns

Chiat (1986) reviewed several studies of the acquisition of personal pronouns both in comprehension and production. She summarised the findings by stating that personal pronouns do not seem to emerge in a clear-cut acquisition order. However, based on the studies reviewed, she gave a rough order of acquisition by which 1st person singular appears (e.g. *I*), then inanimate 3rd person (e.g. *it*), followed by 2nd person pronouns (e.g. *you*). As regards the other pronouns, Chiat stated that their order of acquisition is unpredictable. Comprehension acquisition of the pronouns *my, your* and *her* was examined by Charney (1980) who tested 21 English-speaking children aged 1;6 to 2;6 years for their comprehension of these three pronouns. Children's comprehension of the tested pronoun was assessed when the child was the addressee and when he was the non-addressed listener. The procedure they used is that they had three framed coloured photographs (6 by 9 cm.) of

the child, the mother and the examiner. The examiner laid a cloth over the three pictures and showed the child a doll cut out and then slid it under the cloth onto the back of one of the photographs. The examiner then said, "X, it's under my picture" (looking at the child if he was the addressee or looking at the other adult if the child was the non-addressed listener). Then the child's response determines whether he has comprehended the pronoun or not. If the child did not respond, the examiner said "Go and get it" to encourage the child to respond. The main finding of this study was that the order of acquisition of the 1st and 2nd person pronouns differed according to the child's speech role. In each role, the child initially learned the noun which referred to himself. Another finding was that 1st person pronouns were understood when the child was the addressee before they were understood when the child was not the addressee.

The following table summarises the studies reviewed in this section and will provide basis for comparison with data presented in the present study.

Table 2.11 A summary of the studies mentioned in Section 2.2 including a summary of the results where C=correct responses.

Author	Date	Subjects			Language	Task required	Structure(s) tested	Age of mastery
		No.	Age	MLU				
Fraser *et al.*	1963	12	3;1-3;7		English	Picture-pointing	Affirmative/negative contrast Singular/plural contrast Subject/object contrast	71% C.
Carrow	1968	40	2;6-6;6		English	Picture-pointing	Singular/Plural nouns contrast *(ball/balls)* Plural/Singular nouns contrast *(balls/ball)* Singular/Plural verbs marked *is/are* Plural/Singular verbs marked by *are/is* Singular/Plural verbs marked by inflection *(the cat plays)* Plural/Singular verbs marked by inflection *(the cats play)* Modification *(a big cat)* Coordinated adjectives *(a large blue ball)* Reversible active sentences Reversible passive sentence Prepositions *in, on* and *under* Prepositions *by* and *between* Preposition *in front of* Affirmative/Negative contrast *(the boy is not carrying)* Comparative *(tall/taller)* Simple commands *(stand up)* Complex commands *(bring me the car that is on the chair)* Two commands in the same sentence	4;0 5;0 4;0 6;6 3;0 5;0 2;6 4;6 3;0 6;0 2;6-3;0 3;6 4;0 2;6 5;0 2;6 2;6 4;6
Gaer	1969	96	3;0-6;0		English	Picture-pointing	Active Questions Passive Negative	4;0 (79% C.) 4;0 (73% C.) 5;0 (69% C.) 6;0 (50% C.)
Shipley *et al.*	1969	4 7	1;6-2;9	1.06-1.16 1.4-1.85	English	Responding to commands	Comprehension of commands	See Section 2.2.4.8

Table 2.11 cont.

Author	Date	Subjects No.	Age	MLU	Language	Task required	Structure(s) tested	Age of mastery
Sinclair & Ferriero	1970	174	4;2-7;8		French	Acting-out	Non-reversible active Reversible active Full passive Agentless passive	
de Villiers & de Villiers	1973	7 3 7 7 4 5	1;7-3;2	1.00-1.50 1.50-2.00 2.00-2.50 2.50-3.00 3.00-3.50 3.50-4.25	English	Acting-out	Reversible active Reversible passive	MLU 1.50-2.00 (75% C.) MLU 3.50-4.25 (39% C.)
Clark, E.	1973	70	1;6-5;0		English	Acting-out	Preposition *in* Preposition *on* Preposition *under*	1;9 (94% C.) 2;3 (72% C.) 2;9 (98% C.)
Strohner & Nelson	1974	15 15 15	3;1-3;7 4;1-4;6 5;0-5;6		English	Acting-out	Reversible active sentences Reversible passive sentences	3;0 (80% C.) 5;0 (83% C.)
Kuczaj & Maratsos	1975	15 15 15	2;6-3;1 3;2-3;8 3;3-4;1		English	Acting-out	Preposition *front* Preposition *back* Preposition *side*	3;3-4;1 (87% C.) 3;3-4;1 (87% C.) 3;3-4;1 (76% C.)
Layton	1976	10 10 10 10 10	2;4-2;10 2;10-3;4 3;4-3;10 3;10-4;4 4;4-4;8	1.75 2.25 2.75 3.50 4.00	English	Acting-out	Actives *(make the cat kick the dog)* Comparatives *(show me the car that is bigger than this truck)* Negated adjectives *(show me the cup is not broken)* Singular/Plural nouns contrast *(give me the balls)* Reflexives *(make the mummy feed her (a girl))* Superlative *(show me the largest horse)* Possessives *(show me the boy's daddy)* Passives *(make the cat be kicked by the dog)* Verb inflections *(show me the girls sit)*	2;6 (68% C.) 2;6 (68% C.) 2;6 (68% C.) 2;6 (65% C.) 2;6 (63% C.) 2;6 (60% C.) 3;0 (76% C.) 4;6 (73% C.) 4;6 (50% C.)

Table 2.11 cont.

Author	Date	Subjects No.	Age	MLU	Language	Task required	Structure(s) tested	Age of mastery
Ehri	1976	40	4;0-8;0		English	Objects selection	Coordinated adjectives (*select any objects that are long and soft*)	6;0-8;0 (94% C.)
Hakuta	1977	48	2;3-6;2		Japanese	Acting-out	Reversible active Reversible passive	3;9 5;1
Lempert	1978	40	3;4-5;3		English	Acting-out	Reversible passive *(using the verbs chase or bump)* Reversible passive (*using the verb push)* Reversible passive *(using the verb hit)*	3;0 (70% passed) 3;0 (60% passed) 4;6 (60% passed)
Cox	1979	45 57 44 51	2;2-3;7 4;0-4;9 5;1-6;5 7;2-8;10		English	Acting-out	Preposition *behind* Preposition *in front of*	4;0 (65% C.) 6;6 (65% C.)
Layton & Stick	1979	100	1;8-4;6		English	Acting-out	Comparative and superlative	3;0 (74% C.)
Golinkoff & Markessini	1980	6 6 6 6 6	1;7-5;5	1.00-1.54 1.58-1.92 2.48-2.75 3.06-4.50 4+	English	Picture-pointing	Intrinsic possessives (*boy's leg)* Alienable possessive (*boy's book)* Reciprocal possessives (*boy's daddy)*	2.75 MLU (96% C.) 2.75 MLU (80% C.) 4+ MLU (88% C.)
Charney	1980	21	1;6-2;6		English	Responding to commands	Comprehension of the pronouns *my, your* and *her*	See Section 2.2.4.10
Conner & Chapman	1985	40	3;6-5;5		Spanish	Acting-out	Preposition *under* Preposition *beside* Preposition *in front of* Preposition *behind*	(1) *under* (2) *in front of* & *behind* (3) *beside*

2.2.5 Comprehension strategies

Chapman (1978) was the first who used the term 'comprehension strategies' to refer to cues used by children to understand sentences. Van der Lely & Dewart (1986, p. 292) defined comprehension strategies as "a short-cut or heuristic for arriving at the meaning of a sentence without bringing into play all the information in the sentence". In natural language situations, a child usually uses both his linguistic knowledge and comprehension strategies to arrive at understanding and only rarely will rely on linguistic knowledge alone to reach a full understanding of what has been spoken Chapman & Miller (1975).

Children use comprehension strategies, according to James (1990), when they have partial rather than full linguistic knowledge of a verbal stimulus. However, she also suggested that the child may use comprehension strategies even if other cues to meaning are available to him. Most speech addressed to a child is associated with the here and now (Snow, 1972) which might increase the possibility that a child will use the available cues to interpret a linguistic stimulus (Owens, 1996).

Chapman & Kohn (1978) argue that the child's use of comprehension strategies depends on the extra-syntactic cues that are set into competition with linguistic knowledge. In other words, a child will use comprehension strategies if the extra-syntactic cues present are so strong that they eliminate the role of linguistic knowledge. Therefore, unless in a testing situation, a child's use of comprehension strategies is difficult to detect because in natural language situations children's use of comprehension strategies cannot be easily determined. Chapman & Miller (1975) mentioned some of these extra-syntactic cues such as noun-verb-noun sequences, order of mention in sentences, probable semantic relationships among the words and information from the immediate non-linguistic context.

Children's use of comprehension strategies starts early in their lives. The age at which English-speaking children start to use comprehension strategies was found by Chapman & Miller (1975) to be 1;8 year when they reported that children as young as 1;8 to 2;8 years-old use an animate agent strategy in determining sentence actor (Section 2.2.2.2). Children stop using comprehension strategies gradually as they attain mastery of the syntax of structures tested, as found by Chapman (1978) and Bridges (1984).

Active and passive sentences have been used extensively in the literature to discover strategies used by children to interpret them. Children who are using a comprehension strategy to interpret active and passive sentences will use one of the following three strategies: 1) an 'actor-action-object strategy', 2) an 'animate agent strategy', or 3) an 'event probability strategy'. By using an actor-action-object strategy the child assigns the role of the agent to the first noun and the role of the object to the second noun. Braine & Wells (1978) reported that children as old as 4;0 to 5;0 years apply an actor-action-object strategy on sentences they hear. This strategy is replaced by the process of differentiating active from passive sentences on the basis of syntactic structures as found by Strohner & Nelson (1974) at the age of 5;0 years. (This study is presented later in this section).

In a cross-linguistic study, Slobin & Bever (1982) explored the presence of word order and inflectional comprehension strategies for comprehending simple transitive sentences in children aged 2;0 to 4;4 years in four languages: English, Italian, Serbo-Croatian and Turkish. Each of these four languages treats word order and inflections differently, as they explained. Serbo-Croatian and Turkish are inflectional languages that allow all six word orders of Subject, Verb and Object which are (SVO, OVS, SOV, OSV, VSO, VOS). The difference between these two languages is that in Turkish inflections are always regular and explicit, while inflections are sometimes irregular in Serbo-Croatian. As regards the other two languages, which are English and Italian, they are non-inflectional which means that

they do not allow all forms of word order. However, Italian allows more flexible word order compared to English. Slobin & Bever indicated that they selected these four languages because they vary in regard to the use of word order and inflections to signal agent-patient relations. Unlike children speaking the other three languages, Turkish-speaking children did not show a subject first or agent first comprehension strategy in treating reversible sentences. The only age at which all four languages showed evidence for the actor-action-object strategy was the group whose average age was 3;6 years. Results of this study implies that the types of comprehension strategies used by children to interpret sentences depend on the structure of their native language. Therefore it is expected that Arabic-speaking children will use strategies that are appropriate and specific to the structure of Arabic language.

The second strategy used to interpret active and passive sentences is the animate agent strategy. Chapman & Miller (1975) found that English-speaking children from 1;8 to 2;8 years use an animate agent strategy in determining sentence actor. In another study, Chapman & Kohn (1978) found no evidence of this strategy in children aged 2;0 to 3;8 years, instead they found that these children use a probable event strategy which led them often to choose animate actors. By using a probable event strategy, a child will rely on his knowledge about the usual relations between particular objects to guide his interpretation of sentences and still not use his knowledge of the syntactic structure of the sentences he hears. In their study, Strohner & Nelson (1974), tested 45 children aged 3;1 to 5;6 years and found evidence that the child may use two strategies interchangeably. They reported that 2;0 and 3;0 year-olds show an actor-action-object strategy in acting-out reversible active sentences, but switch to a most probable event interpretation if the sentence permits. Their results indicated that after 5;0 years of age, English-speaking children act out probable and improbable active sentences with equal and accurate facility. This study is criticised for using sentences describing improbable events which conflict children's semantic

knowledge such as *the elephant was chased by the mouse*. (See Section 2.2.5 for a criticism of this study).

As regards children with language impairments, several studies have shown that they use comprehension strategies in interpreting sentences (Bridges & Smith, 1984; Van der Lely & Dewart, 1986; Precious & Conti-Ramsden, 1988). Van der Lely & Dewart, for example, tested children with specific language impairment (hereafter SLI) for their comprehension of active and passive sentences and found that they relied more heavily on semantic cues than the language-matched controls.

The previous studies found evidence for the use of comprehension strategies by children speaking different languages such as English, Italian and Turkish. Some of these languages have relatively restricted word order (such as English) and some others accept all possibilities of word order (such as Turkish). Another finding of the previous studies is that children's reliance on comprehension strategies decrease as they get older. As regards the current research, it is expected that Saudi children will rely on comprehension strategies that are specific to Arabic language. It is also expected that the use of comprehension strategies is expected to be more evident in younger children compared to older ones. expectation regarding the current research is that comprehension strategies younger children. Arabic has a flexible word order, although not as flexible as Turkish (SVO, VSO, OVS) because the verb could not come at the end of the sentence, as is the case in Turkish. Arabic-speaking children are expected to use strategies that are governed by inflections, similar to comprehension strategies used by children speaking morphological languages such as Turkish, Russian or Hebrew.

2.2.6 Language comprehension in children with language disorders

The reason for having a section that presents the development of language comprehension in children with language disorders - although all subjects of this particular research are children with normal language development - is because the outcome of this research will be modified to construct a clinical language comprehension test for Saudi children with language disorders. Consequently, it is important to know whether children with language disorders follow normal children's pattern of comprehension development with delay or their comprehension development follows different patterns if compared to the development of comprehension in normal children. The clinical language comprehension test is going to be carried out on children with SLI. The clinical test will also be carried out on children in whom the language problem is secondary to other conditions, such as intellectual impairment and autism. However, language development in SLI children was chosen for review because they are the group who may depart from a simple pattern of delay. The review will examine whether and how SLI children may demonstrate development that differs from normal children.

Children with developmental language disorders according to Browns & Edwards (1989) are "those children who are unable to communicate effectively through language or to use language as a basis for further learning" (p. 1). Brown & Edwards added that the term 'developmental language disorders' is a descriptive term that covers a range of conditions and impairments varying in their type and severity where the impairment can be primary or secondary consequence of another disability. More specifically, Bishop (1979) presented three viewpoints regarding the language comprehension of children with 'specific developmental language disorders'. The first is the traditional view which considers that there are at least two separate types of specific developmental language disorders- predominantly expressive or receptive. The second is the approach that regards developmental language disorders as being very diverse in individuals ranging from mild

and isolated articulatory problems through to severe receptive disorders wherein expressive language is also deviant. The third view is Eisenson (1968) and Tallal's (1975) view: they argue that the abnormal expressive speech found in developmental language disorders is the result of impaired comprehension.

Specific language impairment in children is used, according to Van der Lely & Harris (1990), to describe "children characterised by severe problems of language comprehension and/or production in the absence of any hearing loss, mental retardation or emotional disorder" (p. 101). A set of criteria of specific language impairment has been proposed by Stark & Tallal (1981, pp. 115-117). According to Stark & Tallal, a child can be said to have a SLI if he represents the following: normal hearing as measured by pure tone audiometry; no behaviour or special problems of adjustment at home or in school; an IQ of more than 85; no history of neurological deficit or lesion; no persisting speech articulation impairment; a reading age that is not more than 6 months lower than his language age (for school age children); a receptive language age that is at least 6 months lower than chronological age and an expressive language age that is at least 12 months lower than chronological age.

Bishop (1979) presented three view-points regarding the language comprehension of children with SLI. The first is the traditional view which considers that there are at least two separate types of developmental language disorders - predominantly expressive or receptive. The second is the approach that regards developmental language disorders as being very diverse in individuals ranging from mild and isolated articulatory problems through to severe receptive disorders wherein expressive language is also impaired. The third view is Eisenson (1968) and Tallal's (1975) who argue that the abnormal expressive speech found in developmental language disorders is the result of impaired comprehension.

Studies of children with language impairment have provided evidence of deficits in their comprehension of sentences (Van der Lely, 1993). In a large study of children attending a residential school in the UK which took those with more severe forms of SLI, Bishop (1979) tested the language comprehension of 51 boys and 22 girls with developmental language-disorders aged 6;3 to 13;1 years. At this school, children were classified as having either receptive or expressive language impairment and the rules of admission to the school dictate that their severe language impairment is not attributed to deafness, mental handicap or emotional disturbances. She also tested 281 control subjects aged 3;9 to 13;2 years. She found failures in language comprehension both in children with expressive language disorders and those with impaired language comprehension. Results showed that 54% of the subjects with language disorders scored below the 10th percentile for their age on the PPVT (Dunn, 1965) Results showed also that 61% of those with language-disorders scored below the 10th percentile for their age on the TROG (Bishop, 1977). It is worth mentioning here that the TROG was initially constructed to be used in this particular research and the first edition of TROG (1977) was used in this research. Children with language disorders had a particular difficulty with reversible passive sentences as shown by her results. Bishop's main conclusion was that expressive language abnormalities are directly related to receptive language difficulties. However, she found that the types of errors in the two groups were different. The use of the word 'error' in the current research is based on the distinction made by Crystal *et al.* (1989) between natural error and deviance. A natural error, according to Crystal *et al.*, is a predictable part of normal language development. Those classified as having a receptive language impairment in Bishop's study had more grammatical errors, while those classified as having expressive language disorders had errors that were similar to younger normals. When testing language comprehension, error types can by analysed by controlling distracters used. When testing for the comprehension of the plurals by asking the child to point to a picture of *cats*, for example the grammatical distracter would be a picture of *a cat*, while the lexical distracter could be a picture of *dogs*.

Error analysis helps as well in identifying comprehension strategies employed by children by analysing the type of distracters selected. Adams (1990) tested three groups of English-speaking children: a group of 5 boys and 2 girls aged 4;1 to 6;2 years with expressive language impairment; a group of 4 boys and 3 girls aged 4;7 to 5;10 years with developmental dyspraxia, and a control group of 4 boys and 3 girls aged 4;6 to 5;8 years matched to the previous two groups in chronological age. Adams designed a syntactic comprehension task to be used in this study to test the study subjects' syntactic comprehension. The test she used was composed of five sub-tests which are: 5 reversible active sentences, 6 embedded clauses, 6 double object constructions, 5 embedded phrases and 6 reversible passives. The study was designed in such a way to detect comprehension strategies used by children to comprehend sentences instead of using their linguistic knowledge. The main finding of the study was that children with apparently isolated impairments of expressive syntax have subtle deficits of comprehension in comparison to age-matched controls. This result confirmed the finding of researchers such as Bishop (1979) that even children who are classified as having expressive language impairment have a comprehension impairment to some degree. Another finding, particularly relevant to the use of comprehension strategies, was that children with language impairment interpreted embedded sentences using a word-order strategy when the syntactic frame cannot be utilised. This finding confirmed what has been found by other studies (for example Van der Lely & Dewart, 1986; Precious & Conti-Ramsden, 1988) that children with language impairment use comprehension strategies similar to those employed by normal children.

The fact that children with language disorders have problems with word order (represented by reversible passives in Bishop's study) was supported by later studies. Van der Lely & Dewart (1986) investigated language comprehension in three groups of English-speaking children: a group of 11 SLI children aged 4;6 to 5;11 years, a group of 11 controls aged 4;0

to 6;0 years matched to the SLI in their chronological age and a group of 11 controls matched to the SLI on language ability as measured on the verbal comprehension scale of the Reynell Developmental Language Scale (hereafter RDLS, Reynell, 1977, cited in Van der Lely & Dewart, 1986) and the British Picture Vocabulary Scale (hereafter, BPVS, Dunn *et al.* 1982). The SLI children were selected on the basis of the following strict criteria: they were to be identified by speech-language therapists as having severe difficulties with language comprehension; had to have a score of at least -1.5 standard deviation below the mean on the comprehension scale of the RDLS; had to fall into the chronological age range of 4;0 to 6;0 years as well as show evidence of normal non-verbal cognitive development, hearing, neurological development and emotional and social behaviour and development. The aim of this study was to investigate syntactic comprehension and the use of comprehension strategies by asking children to act out 24 active and passive sentences varying in their semantic bias. The three semantic bias levels used were: unbiased such as *the lorry hits the car*; positive bias such as *the dog wears the hat*, and negative bias such as *the hat wears the dog*. Results showed that SLI children primarily based their interpretation on semantic expectations or the sequence of content words and relied little on syntactic information. The other finding was that SLI children used a probable-event strategy more than the language-matched controls.

A study by Van der Lely & Harris (1990) compared the syntactic and semantic comprehension in three English-speaking children's groups; 1) 14 SLI aged 4;10 to 7;10 years, 2) 14 age-matched controls and 3) 14 language-matched controls as measured by two language tests, the BPVS (Dunn *et al.*, 1982) and Grammatical Closure sub-test from the ITPA (Kirk *et al.* 1968). The following criteria were used to include the 14 SLI children: they were to be identified by speech-language therapists as having severe difficulties with language comprehension and were to satisfy the set of criteria proposed by Stark and Tallal (1981). The children were asked to act out 36 semantically reversible sentences in the first

experiment. Sentences presented were varied in two aspects: thematic content (transitives such as *the boy pushes the girl*, locatives such as *the cup is in the box* and datives such as *give the boy to the girl*) and in the order of thematic roles (canonical such as *the boy pushes the girl* as opposed to non-canonical such as *the girl is pushed by the boy*). They found in this experiment that SLI children performed less well than both control groups. The SLI children's performance was significantly worse than the language-matched controls in three-sentence types, the canonical and the non-canonical transitives and the canonical datives, while both groups' performance was poor for the rest of the sentence types. Sentences used in Experiment I were used again in Experiment II but using a picture-pointing task. In Experiment II, 16 SLI children (13 children from experiment I in addition to 3 children who met selection criteria) were compared to their language-matched controls. Results of this experiment were similar to those of Experiment I. Error types analyses revealed that the SLI children had a very high proportion of word order errors, 75% to 100%, compared to 50% to 75% word errors made by language-matched controls. This led the authors to conclude that SLI children were weaker in their syntactic comprehension rather than in their semantic comprehension. This study shows that although SLI children were matched to normals by language measure; they showed greater and different language comprehension problems compared to the language-matched controls. This supports the claim that SLI children have deviant rather than delayed language development compared to normal children.

In a study that investigated English-speaking children with language disorders other than SLI children, Bridges & Smith (1984) compared the performance of 24 children with Down's syndrome aged 4;4 to 17;1 years to the performance of 24 controls aged 1;11 to 4;4 years who were matched to the Down's syndrome children in their verbal comprehension ages which ranged from 2;5 to 5;2 years as assessed by the RDLS (Reynell, 1969, cited in Bridges & Smith, 1984). It is well known that subjects with Down's syndrome suffer from cognitive limitations and usually have an upper limit mental age of 4;0 to 5;0 years

(Rondal, 1993) and they may have severe learning difficulties (Lees & Urwin, 1991). The major finding of Bridges & Smith's study was that the course of language comprehension development of children with Down's syndrome was approximately equivalent to the normal sequence. With regard to the strategies used by the Down's syndrome children to interpret sentences, they found that the influence of event probability was not great and did not differ for the two groups of children. This supports the claim that children with language problems secondary to other conditions show delay but not deviance from normally developed children.

2.2.7 The acquisition of Arabic as a first language

Most studies of language comprehension published in English/American literature tend to be about the acquisition of English. These have been the basis of tests of language comprehension for English-speaking children. With regard to Arabic language, there are few studies available about the acquisition of Arabic as a first language such as Omar (1973), Smadi (1979), Abdu & Abdu (1986) and Karam-Eldin (1989). Almost all these studies discuss the acquisition of expressive language only and the only exception is Omar's (1973) study which implemented a simple language comprehension test. None of the results of these studies have been used to construct a language production or comprehension test for children.

2.2.7.1 Omar's (1973) study

Margaret Omar (1973) was the first to investigate the acquisition of Arabic as a native language when she studied the language acquisition of the Egyptian Arabic spoken in a village in Egypt by the use of the case study technique. She studied the stages and rate of development of the phonological system in addition to some syntactic structures such as the negative and interrogative transformations, the plural of nouns and the gender and plural of adjectives. She implemented five testing procedures: one for the comprehension of some

vocabulary items and morpho-syntactic structures and the other four tested the expressive language acquisition of negation, interrogation, plurals and adjectives. Her subjects were 37 children aged 0;6 to 15;0 years. The following table gives details of Omar's subjects who were included in the comprehension test.

Table 2.12 The age and gender of Omar's comprehension test subjects.

Subject	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Age	2;8	3;0	3;6	3;6	4;0	4;0	4;6	5;0	5;0	5;6	6;0	6;0	6;0	6;6	6;6	7;0
Gender	F	F	M	F	M	F	F	M	M	F	M	F	M	F	M	M

Omar developed a comprehension test with which she tested 16 children's comprehension of 20 vocabulary items (9 nouns and 11 adjectives) and 17 morpho-syntactic structures. She used two procedures, a picture-pointing and an acting-out task. Only four items (Items 9, 10, 11 and 12) were tested by the use of an acting-out task, while the rest of the items (Items 1-8 and 13-25) were tested by the use of a picture-pointing task. In the picture-pointing task, almost all items were tested by the use of two pictures: the target and a distracter. The only exceptions were Items 7 which had 3 distracters and Item 8 which had 2 distracters.

The third section of Omar's comprehension test, Items 13-25, investigated minimal grammatical contrasts by the use of two pictures: a target and a distracter, where two sentences were used to test every item. Omar admitted that the validity of some of this section's items is in question since many children failed them because the desired grammatical contrast could not be illustrated clearly. A copy of the pictures used for testing is not included in Omar's book for us to judge the representativeness of these pictures to the grammatical contrasts they are testing.

After reviewing children's achievements in the comprehension test, Omar noticed that some children's failures were due to reasons other than the lack of linguistic knowledge. She attributed her subjects' poor performance to the inadequacy of the illustrations and the fact

that her subjects were not used to pictures. The children's performance on Items 6 and 7 which tested for the comprehension of colours was poor for younger children and adequate for older ones, so Omar concluded that basic colours are not mastered until about age 6;0 years. This poor performance might be attributed to the insufficient exposure of her subjects to colours since they were living in an Egyptian village and the study took place in 1968.

Omar's study results can be summarised in the following points:

1. Prepositions were tested through an acting-out task and almost all children passed them. Having this result, Omar suggested that prepositions are acquired very early, probably before 3;0 years of age.
2. Omar compared children's performance on Item 10 (*the red car pushes the green car*) to their performance on Items 6 (*black - yellow cats*) and 7 (*green - yellow - red and blue flowers*), claiming that these three items (Items 10, 6 and 7) are testing for the comprehension of colours. Evidently, Items 6 and 7 tested for colours; but Item 10 is testing for the comprehension of reversible active structure and the colour is not the main target tested by that item. Although Item 10 was much more complex than Items 6 and 7, the number of children who passed it was more than the number of children who passed Items 6 and 7. Again this might be attributed to the children's unfamiliarity with pictorial representation.
3. Singular/plural forms were tested by two items and only two children were considered by Omar not to know the distinction between singular and plural for lack of linguistic knowledge. Comprehension of the dual aspect was not tested, although it was analysed later in the children's expressive language.
4. Animate and inanimate nouns were tested through the use of pronouns. The response required from the child was an expressive one and only two children whose failure was considered by Omar to be due to a lack of the distinction of the item. Omar presumed that this distinction (animate - inanimate) is not late in being acquired.

5. Present and future tenses of the verb were passed by almost all children except two who lacked the knowledge of this item. Present progressive and past tenses of the verb which were included in the test were considered invalid by Omar as so many children failed them. This was possibly due to the difficulty in representing the contrast pictorially.
6. Affirmative and negative forms of the verb were passed by all but one child. This was taken by Omar as evidence that this contrast develops early in the child's life.
7. Active and passive voice of the verb was failed by one child only which indicates that this contrast too develops early in the child's life.
8. A neutral subject (someone) was used to test the children's comprehension of the gender of a verb. The child has to determine the subject of the action by the verb cue only. Through her study's responses, Omar concluded that this form may not be acquired until about 5;0 years of age.
9. The comprehension of word order through the sentence *the girl is smaller than the boy* (which is in fact testing comparatives as well) demonstrated that this structure is not understood until 5;0 years of age. However she attributed her subjects' poor performance in this item to using *smaller* instead of *larger* for comparison which she thought would yield better results if used.
10. Modified adjectives were not comprehended by Omar's subjects until about 4;0 or 4;6 years. In fact, the structure tested by Omar is the modified subject, which made it more difficult for her subjects to comprehend. The two sentences presented were *the big boy with a dog* and *the boys with a big dog.*

Omar's comprehension testing procedure can be criticised for offering only two choices for the child to select from when using pictures, allowing a 50% chance factor for a child to guess the correct picture even if he does not comprehend the linguistic item tested. Another critique for her procedure is that she did not set clear criteria for selecting her subjects. She identified at the beginning of her research that 5 of the children she included in the study had

below average intelligence and some others included in the study were not healthy. She reached decisions regarding intelligence and general health conditions through her observations and subjective judgement and objective testing was not performed. Another critique of her procedure is that the drawings she used were not adequate in representing the structures tested, as she herself admitted. When introducing new procedures, practice items need to be tried first and this was not done by Omar, which resulted in children failing as a result of not understanding the task itself. She did not detail the principles she used for the selection of structures. Another problem in relation to structures tested is that they were not well defined (e.g. she tested the comprehension of reversible active in Item 10, while she claimed that she was testing for the comprehension of colours). For the previously mentioned reasons, results of Omar's comprehension test could not be used to draw conclusions about the comprehension of the Arabic language by young children and a comparison with studies of other languages results is not appropriate.

2.2.8 Factors that aid comprehension

In addition to the linguistic structure used, Carrow (1968) listed two other factors that aid comprehension. They are: 1) the referent for the linguistic structure used and 2) the frequency with which that particular item is used in the language. More specifically, (Spearritt, 1962, cited in Carrol, 1972) considered that attention, motivation, auditory and memory are factors that are needed for comprehension in addition to the vocabulary and the grammatical features. The extent of using such factors according to Fraser *et al.* (1963) depends on the nature of the sentence contrast, on its embeddedness, its familiarity, the number of redundant features and the total length of the sentences. Miller & Paul (1995, p. 6-7) provided a comprehensive review of the extra factors that are needed to comprehend language. One cannot ignore the effect of comprehension strategies (Section 2.2.5) which are often used by children to aid language comprehension.

The factors aiding the linguistic knowledge in language comprehension are important to consider when constructing language comprehension tests. Factors such as guessing, inference, memory and reliance on prior knowledge must be controlled in order to get valid data about comprehension (Carrol, 1972). This is because failing a test item might result from a lack of knowledge of that specific item as well as from other factors (Carrow, 1968). Being aware of context strategies used by children to comprehend sentences enables a test designer to vary the items and to control the distracters in a way that makes it possible to detect these strategies. This is because comprehension improves when other context clues are being used by the child to interpret the presented sentence.

2.2.9 Child Directed Speech (CDS)

Most of the grammatical structures that will be tested in this research will be assembled from the conversations of some Saudi parents with their children. The purpose of analysing these conversations is to get a natural sample that illustrates the level of complexity a Saudi child is expected to comprehend within the age range of the proposed test. It must be noted that comprehension in a conversation is different from comprehension in a controlled test situation. This is because during conversation the listener is aided by the context in which the conversation occurs (see Section 2.2.2.3 for the definition of the context), in addition to the linguistic stimulus itself. This means that children's responses to structures understood in context may be less in test situations.

The special form of adults' speech to children is called 'Child Directed Speech' (CDS), 'Baby Talk' (hereafter BT) and 'motherese' and was defined by Kaye (1980, p. 489) as "the speech of adults to children between the ages of 1;0 and 3;0 years".

With regard to the age at which adults start using this so-called 'baby talk', Phillips (1973) suggested that parents only begin talking in CDS around the end of the first year of their

child's life. However, Snow (1977) has reported a number of features of CDS prevalent in mothers' speech to infants as young as 0;3 months. Child directed speech is not restricted to mothers. Fathers and other adults including non-parents, make a similar type of modification when talking to toddlers (Berko-Gleason, 1977). However, Snow (1995) reviewed the literature and reported that fathers' and secondary caregivers' speech to children have fewer features of CDS compared to that of mothers. She added that fathers are more likely to use low frequency vocabulary items than mothers are.

As children grow older the complexity of adults' speech directed to them increases. Phillips (1973) analysed the speech of 30 mothers to their children. Children were divided into three groups of 10 children each, aged 0;8, 1;6 and 2;4 years. A 15-minute sample of the speech of every mother to her child was analysed. Results of Phillips' study showed that mothers' speech to 1;6 year-olds was significantly simpler than their speech to 2;4 year-olds. However, there were no significant differences between the complexity of mothers' speech to 1;6 year-olds and 0;8 year-olds. Phillips concluded that mothers keep their speech complexity at a simpler level until a certain age and they start using more complex speech as their children grow older. Another study was carried out by Pan *et al.* (1993, cited in Snow, 1995). They measured MLU of the five longest utterances in a 10-minute conversation of mothers speaking to their children when they were 1;2 year until they were 2;8 years. They noticed significant growth over time in mothers' MLUs as their children got older.

There are two suggested purposes for CDS, as mentioned by Bridges *et al.* (1981), The first is that CDS is a way of teaching language and that the function of the special characteristics of adult speech is to enhance certain features and distinctions for children and thereby to facilitate children's learning of syntactic structures (Snow, 1972; Newport *et al.*, 1977). The second purpose suggests that CDS is a response to a particular social and communicative

setting, and that the adjustments adults make are motivated by their aim to keep the conversation going for as long as possible (Cross, 1977; Newport *et al.*, 1977; Kaye, 1980; Snow, 1986 and Pine, 1994). Newport *et al.*, for example believe that changes in mothers' speech when they address children is aimed at comprehension complexity not at syntactic complexity. They reached their conclusion after reviewing mothers' speech and finding that even though it was shorter; it was syntactically complex. In a view that combined both purposes, Snow (1972) thought that when adults speak to young children they intend to keep their speech simple and interesting for social communicative purposes. However, they unintentionally teach language to young children, simplifying language for them and making it more interesting.

It is possible to list universal characteristics for CDS identified by Kaye (1980). These are: 1) prosodic features, such as higher pitch, greater range of frequencies and more varied intonation (Ferguson, 1964; and Garnica, 1977); 2) lexical features, such as using special forms (Ferguson, 1964); 3) complexity features, such as shorter utterances and fewer embedded clauses, (Snow, 1977); 4) redundancy features, such as more repetitions (Newport *et al.*, 1977) and 5) content features, such as restriction to topics in the child's world (Berko-Gleason, 1977; Snow, 1977; Newport *et al.*, 1977). When mentioning shared features of CDS, it must be noticed that CDS, as stated by Ferguson (1956), varies from district to district even when speakers share the same dialect, and even from family to family. Cross (1977) analysed the speech of mothers to their children and reported that one third of mothers' sentences were questions, almost one third were declaratives, 6% statements and 7% imperatives. The rest of the sentences were either too fragmented or too disrupted to code reliably, or were *yes-no* responses to child questions. Snow (1977) reviewed literature regarding the effect of the situation upon the complexity of mothers' speech to their young children and concluded that mothers' speech was more complex in free situations such as playing than in care-taking situations such as dressing.

The speech of children addressed to their younger mates was observed to have the features of CDS. In one of the studies investigating this aspect, Dunn & Kendrick (1982), described the adjustments in the speech made by 40 2;0 and 3;0 years-old children when talking to their 1;2 year-old siblings and compared it to those made by mothers addressing their babies. Their main conclusion was that 2;0 and 3;0 year-old children did make systematic adjustments in their speech when talking to their infant siblings. There were both similarities and differences between these adjustments and those made by mothers talking to their babies. The presence of such a form of CDS is strong evidence in favour of the claim that CDS is aimed at comprehension complexity and not at teaching the language to the child.

There are several indicators that are often used to measure the complexity of adults' speech to children such as MLU and the number of verbs per utterance. This measure was used as a complexity measure because simple clauses will have fewer main verbs than complex sentences. The number of verbs per utterance was used among other measures by Phillips (1973), to compare the speech of 30 mothers to their boys with their speech to an adult. Children in Phillips' study were divided into three groups of 10 children aged 0;8, 1;6 and 2;4 years. She found that the mean verbs per mothers' utterances were 0.82, 0.80, 0.92 verbs for the age groups 0;8, 1;6 and 2;4 years respectively, whereas the mean for verbs per utterance when the mother was speaking to an adult was 1.53 verbs. The other study that used the number of verbs per utterance to measure adults' speech complexity was that of Hoff-Ginsberg (1985). She studied 22 mother-child pairs and the children's mean age at the start of the study was 2;4 years. Mother-child conversation was recorded four times with 0;2 months intervals between recordings. She found that the number of verbs per utterance increased as children grew older. She reported the following mean verbs per utterance for the four recording sessions respectively as 0.38, 0.53, 0.61 and 0.7 verbs. Results of this study demonstrate clearly that mothers use more verbs per utterance as their children grow older.

Discourse functions present in the speech of adults to children is an aspect that received the attention of researchers in the field of child language. A fairly recent study that investigated this aspect in detail is that of Hampson & Nelson (1993). They analysed the speech of 45 mothers to their children. Children were videotaped when they were 1;1 year in their homes in two context; a 15-minute free-play session and a 15-minute care-taking episode focused around a meal. Maternal language functions were assessed by coding each utterance into one of 12 categories. The codes they used were: 1) request for information; 2) statements; 3) description; 4) request for action; 5) conversational devices; 6) referential repetitions; 7) conventional recasts; 8) performatives; 9) expressive repetitions; 10) sounds; 11) request for permission and 12) elicited imitation. Hampson & Nelson's analysis results at 1;1 year are presented in the following table:

Table 2.13 Discourse functions investigated in Hampson & Nelson's study of mothers speech to their 1;1 year-old children.

Function	Number		Percentage	
	Mean	Range	Mean	Range
Description	58	3-116	21	2-37
Request for information	21	0-57	7	0-16
Performatives	13	0-41	5	0-21
Referential repetitions	3	0-25	1	0-7
Statements	30	8-136	10	5-32
Request for permission	27	11-45	10	4-19
Request for action	57	14-155	20	8-35
Conversational devices	35	11-90	13	3-30
Expressive repetitions	4	0-17	2	0-6
Sounds	25	4-67	9	3-22

As the table shows, the largest categories in terms of mean percentage were Description and Request for action. Conversational devices, Statements and Request for permission made up the next largest categories. Referential and Expressive repetitions were the smallest categories.

With regard to CDS in Arabic, an early study was performed by Ferguson (1956) in two Arabic dialects, namely Syrian and Palestinian. Ferguson's study was aimed at listing Arabic BT words that were used in these two dialects. A BT word, as the name implies, is a

word that is "regarded by a speech community as being primarily appropriate for talking to young children and which is generally regarded as not the normal adult use of language" (Ferguson, 1964, p.103). There were three sources for BT words which are: 1) elicitation from 7 informants (3 men and 4 women); 2) gathering from Arabic dictionaries and 3) direct observation. In his study, at the lexical level Ferguson described the use of BT words given to people such as mother and father, things such as water, actions such as sleeping and drinking. He also reported that his results showed some similarities between CDS in Arabic and English such as the presence of repetition, the use of BT words and the frequent use of single words to function as a whole utterance. One of Ferguson's remarks was that he observed a lack of inflectional prefixes or suffixes in BT words, although there are potentially a huge number of morphemes in the Arabic language. Another observation was that all the BT words recorded had neutral gender, unlike the other words in Arabic, which means that they do not belong to either masculine or feminine gender. The final observation noticed by Ferguson was that BT words occur either as sentence-words or are imbedded among normal Arabic words and adults were never observed linking two BT words in one sentence. An example of Arabic BT words listed by Ferguson are /nini/ *sleep* /nunu/ *small* and /titɪ/ *grandmother*. (See Ferguson's chapter for more details).

Child directed speech in Arabic was described by Ferguson (1964) among CDS in five other languages. According to him, there is a record of Arabic CDS at the beginning of the nineteenth century which is very much like Arabic CDS today. He added that Arabic has many BT words with pharyngeal fricatives, although these are often assumed to be acquired late in Arabic. As regards the structure of Arabic CDS, Ferguson noticed a shift in gender which is used as a mark of endearment. The example given by him was the sentence /win ṛuħti/ *where did you go?* (fem.) said to a little boy. Omar (1973) studied CDS as part of her research that investigated the acquisition of Egyptian Arabic. Full details of the subjects were not mentioned by Omar; however, she reported that CDS is widely used in the

Egyptian Arabic culture. She gave some examples of BT words that are used only with babies such as /mbu/ for *water*, /mama/ for *food* and /nɪnɒ/ for *mama*. It must be noted that as was the case in Ferguson's (1956) study, Omar's study was restricted to mentioning some BT words such as names given to people, things and actions. She compared her results to those of Ferguson's (1956) and found that several of the items used by parents when speaking to their children are similar in the three dialects. Omar noticed that BT words she observed had no inflections or affixes. She also noticed that they do not have plural forms nor any kind of marked gender. The previous two observations made by her are similar to Ferguson's (1956) observations which were presented earlier in this section.

2.3 Comprehension assessment

As mentioned earlier, language comprehension is not a directly observable behaviour unlike language production. The decision whether a certain utterance has been comprehended or not can only be reached through the listener's response either by words or by actions (Miller & Paul, 1995). In natural conversation, there are occasions when the listener does not show a response that indicates he understood a certain stimulus even though he has in fact understood it, or indicates that he understood when he has not. An assessment of children's language comprehension is needed to get an idea about how much use a child makes of linguistic information and to reveal comprehension strategies used by the child to comprehend language. Such an idea could be achieved by both observing the child's language comprehension in a natural conversation and assessing his language comprehension in a test situation. Assessing the child's comprehension in a test situation allows for testing the child's ability to comprehend language in the absence of contextual clues, while observing the child's language comprehension in a natural conversation gives an idea about the child's ability to achieve comprehension through the use of clues from the environment in addition to the child's linguistic knowledge. Thus, naturalistic observation is more appropriately used with younger children because all situational cues are included (Engen & Engen, 1983). While the decontextualised comprehension is the level of comprehension that is usually assessed in tests of language comprehension, it has been emphasised by Miller & Paul (1995) that when children's language comprehension is assessed, both contextualised and decontextualised comprehension need to be considered. Testing the use of comprehension strategies is one way mentioned by Miller & Paul for testing both contextualised and decontextualised levels of comprehension.

Comprehension tests along with the experimental studies form the basis for information on development of language comprehension (Fletcher, 1985). Assessing children's language in a clinical setting has three advantages according to Miller (1978). The first is to identify

children with potential language problems by screening; second, to establish a baseline for functioning levels prior to therapy and third, to measure the effectiveness of therapy programs. Detecting a language impairment from an early age helps in providing speech-language therapy service when the child is young. Early detection of language disorders dictates the need for powerful assessment tools of language behaviour.

The need for tests of language comprehension in general and tests of syntactic comprehension in particular was stressed by many researchers (Longhurst & Schrandt, 1973; Marquardt & Saxman, 1973, Carrow, 1974; and Adams, 1990). In one of these studies, (Marquardt & Saxman, 1973), it was thought that comprehension measures are better indicators of linguistic knowledge than production measures. It was shown elsewhere in this thesis (Section 2.2.2.2) that information about language comprehension could not be generalised from production data, as the two processes of comprehension and production are not similar. The most valid way of getting information about language comprehension is to perform an appropriate assessment of it.

Comprehension assessment tools were grouped by Wiig & Semel (1976) into two groups. The first group are 'cognitive-semantic tools' which assess a knowledge of the meaning and concept of a word. The second group are 'linguistic processing tools' which assess grammatical structures. With regard to the tasks used in comprehension tests, Leonard *et al.* (1978) divided them into three groups: 1) identification tasks such as pointing to pictures; 2) acting-out tasks such as acting-out a sentence on certain objects and 3) judgement tasks such as presenting a sentence and asking the child whether the stimulus is right or wrong.

The study by Fraser *et al.* (1963) (Section 2.2.2.2) provided a model for the typical format of many tests of language comprehension by manipulating a single grammatical feature and requiring the child to point to the correct picture in response to the sentence spoken by the

examiner (Rees & Shulman, 1978). By applying such procedures, the examiner can assume that the child has answered using his knowledge of syntax and was not aided by a comprehension strategy. This is because some children may perform well in a contextualised test (i.e. with the presence of extra-syntactic cues); however they may fail the same item in a decontextualised test (i.e. with the extra-syntactic cues removed) (Miller & Paul, 1995).

Once the importance of testing language comprehension has been established, a speech-language clinician has the choice of either using a formal standardised test or a clinician-made non-standardised test. Each of the two has its advantages and disadvantages. Gerard & Carson (1990) point out that standardised tests are known for their reliability, validity and objectivity. They add that by using a standardised procedure the child's performance can be compared to that of other children matched in age, which is useful for screening purposes as well. On the other hand, standardised tests were criticised strongly by Leonard *et al.* (1978) because they yield a test score which does not help very much in planning therapy. Another criticism of standardised tests was provided by Miller & Paul (1995) who argue that standardised tests focus mainly on vocabulary, morphology and syntax and ignore other components of language like pragmatics. Clinician-constructed non-standardised procedures are recommended as an alternative to the standardised ones (Leonard *et al.*, 1978; Miller & Paul, 1995). Leonard *et al.* (1978) gave three advantages of using non-standardised testing procedures: 1) to enable the clinician to test comprehensively features which seemed suspect during the child's performance on a standardised test; 2) to assess the child's production or comprehension or a feature that is not assessed at all in a standardised test and (3) to determine the extent of a child's difficulty with a particular feature of language. Leonard *et al.* provided in their article a contemporary review of pragmatic, semantic and syntactic behaviour in order to aid clinicians in the construction of non-standardised measures.

As regards the problems encountered when assessing language comprehension, there are problems that are general to any language test, while there are other problems which are specific to tests of language comprehension. One of the general problems is that whatever a test designer does to make the test natural, any test situation is to some degree unnatural (Engen & Engen, 1983). Another problem in relation to language tests in general, according to Cazden (1972), is that the interpersonal relationship of the examiner and the subject can have a great influence on the subject's ability to perform or respond to the task required.

As regards the problems which are specific to language comprehension, Miller (1978) mentioned three problems which are defining the type of response required from the child, determining the requirements each task imposes upon the child, and specifying the content to be used for assessment. When discussing the pitfalls of comprehension tests, it must be acknowledged that there are two types of problems with comprehension tests. The first are problems with the specific procedures used to investigate comprehension and these can be managed with a better use of appropriate procedures for assessing comprehension. The second type are the problems which could not be managed because they are inherent in the process of comprehension itself. After reviewing some tests of language comprehension, Carrol (1972, p. 24) expressed the second problem by stating that "there is no one technique that universally gives valid and reliable information". Similar arguments were raised by other authors (Waryas & Ruder, 1974; Bowerman, 1978; Rees & Shulman, 1978). Rees & Shulman (1978), for example claim that a comprehensive approach to the measurement of comprehension is not yet available to speech-language clinicians in the form of a clinical test. Language comprehension tests were criticised for the following: 1) requiring memory abilities (Carrol, 1972); 2) not giving an interpretation of the processes that underlie test performance (Bridges, 1985); 3) testing the child's use of comprehension strategies when aimed at testing his syntactic knowledge (Bowerman, 1978); 4) failing to evaluate the

complete range of operations the listener performs in understanding utterances and 5) requiring an understanding of structures that might be beyond children's comprehension.

A person assessing children's comprehension abilities needs to be aware of some administration and presentation points. Carrow (1968) made two observations. Her first observation was that items' order of presentation affects understanding. Her second observation was that some test pictures do not represent the concept they are drawn to represent. Tweney & Petretic (1981) give advice on test administration and warn examiners not to use non-verbal cues when presenting their questions. Another administration point was noticed by Waryas & Ruder (1974) which is to be considered when testing the plural against the singular. For example, when testing the plural *boys* against the singular *boy* a child may point to one of the boys in the plural item indicating that he is the singular *boy*.

When language comprehension is assessed, an examiner wishing to eliminate the involvement of memory is advised by Carrol (1972) to have a shorter delay between stimulus presentation and the child's response. Bellugi-Klima (1971) provided some other advice to be followed by an examiner who wants to test for decontextualised comprehension, such as controlling the situations so that the child gets minimal cues from the situation around him, using words that are in the child's vocabulary, and constructing test items in such a way that the correct answer from the child can be achieved only through comprehending the particular structure being tested.

In relation to test results, Müller (1985) highlighted two crucial points. Firstly, language test scores reflect the theoretical viewpoint of the test designer and are not a definitive statement about the child's linguistic abilities, and secondly, therapy should not be based on the test itself because language tests investigate a narrow range or sample of abilities. Lee (1970) pointed out that when assessing language comprehension, there is a problem of

having the examinee guess the correct picture without knowing the structure by attending to the nouns of the sentence and comparing them with the pictures presented. However, she added that the technique of contrasting sentence-pairs allows a solution to this problem. If two sentences, using the same contentives and differing in only one syntactic feature are presented together, and the child is asked to identify both sentences from a set of four pictures, then the grammatical task is clarified and can be pictured. A final point that assists in reaching a more reliable diagnosis of the language behaviour is using more than one test to assess a language problem (Schery, 1985). Using more than one test becomes more efficient if we know the features of every test we are using. By knowing these features, one might rely on memory and vocabulary knowledge in one test more than the other so that children's performance can be compared and contrasted.

The most popular methods for assessing comprehension are picture-pointing tasks or object-manipulation tasks. Children with developmental levels of 20 months or older can generally respond successfully to object-manipulation tasks, whereas children with developmental levels of 24 months or older can respond to picture-pointing tasks (Miller & Paul, 1995). This is true for most cultures; however cultural differences need to be considered as was the case in Omar's (1973) study (Section 2.2.7.1). Cocking & McHale (1981) reported that children's performance in object-manipulation tasks is superior to their performance in picture-pointing tasks. This conclusion was reached after language comprehension of 68 4;0 and 5;0 year-olds was tested using both pictures and objects stimuli.

Pictures are introduced to children in western cultures such as the American and British one, early in their life. Moerk (1974) found that picture books were the main tools used by mothers to interact with their children aged between 1;9 and 2;4 years. This finding was obtained after observing the interaction of 23 mothers with their children who were aged 1;8 to 5;0 years. Saudi mothers' use of picture books to interact with their children is rare

since this habit is not common in the Saudi culture. This point needs to be taken into account when using pictorial representation with young Saudi children. Another source for children's knowledge of pictures is pre-school education. In the United States, for example Shatz *et al.* (1996) reported that children, even younger than 2;6 years, often attend nursery schools or day care centres. Nursery schools in Saudi Arabia are not so common as they are in other countries such as America or Britain (Section 2.1.4). Most children have their first chance of learning when they enrol in elementary schools around the age of 6;0 years. The main source for introducing Saudi children to pictures is through watching children's programs like cartoons on the TV. Children's programmes are only one of the sources of introducing pictures and colours for young American children as mentioned by Shatz *et al.* (1996).

The effect of colour on picture-pointing tasks was tested by Straub (1978). He compared the performance of two groups of children varying in age and language ability on two versions of a language comprehension task, a black and white version and another coloured version. The two groups were one of 20 children aged 4;7 to 9;11 years who were not suffering from any speech or language problems as judged by four speech-language therapists and the second group consisted of 20 children aged from 3;0 to 9;11 years with a language problem as classified by their score on PPVT (Dunn, 1965) and another test (varied according to the child, see Straub, p. 74). All subjects of the two groups had to pass a colour blindness test prior to including them in the study. The two conditions used the same set of illustrations except that one version used black and white line drawings, while the other used the same line drawings filled with colour. Results of this study demonstrated that younger children may be unable to efficiently interpret black and white illustrations used in most language comprehension tests. More specifically, younger children in both groups performed significantly better when given the colour task first rather than the black and white task. The results of Straub's study indicate that children with language disorders

under the age of 7;0 years are only able to perform adequately on language comprehension tests when the illustrations used for testing are coloured. As regards colour terms, they were found by Andrick & Tager-Flusberg (1986) to increase largely from 2;0 to 3;0 years of age. Their subjects were 30 children aged between 2;0 and 4;0 years and they found that: 50% of the 2;0 years-old, 90% of the 3;0 years-old and 100% of the 4;0 years old selected at least one example for each colour term. This result was supported by Shatz *et al.* (1996) who found that children as young as 2;6 years were competent at identifying the following colours: blue, green, purple, orange, red and yellow. Shatz *et al*'s subjects were 26 children aged 2;1 to 2;9 years and were required to identify coloured rectangles.

Tests that relied on object-manipulation tasks were criticised by Johnston (1985) because they allow children to use their world knowledge to perform the required action. Johnston's criticism supports the view that a picture of a child's language comprehension can only be achieved by removing all contextual clues. However, this view goes against the claim raised by Miller & Paul (1995) that both contextualised and decontextualised comprehension need to be considered when children's language comprehension is assessed. Object-manipulation tasks were also criticised by Golinkoff *et al.* (1987) for underestimating children's linguistic sophistication. This criticism could be true if the materials used for testing are not appropriate for the linguistic task under assessment.

As regards picture-pointing tasks, they were criticised by Golinkoff *et al.* for not providing subjects with sufficient incentive to perform. This is because the child's response is restricted to pointing to a restricted set of pictures, however this can be considered an advantage for picture-pointing tasks as an appropriate selection of the target pictures and the distracter will enable the tester to assess the child's type of error. Another criticism of picture-pointing tasks was presented by Cazden (1972) which is that correct interpretation of pictures may depend upon acceptance of particular conventions. An example that illustrates this problem was

given by Cazden when she noticed that 10;0 years-old middle class white children said that black-and-white pictures in which colouring was shown by dots were coloured or shaded, while lower-class white children of the same age considered the shading of pictures as depicting dirt. This problem with pictures can be decreased to the minimum if the objects drawn are known to the child and the drawings are clearly drawn.

2.3.1 Criterion-Referenced Tests

Kaplan & Saccuzzo (1997) defined a criterion-referenced test as the one that "describes the specific types of skills, tasks, or knowledge that the test taker can demonstrate" (p. 62). Another definition of a criterion-referenced test according to Hambleton (1990) is that it is a test designed to "assess the performance levels of examinees in relation to a set of well-defined objectives (or competencies)" (p. 389). He pointed out that criterion-referenced test scores are not compared to cut-off scores or standards, instead a descriptive interpretation of scores is used.

In criterion-referenced testing the child's performance is compared to some clearly defined criterion for mastery. Several terms have been used as synonyms for these criterion-referenced tests such as 'domain referenced', 'proficiency tests', 'mastery tests', 'competency tests' or 'basic skills tests' (Hambleton, 1990). As these names imply, criterion-referenced tests are constructed to permit the interpretation of individual (and group) test scores in relation to a set of clearly defined objectives or competencies (Hambleton, 1990). This distinguishes them from norm-referenced procedures that relate test scores to a clearly defined norm group. In relation to the tests of language comprehension, a norm-referenced one is constructed with normal developmental data on comprehension acquisition in mind (Miller & Paul, 1995). Norm-referenced procedures are useful, according to Lund & Duchan (1993), in differentiating between average and less than average performance. According to Kelly & Rice (1986), the advantages of norm-

referenced testing procedures are that they are objective, replicable and stable. Byrne (1977) highlighted the need for norm-referenced tests because they give a meaningful score that can be used in reports about a person with a communicative deficit. However, test scores and language test scores in particular have been criticised by Müller (1985) for not being diagnostic and for providing very little information on which therapists can base intervention. Age-equivalent scores of language ability, according to McCauley & Swisher (1984), are often misused. Norm-referenced procedures were criticised also for not even providing a partial impression of a child's communicative competence (Newhoff & Leonard, 1983). This is because norm-referenced procedures give the final test score achieved by the child in order to be compared to the performance of his peers, and do not take into account the score achieved in every aspect tested.

Talking about the difference between norm- and criterion-referenced tests, one must note what has been reported by Hambleton (1990) that by looking at test items only, one would not be able to judge whether the test is a norm- or a criterion-referenced test. This is because the same items can be used in both types and the way to differentiate the two is to look at the way their results are interpreted.

With reference to the aim of criterion-referenced tests, it is to assess an examinee's level of performance in relation to each of a set objectives measured by the test (Hambleton, 1990). Scores of criterion-referenced tests may be used, as mentioned by Kratochwill & Sheridan (1990), for three purposes: 1) as diagnostic procedures; 2) to monitor intervention and 3) to assess readiness for placement in a prescribed program.

It is well documented that pre-school children vary in the rate at which they acquire language (Richards, 1994). One feature of criterion-referenced tests is that they account for such variability that exists between children. This is because such tests assess the child's

performance in relation to certain objectives and not in relation to the performance of his peers as is the case in norm-referenced tests. When testing for the comprehension of the preposition *in*, for example, the aim in a criterion-referenced language comprehension test is to know whether the child comprehends the preposition *in* or not, while the aim in a norm-referenced language comprehension test is to compare the child's performance with the preposition *in* to the performance of other children.

One of the features of criterion-referenced tests, according to Anastasi & Urbina (1997), is the procedure of testing for mastery. This procedure results in an all- or-none score indicating whether the individual has or has not mastered the specified behaviour. There could be an intermediate level, as pointed out by Anastasi & Urbina, whereby the child shows that he has some knowledge of the behaviour investigated. Mastery level is not obtained by comparing one child's performance to the performance of other children which means that variability in language acquisition, in the case of a language test, between children is still accounted for. The interesting example of the dog owner who wants to ensure his dog cannot escape from the back yard, was given by Popham & Husek (1975) and it clarifies this point. This owner will give his dog a fence-jumping test to find out how high the dog can jump so that he can build a fence high enough to keep the dog in the yard.

Although in criterion-referenced tests the child's performance is compared to well defined objectives, normative data can be collected in such tests (Popham & Husek, 1975, Anastasi & Urbina, 1997 and Aiken, 1997). This does not conflict with the aim of criterion-referenced tests because the data collected on normal children can be useful, according to Hambleton (1990), in setting realistic standards for examinee performance. This case is different in norm-referenced tests when normative data are collected for the purpose of comparing children's performances.

In relation to clinical setting, criterion-referenced tests are linked to therapy as stated by Bergan (1990). This enables the therapist to use the information from test results to guide therapy. Another feature mentioned by Bergan is that criterion-referenced tests are useful in monitoring therapy (i.e. to check whether therapy is effective or not). With reference to screening purposes, Bergan also pointed out that criterion-referenced assessment can be used for screening; but he added that norm-referenced tests are the most typical approaches that are currently used in screening.

As regards the disadvantages of criterion-referenced tests, it is claimed that they do not give normative data. In response to this claim Kratochwill & Sheridan (1990) argued that criterion-referenced tests and norm-referenced tests are designed for different purposes. When constructing criterion-referenced tests, items are selected from every domain being assessed, while in norm-referenced tests items are selected to discriminate between individuals. The special case of developmental tests needs to be considered. In developmental tests, the order of items presentation most likely reflects development which makes it possible to add some norm information.

Brown (1983) raised another disadvantage that is concerned with how we define proficiency levels. He pointed out that proficiency level is usually determined by using some ideal standards, which means that we are using a normative interpretation.

2.3.1.1 Construction of criterion-referenced tests

Hambleton (1990, p. 395) outlined twelve steps necessary for the construction of criterion-referenced tests. He pointed out that these steps can be modified according to the purpose of the test. Six of them were found to be relevant to a developmental language test and they will be presented in the following paragraphs accompanied by a brief discussion of the relevance of each to developmental language tests.

Step 1. Specifying the following: test purposes, test content, groups to be assessed, time, money and expertise available to construct and administer the test and a list of procedures for constructing the test. This step is very important as a start to any test including developmental language tests.

Step 2. Preparing well-defined objectives. The behaviour domain must be clearly defined. With reference to tests of language comprehension, the level of comprehension (contextualised or decontextualised) and the domain of language (semantics, syntax, etc.) to be assessed need to be determined. After that, structures to be tested such as negation and preposition need to be considered when defining the test objectives.

Step 3. Selecting the appropriate items to represent every objective decided in Step 2. Golden *et al.* (1990) suggested selecting more items than actually necessary, because these items will then be pared down by the validation process. Lemke & Wiersma (1976) raised another point: when selecting items, they should have face validity and reflect the objective to be measured. In addition, the item should not require abilities other than those which the test aims to assess (such as requiring advanced short term memory in a language comprehension test).

Step 4. Preparing test items to measure the objectives and initial editing of the test. Prior to the next step, Golden *et al.* (1990) recommend administering the proposed items to several normal individuals to see how they work. This is done to investigate the performance of items. This step can be valuable as well to check if items are applicable in real situations or not. This step may show that subjects can't comprehend the instructions, the administration is too difficult for the examiner or other related possibilities (Golden *et al.*, 1990). The case with developmental language tests is slightly different because they require modification. Younger

children, for example may require different materials and conditions because they are less mature in a range of psychological abilities such as attention and co-operation.

Step 5. Setting the criterion for passing and failing the test, setting a minimum standard of performance on each objective.

Step 6. Collecting information regarding reliability and validity and preparing a test administrator's manual and a technical manual.

Hambleton (1990, p. 396) provided seven technical advances in criterion-referenced testing technology. Those relevant to developmental language tests are: content validity, reliability and standard setting are discussed below.

Content validity

Content validation involves the systematic examination of the test content to determine whether it covers a representative sample of the behaviour domain to be measured (Anastasi & Urbina, 1997). The content of a test can said to be valid if the score achieved by a particular testee represents his knowledge in the task being assessed. Thus one agrees with Kaplan & Saccuzzo (1997) that the evidence for content validity is logical rather than statistical. They added that there are factors, other than the testee's knowledge of the task, that may limit his performance. In relation to the tests of language comprehension, a test constructor needs to specify from the beginning whether factors such as memory and inference will be considered when constructing the test or not.

Reliability

These measures are grouped into internal consistency and test re-test reliability. As regards internal consistency, Shewan & Pepper (1984) pointed out that it indicates to what extent

the items on a test contribute consistently to the total score. Although, there are several procedures for the computation of internal consistency, Kapplan & Saccuzzo (1997) pointed out that the most suitable formula for tests where items both have variable difficulty and are dichotomous (i.e. scored pass or fail) is Kuder-Richardson 20 (hereafter KR-20). Kapplan & Saccuzzo reported that KR-20 is usually more valuable than other measures of internal consistency such as the split-half procedure. Three variables are used in KR-20 which are the number of items used on the test, the variance of the total test score and the proportion of subjects passing every item. (See Section 2.3.1.1 for more details). According to Carmines & Zeller (1979), KR-20 is an estimate of the expected correlation between one test and a hypothetical alternative form containing the same number of items. With regard to the level at which a test can be considered reliable, they reported that reliability estimates in the range of 0.7 and 0.8 are good enough for most purposes in basic research.

Test re-test reliability refers to the stability of test scores on repeated occasions. The degree to which test results are reliable is an indication of the quality of the test (Fluharty, 1974). The reliability of criterion-referenced tests was defined by Swaminathan (1974) "as the measure of agreement between the decisions made in repeated test administration" (p. 264). They stress that if the test consists of items measuring several objectives, then it is necessary to determine the reliability for each sub-test measuring a particular objective. This means that a criterion-referenced test will have as many reliabilities as there are objectives included in the test.

Anastasi & Urbina (1997) pointed out that there are several techniques that have been designed to evaluate the reliability of criterion-referenced tests in particular, and that some of these are appropriate for simple mastery or non-mastery decisions, and some others take into account the actual scores obtained on the two occasions of testing.

Kline (1986) listed some sources of unreliability such as: subjective marking by the examiner, guessing by the testee, test length and test instructions (ambiguity of a test item decreases the reliability of the test). In relation to developmental tests of language abilities, the time interval between test and re-test must be appropriate. An appropriate period between the two used in most tests of language performance is between 2-3 weeks (Fluharty, 1974; Rifaie, 1994). Having less than this period may cause a memory interference as children might be able to remember the test which causes reliability to rise artificially (Kline, 1986). Conversely, having a long period between test and re-test allows for some developmental effect as children's language develops fast which may improve re-test results. Age may have an effect on reliability as reported by Anastasi & Urbina (1997) as younger children may show a lower reliability compared to older ones since their scores are influenced by guessing and arguably other performance variables like attention.

Standard setting

A standard or cut-off score on the test scale is needed to separate examinees into groups (e.g. masters and non-masters). One method used in setting the standards for tests of language comprehension is to set a criterion level which will help in determining whether children have mastered a certain linguistic structure or not. A criterion that is often used in language comprehension tests is to set a 60% cut-off by which a certain structure will be considered mastered by a certain age group if it was passed by 60% of the children tested in that particular age group. The 60% cut-off was used before by Carrow (1968) who studied language comprehension of certain grammatical structures. Carrow indicated that she had not selected a 50% cut-off as in other tests such as the Stanford-Binet (Greene, 1952, cited in Carrow, 1968) because a 60% cut-off makes the criteria stricter. Brown (1983) pointed out that by setting the standards high enough, one will ensure that the test taker has mastered the structure being tested. The 60% cut-off criterion was also used in Miller &

Yoder's (1984) test. In addition to the 60% cut-off data, Miller & Yoder provided data for a 90% pass criterion.

2.3.2 A review of some of the current tests of language comprehension

This section reviews some of the most frequently used testing procedures currently in use for testing language comprehension in children in clinical settings and it will be restricted to tests designed to be used with first language English-speaking children. Most of the tests reviewed are procedures that were standardised on either American or British populations. Wiig & Semel (1976) classify language comprehension assessment tools into cognitive semantic tests and linguistic processing tests which assess morphology and syntax. This classification will be used to present the language comprehension tests reviewed in this section. The summary of the language comprehension tests will be presented in Tables 2.15 and 2.16 based on certain criteria. These criteria will be discussed in the following paragraphs.

The first few criteria included in the tables are related to test manuals. A good test will have test objectives as well as test limitations presented clearly in the test manual. Information regarding reliability, validity and tables that help in interpretation of results need to be presented in the manual if they are available. Most tests give an age equivalent to the raw score, but they do not give information that helps as a guide to therapy. A diagnostically strong test relates test results to clear therapy objectives. Finally, test manuals should give detailed testing procedures as well as advice on how to deal with problems that arise when administering the test because this will help in getting valid results.

Materials used for testing need to be attractive and at the same time suitable to the child's experience in that they represent items that are typically known to children. Coloured drawings, if pictures are used, were shown to be more appropriate than black and white ones (Section 2.3). Another point to be considered when using picture-pointing tasks for testing is

to have an appropriate number of pictures testing every item. The use of four pictures to test for every item has been employed by most studies and it seems the most appropriate number to be used for testing every item. This is because having too few pictures may increase the possibility of having the child select the correct picture by chance, yet at the same time having too many pictures will minimise the chance factor to a low level. However, it creates another difficulty for the child to scan all five or six pictures at the same time.

When administering the test, it is important that the child being tested does not know if he is scored correct or incorrect, in order to keep him encouraged and to avoid distraction. Being discouraged or distracted affects the child's responses. Another point that helps in administering a test is to have a ceiling and a floor for the test which tells the examiner where to start from and where to stop. Most tests try to limit the skills required by an examiner for its implementation and try to make them relatively easy to administer. This helps as well in making the test reliable.

The availability of a screening test is important because it enables the examiner to get a rough idea about the child's linguistic ability, which in turn will help in using the actual test more efficiently (i.e. selecting an appropriate starting point). Another important feature that needs to be present in tests of syntactic comprehension is a vocabulary pre-test, which helps to ensure that failure in the test is not because of failure to recognise the vocabulary used in that test. Finally, the presence of two forms for a test makes it easier to test the child twice within a short period of time without allowing a learning effect to interfere. Such a feature is valuable when performing reliability and follow-up assessments. The following two tables present general information about tests reviewed and a detailed discussion of every test is presented next.

Table 2.14 General information about three cognitive semantic tests reviewed in the current study.

Cognitive semantic tests		English picture vocabulary Scale	British Picture Vocabulary Test	Boehm Test of Basic Concepts
	Age range of the test	5;0 to 11;11	2;11 to 18;1	Pre-school version 3;0 to 5;0
Manual	Explains the purpose clearly	Yes	Yes	Yes
	Indicates limitations of the test	No	No	No
	Gives statistical information about the test	Yes	Yes	Yes
	Informs about reliability and validity of the test	Yes	Yes	Yes
	Helps in results' interpretation	Yes	Yes	Yes
	Relates results to therapy	No	No	Relates to teaching
	Gives clear and informative administration procedures	Yes	Yes	Yes
	Tells the examiner how to deal with administration problems	Yes	Yes	No
	Tells when to give help	No	Yes	No
Material	Appears attractive	No	No	No
	Appropriate to the child's experience	Yes	Yes	Yes
Administration	Number of choices given to the subject	4 choices	4 choices	4 choices
	The child notices when scored fail or pass	No	No	No
	Additional information can be added to the form	No	Yes	No
	There is a ceiling and a floor for the test	Yes	Yes	Yes
	Administration time	15 minutes. approximately	Depends on the version used	20-30 minutes
	Requires highly skilled examiner	No	No	No
	Type of responses required (i.e. manual, verbal)	Pointing	Pointing	Pointing for most items and verbal responses for other items
Miscellaneous	The test is flexible enough to be customised	No	No	No
	A screening test is available	No	No	No
	The test is portable	Yes	Yes	Yes
	There are two forms for the test	No	A short form is available	Yes

Table 2.15 General information about four linguistic processing tests reviewed in the current study.

Linguistic processing tests		Derbyshire L. S.	M-Y test	TROG	SCT
	Age range of the test		4;0 to 8;0	4;0 to 13;0	3;0 to 5;0
Manual	Explains the purpose clearly	Yes	Yes	Yes	Yes
	Indicates limitations of the test	No	Yes	No	No
	Gives statistical information about the test	No	Yes	Yes	Yes
	Informs about reliability and validity of the test	No	Yes	For reliability only	Yes
	Helps in results' interpretation	Yes	Yes	Yes	Yes
	Relates results to therapy	Yes	Yes	No	No
	Gives clear and informative administration procedures	Yes	Yes	Yes	Yes
	Tells the examiner how to deal with administration problems	Yes	No	Yes	No
	Tells when to give help	Yes	No	Yes	No
Material	Appears attractive	Partially	No	No	No
	Appropriate to the child's experience	Yes	Partially	No	Yes
Administration	Number of choices given to the subject	2 choices	4 choices	4 choices	4 choices
	The child notices when scored fail or pass	No	No	No	No
	Additional information can be added to the form	Yes	No	No	No
	There is a ceiling and a floor for the test	No	No	Yes	Yes
	Administration time	Not timed	10-30 m.	10-20 m.	10-15 m.
	Requires highly skilled examiner	Yes	No	No	No.
	Type of responses required (i.e. manual, verbal)	Pointing and acting-out	Pointing	Pointing	Pointing
Miscellaneous	flexible enough to be customised	Yes	No	No	No
	A screening test is available	Yes	No	No	Yes
	A vocabulary pre-test is available	Yes	No	Yes	No
	The test is portable	No	Yes	Yes	Yes
	There are two forms for the test	No	No	No	No

Cognitive semantic assessment procedures

2.3.2.1 English Picture Vocabulary Test (EPVT): Brimer & Dunn (1973)

The EPVT manual provides tables that help the examiner to convert raw scores into age levels. These tables were achieved after standardising the test on about 3,240 normal English children. Reliability of EPVT was estimated separately for each year group and for the total samples by the use of Kuder-Richardson reliability by year group. Content and construct validity were measured for this test and found to be valid. This test has been largely abandoned in favour of the BPVS in Britain.

2.3.2.2 British Picture Vocabulary Scale (BPVS): Dunn *et al.* (1982)

The purpose of this test is to measure the subject's receptive vocabulary for standard English. The test comes in 2 forms, a long (156 plates) and a short (38 plates) one. The short form was standardised on 3,334 normal English children. The sample used for standardisation was mainly of children who speak English as their first language. During standardisation, the socio-economic status of the parents was taken into account. The manual gives the examiner an age equivalent to the child's raw score, a standardised score equivalent, percentile rank and a confidence-based age equivalent. Reliability information was collected for this test by estimating the correlation between scores derived from the short form together with a block of items from the long form shown by age groups (ability scores and raw scores). Validity information has been collected through investigating content as well as construct validity.

Test items are familiar for the majority because they are present in the child's environment. The value of the test diagnostically is restricted to assessing children's receptive vocabulary and it needs to be used in conjunction with other assessment tools to cover the other language modalities. The test is similar to the PPVT in that it examines the child's receptive vocabulary. However, the main difference between the two is that some items from PPVT have been replaced by other items which are appropriate to British culture. Another

difference is that BPVS was standardised on British children, unlike PPVT which was standardised on American children.

2.3.2.3 Boehm Test of Basic Concepts: Boehm (1986)

This was designed to assess children's mastery of the basic concepts that are both fundamental to understanding verbal instruction and essential for early school achievement. It uses picture arrays and verbal instructions by presenting a picture and asking questions about this picture. The most extensively tested categories are space concepts such as *above*, quantity concepts such as *half* and time concepts such as *beginning*. This test is used mostly by American teachers to assess children's vocabulary prior to their admission to schools. Reliability information which is included in the manual consists of: 1) split-half reliability coefficients and standard errors of measurement, by form, grade and socio-economic level and 2) test-retest reliability coefficients by form and grade. To achieve validity information, Boehm-R test scores were correlated with some measures, such as the Comprehensive Test of Basic Skills, California Achievement Test and Iowa Test of Basic skills.

The model of language used depends on the verbal understanding the child shows for each concept and the model can be considered appropriate. With regard to the language used in the test, it seems suitable to the children's age and developmental ranges. Test items are designed to test basic concepts, thus they are diagnostically strong in assessing this aspect only. However, this causes some items to be improbable, although most of them are functional. An example of an improbable item is Item 2-5 where the child is shown a picture of an elephant and a mouse at the top of a jungle gym. Some of the questions asked about this picture are: (Is the elephant *above* or *below* the mouse)? and (Do you think the elephant can climb up *above* the mouse)?

2.3.2.4 Derbyshire Language Schemes (DLS): Knowles & Masidlover (1982)

This test was first designed to be used both as an assessment and a rehabilitation program for children with severe learning difficulties. According to Lees & Urwin (1991) this test has been used successfully in a range of clinical settings and clients, although it was originally intended for use with children who show severe learning difficulties. It consists of the Rapid Screening Test (RST), the Detailed Test of Comprehension (DTC) and the language training scheme. The same comprehension items can be used to test expression if administration commands are slightly modified. No statistical information has been presented because the test is a criterion-referenced one. The test is based very closely on available studies of normal language comprehension at the time of its construction. The concept of Information-Carrying Words (hereafter ICW) was introduced by the test and it can be explained as the amount of information in a request. This means that certain words in the target sentence will be varied in the distracters to elicit the child's comprehension of these words. By considering ICW, the test acknowledges that the availability of cues present in the non-linguistic context will be used in processing commands and tries to take these into account. The model of language comprehension used matches what is known about the development of language comprehension. In its 3 sections it reflects major stages in comprehension development.

Derbyshire Language Scheme is more concerned with testing vocabulary and syntax. It is divided into three developmental stages: first words, 2-4 word level and a level that investigates grammatical development.

With regard to test items they are functional, indeed one of the aims of the test is to use functional language. Materials used are real toys and black and white drawings. Toys used for testing can be chosen to suit the age and interest of the client, which is one of its great advantaged.

Derbyshire Language Scheme is a very difficult test to administer and needs a skilful examiner. This is because an examiner administering the test should be aware of the concept of ICW which forms the basis for the test. Another factor that made DLS difficult to administer is the complexity of its forms. The RST takes about 5-8 minutes to administer, while the DTC takes between 20-50 minutes. The test gives detailed instructions on deriving teaching objectives and relates these to methods.

2.3.2.5 Miller-Yoder Language Comprehension Test (MY): Miller & Yoder (1984)

The purpose of this test is to measure language comprehension of American-English-speaking children. The test was first designed to explore the grammatical comprehension abilities of persons with mental retardation.

The language area investigated by this test is sentence comprehension. Comprehension of the following syntactic structures is assessed here active, preposition, possessive, negative/affirmative, pronoun, singular/plural, verb inflection, modification, passive and reflexivisation.

Test results can be used to classify children according to their chronological age or developmental age. As regards chronological age, the child's total score is compared to the performance of pre-set age-matched norms with a one year interval for children between 3;0 and 8;0 years. Regarding the developmental age level, it can be assigned based on a 60% and/or a 90% pass criterion. A 60% cut-off score was used as a structure-passing criterion (which means that a structure will be considered passed by a certain age group if it was passed by 60% of the subjects in that group). Data on a 90% cut-off score are provided in the manual as well. The Miller and Yoder test provides an error analysis that allows the examiner

"to compare the child's incorrect responses to expectations based on sentence difficulty" (p. 10, Test Manual).

2.3.2.6 Test for the Reception Of Grammar (TROG): Bishop (1989)

This test was originally designed as a research tool to be used in assessing grammatical language comprehension in children suffering from specific developmental language disorders. Statistical information is presented in the manual including the centile equivalents and age equivalent scores for blocks passed. Reliability was assured through the split-half reliability coefficients. To achieve validity information, TROG scores were compared with the EPVT and the correlation between these two tests was 0.774, while the partial correlation between the two tests after adjusting for age was 0.442. The TROG manual gives a table (p. 21) that helps in predicting the number of blocks that will be passed in the TROG by a subject when his EPVT score is provided.

The test manual does not present a background of the theory, although this is explained a little in the research study (Bishop, 1979) which gave rise to the test. The TROG starts by testing for the comprehension of nouns, verbs and adjectives. The test of syntax comprehension comes next by introducing 80 items. Items are divided into blocks of 4 items, each block tests for the comprehension of a specific type of contrast. Structures tested are: two element combination, negative, three element combination, singular/plural personal pronoun, reversible active, masculine/feminine personal pronoun, singular/plural noun inflection, comparative absolute, reversible passive, *in* and *on*, post-modified subject, *X but not Y*, *above* and *below*, *not only X but also Y*, relative clause, *neither X nor Y*, embedded sentences.

Structures used for testing are artificial for the majority, i.e. some of them are not present in natural speech addressed to children and because some of the vocabulary items used such as

the *elephant* are not normally present in children's environment although probably occur frequently in children's books.

2.3.2.7 Sentence comprehension Test (SCT): Wheldall *et al.* (1987)

The main aim of the SCT is to assess objectively the child's ability to understand various language forms in the relative absence of contextual or other clues to meaning. This test is aimed at "children whose level of language development is at least at a 3;0 years-old level" (p. 3, test manual). Brief statistical data were presented including a table showing the approximate ages by which 50 % and 75 % of the children have passed each sub-test. Reliability information showed significantly high reliability when the test-retest method was used. The split-half technique showed that the mean for odd items was very similar to the mean for even items. With regard to the test validity, SCT test scores were found to be highly correlated with BPVS both for chronological age and vocabulary age, indicating high validity.

With regard to the language model used, it seems appropriate - although it is a modification of an old model which is Fraser *et al.*'s (1963) model. The comprehension of 10 structures is tested in SCT which are: simple intransitive *the horse is eating*; simple transitive *the boy is reading the paper*; intransitive with an adjective *the old man is reading*; plural *the girls are skipping*; past tense *the boy has slipped*; future tense *the dog is going to jump*; negative *the boy is not crying*; prepositions *the mouse is in the box*; embedded phrases *the dog with short legs is jumping* and passive such as *the boy is being pulled by the girl.*

What makes this test significant is the Punjabi bilingual version which enables a Punjabi-speaking examiner to test children who speak Punjabi as their first language. Construction of the Punjabi version started in 1984 when the SCT was translated into Punjabi and both the English SCT and the translated versions were piloted on 50 children aged 4;6 to 5;5 years

speaking Punjabi as their first language and English as their second language. Accordingly, the Punjabi version was modified and was then implemented on 172 children speaking Punjabi as their first language attending nurseries, infants' schools and day nurseries in Britain. Children were divided according to age into 5 groups with the following number of children tested in every age group: 26 aged 3;6 years, 34 aged 4;0 years, 34 aged 4;6 years, 38 aged 5;0 years and 40 aged 5;6 years.

2.3.3 Existing assessment procedures for child language in Arabic

There are currently trials in different parts of Arabic-speaking countries to establish tests of children's language which will be more appropriate. Most of these trials are taking place in Jordan and Egypt. However, they are not expected to be appropriate to Saudi children because of the slight difference in the dialect and culture already discussed. The most elaborate of these trials is one which was developed in Egypt recently (Rifaie, 1994). This test (which is a result of a PhD work) was developed after comprehensive research. The ALT is a norm-referenced test that consists of different aspects: receptive and expressive vocabulary, receptive and expressive syntax, conceptual understanding, pragmatics, prosody and spontaneous speech.

With regard to the comprehension items included in the ALT they can be divided into four groups.

- Receptive vocabulary items: body parts, clothes, vegetables, fruits, animals, furniture, general tools, transportation means, food utensils, colours, plants and money.
- Receptive morphology: verb tenses, singular/plural, personal pronouns, conjunctions, possessives, temporal relations and locatives.
- Receptive syntax, negation, comparatives, superlatives and passive voice.
- Understanding modifiers: adjectives, adverbs, opposites, semantic categories, pairing (matching), the use of common objects, number concept, time concept.

This test, which was constructed by Rifaie (1994), was standardised on 160 children (59 girls and 61 boys) aged 0;1 month to 0;8 years. Norms and statistical data are presented in the results section of the thesis in addition to information on both the reliability and validity of the test. As the first serious effort to do something scientific, this test is a very good start to encourage the construction of more tests for Arabic children's language. However, in being so comprehensive the test gives very few items per 'aspect' and this is not so helpful in indicating therapeutic goals.

As indicated by the previously mentioned items, the test designer tried to include a comprehensive number of items to be tested. This might have an effect on the quality of the tool. The time needed to administer such a test is expected to be very long and it cannot be performed in one or two sessions. The test instructions are presented in the Egyptian dialect, a point which needs to be considered when using the test with children speaking other Arabic dialects. Another criticism of this test is that it is norm-referenced, which means that it neither points to the strengths and weaknesses of a child's language nor tells the clinician where to start therapy. Other information about the test materials and the way results are interpreted cannot be presented because the actual test is not available to this author for critical analysis.

2.3.4 Hearing assessment

Auditory reception of speech is important in facilitating normal language acquisition (Cramer & Erber, 1974). Therefore, subjects of a normal language acquisition study need to have average hearing. Hearing ability might be tested through a pure tone audiometry or a speech audiometry. Although pure tone audiometry represents the principal basis of a hearing evaluation as stated by Bess & McConnell (1981) they did indicate that it does not provide direct information as to how a person hears and understands speech. Pure tone threshold was criticised by Cramer & Erber (1974) for not reflecting the testee's capacity to perceive more

complex sounds since they test for the ability to discriminate signals. Speech audiometry can be performed by either a speech-perception threshold or a speech discrimination test. Speech-reception threshold is concerned with the ability of a person to recognise speech 50% of the time and spondaic words (two-syllable words) are used. Bess & McConnell (1981) reported that a speech-reception threshold does not provide any concrete information as to how well speech is understood at conversational level. The hearing test that provides such information is a speech discrimination test, which is performed using phonetically balanced monosyllabic words. According to Northern & Downs (1991), the most practical method for testing auditory speech discrimination in children has been to use some form of picture identification tasks whereby the child hears the test word and attempts to identify an appropriate picture. They added that word repetition tasks are more appropriate for adults since children are less likely to respond to such tasks. Several tests have been constructed for use to test children's discrimination abilities. Bess & McConnell mentioned one example of such discrimination tests for young children under the age of 12;0 years which is the Word Intelligibility by Picture Identification test (hereafter WIPI) (Ross & Lerman, 1970). The WIPI consists of four lists of 25 plates, with six pictures on each plate. An examiner performing a speech audiometry needs to make sure that the testee is not getting an extra clue by reading the examiner's lips while she is saying the words.

There are two important factors mentioned by Northern & Downs (1991) that need to be present in a test of speech discrimination which are the use of restricted vocabulary items that are familiar to children and the uncomplicated response required from children. Ashoor & Prochazka (1985) constructed a test of speech discrimination for Saudi children. The criteria they assigned for choosing the words they used in their speech perception word list were as follows: 1) Only nouns which would be familiar to the child and which could be illustrated were chosen; nonsense and abstract words were excluded. The words were obtained from children's stories. 2) Words were chosen, where possible, which would have similar forms in

colloquial and Modern standard Arabic. 3) The lists were phonetically balanced in the sense that vowels and consonants appear with the same frequency as in the spoken language. Each word in the list of their Saudi speech perception test has a corresponding picture-identification response card with ten pictures. Before testing began, children studied the pictures and familiarised themselves with them. The child was instructed to point to the picture corresponding to the word that he or she heard (Cramer & Erber, 1974).

As regards the stimulus presented to children, it can be either live or pre-recorded. Bess & McConnell (1981) point out that words had to be presented to young children at levels between 32 and 40 dB greater than the level at which older children and adults can respond. Since the normal range for hearing threshold is from 0-15 dB (Northern & Downs, 1991), therefore the intensity of words spoken in a speech discrimination test need to be within the range of 32-55 dB. Normal conversational speech is within the range of 20-45 dB, while it is from 45-65 dB for loud speech. Accordingly an examiner using live speech to perform a speech discrimination test for young children needs to present stimulus words slightly louder than usual conversational speech. If another testing procedure, such as a language test, is going to be carried out, the same loudness level should be maintained by the examiner.

Chapter Three

Procedures & Methods

The procedures used in this research to study Saudi children's language comprehension were chosen and modified to accomplish the research aims. Thus the procedures adopted were selected and implemented so that they will yield results that provide an idea about the patterns used by Saudi children to comprehend selected morpho-syntactic structures of the Arabic language. They were in two parts; one preliminary and subsidiary (the CDS study) and one which aimed to fulfil the main aim of the study (the language comprehension study).

Adult language directed to young Saudi children was studied for the following reasons:

- it is one way of discovering the type and range of structures a Saudi child is expected to comprehend which will add to our understanding of the process of language comprehension.
- it confirms the variety used when speaking to children and establishes the vocabulary items that are expected to be understood by Saudi children since the test is aimed at assessing the morpho-syntax level.
- Since the aim was to establish a criterion-referenced test, a criterion level of comprehension relevant to the age range of the test needed to be chosen.

The approach used in studying CDS was through recording both fathers and their children in natural situations - play situations.

The main procedure which was used to pursue the main purpose of the research is a language comprehension study that investigates Saudi children's comprehension of selected morpho-syntactic structures. A language comprehension test that uses both objects and pictures was designed for that purpose. Assessing language comprehension in a test situation allows for testing the child's language comprehension abilities in the absence of contextual clues, which is a principal way of studying the process of language comprehension. This was stressed by Fletcher

(1985) who reported that comprehension tests along with the experimental studies form the basis for information on the development of language comprehension.

Procedures used for the assessment of language comprehension need to be designed to elicit the listener's responses because language comprehension is not directly observable behaviour like language production. Miller & Paul (1995) clarified this point when they stated that the decision about whether a certain utterance has been comprehended or not can only be reached through the listener's response either in words or in actions.

The procedure used in the language comprehension test was designed so that the cues used by children to comprehend the morpho-syntactic structures studied could be identified. That is, it was designed so that a child will point to the correct picture only if he utilises all the cues contained in the structure in question. Moreover, if the child points to one of the distracters (i.e. not the correct picture), the cues that were used by the child and the cues that were ignored by him can be identified. This is because the child's response to the tested structure can be analysed when an incorrect answer has been. This approach to studying language comprehension provides an insight into children's language comprehension processes at various ages and factors that influence their comprehension.

Data yielded from the language comprehension study, which includes data from the language test and the CDS study, will be used in the future to construct a clinical test for the comprehension of morpho-syntax for use by Saudi speech-language therapists. Since subjects of the clinical test are children with language disorders, and users of the test are Saudi speech-language therapists, it was considered important to consult speech-language therapists working in Saudi about their views regarding child language testing procedures used in Saudi Arabia before the study began, and their expectations and priorities for a newly constructed language test for Saudi children with language disorders.

3.1 The questionnaire distributed to Saudi speech-language therapists

A questionnaire was distributed to 20 speech-language therapists in the period between 1/1/94 and 12/2/94.

3.1.1 Aims of the questionnaire

The first purpose of the questionnaire was to investigate speech-language therapists' views regarding child language testing procedures used in Saudi Arabia at that time. The second purpose was to discover their expectations and recommendations for a newly constructed language test for Saudi children.

3.1.2 Questions asked in the questionnaire

Speech-language therapists were asked to identify the way they use assessment procedures at their clinics to assess children's expressive and receptive language. After a brief explanation of the difference between norm-referenced and criterion-referenced tests, they were asked to state which of the two would be most useful to them. Finally, they were asked to write down the cultural points that needed to be considered when constructing an Arabic language test for children. (See Appendix 2 for a copy of the questionnaire).

3.1.3 Questionnaire results

Thirteen questionnaires were returned and all these therapists indicated the unavailability of an objective test for children's language in Arabic and they expressed their need for such a test. When asked about the procedures they were using, answers were variable. However, most therapists indicated that they were using a combination of three methods: language sampling, direct observation and translated language tests. They reported that the translated language tests they use were culturally inappropriate since they were constructed to satisfy children's needs in western cultures. It was decided at that time to perform some research that would prepare the way for an assessment tool for Saudi children's language.

3.2 The study of Child Directed Speech (CDS)

As was explained at the beginning of this chapter, there were several reasons for studying adult language directed to young Saudi children However the overall aim of the research was to study Saudi children's acquisition of selected morpho-syntactic structures. The CDS study would be one of the sources for picking out both morpho-syntactic structures and lexical items used by adults when they speak to young children. This was to ensure that the structures and items used in the study of language comprehension were those regularly used in oral communication in the home and in the variety of spoken Arabic, and this in turn would make the assessment tool ecologically valid and culturally appropriate. The study of CDS was performed in two stages in which the first stage was a pilot study. The following table presents the time period during which every stage was performed and the number of subjects in every stage.

Table 3.1 Details of the CDS studies including subjects, period and place of implementation of the study.

Stage no.	Study subjects	Period of implementation
Stage I (pilot study)	Five adults and children pairs	1/8/1994 to 1/9/1994
Stage II study	Twelve adults and children pairs	1/9/1995 to 1/11/1995

3.2.1 Stage I (pilot study):

3.2.1.1 Subjects

The conversations of five adults with five children were tape recorded in Riyadh during the period 1/8/1994 to 1/9/1994. The following table indicates the ages of the children and adults and the relationship between the adult and the child.

Table 3.2 Stage I study subjects' details.

Child no.	Age and gender of the child	Age and gender of the adult	Relationship of the adult to the child	Adult's education
1	5;1 (a girl)	19 (a female)	Sister	University student
2	4;0 (a boy)	19 (a female)	parent's friend	University student
3	4;0 (a girl)	17 (a female)	Parent's friend	High school diploma
4	3;6 (a boy)	33 (a male)	Father	Bachelor degree
5	3;2 (a boy)	30 (a male)	Uncle	Bachelor degree

There were some cultural/religious constraints on the subjects' selection because women in Saudi prefer not to be heard by strangers. For that reason, I was required to ask my two sisters to make conversations with three children. The other two subjects were men, one making conversation with his son and the other with his nephew.

3.2.1.2 Method

Every adult was asked to conduct conversation freely with the child and no activity was specified. The adult was instructed to speak naturally with the child and try not to force the child to talk. There was nobody present during the recording situation except the participating adult and the child. An analysis of both the grammatical structures and the lexical items used by adults was performed. It was found that the use of morpho-syntactic structures and lexical items was very limited. The reason was that the adults on the tapes treated the task as an interview and were only asking questions and the children were answering, which led to little conversational data. This might be because participants were not given a context for conversation such as a toy to play with or a task to complete. There was little initiation from the children, which is another reason for having little conversational data and this is because these three conversations were between a child and an unfamiliar adult (i.e. the adult in these three samples was not a parent, a brother, or a sister). Since our aim is to find out what level of language comprehension is expected of children, it was important to use subjects who have very close relationships to the child. The difficulty of gaining access to Saudi women, especially for me as a man, was the main constraint. This problem could have been overcome by accessing women through a female relative, but, women did not want their voices to be audio-recorded. This is an important point that needs to be taken into account when researching in a very conservative culture like the Saudi Arabian one. Video-recording was not used in place of audio-recording because most study subjects did not want to be video-recorded. It was felt that further data using appropriate procedures was required and to ensure that the sample collected would be more typical of

conversations between parents and their children. This study was treated as a pilot study and changes would be made to improve the quality and amount of data collected.

Points that were considered during the next study of CDS were: instructions to adults should be very clear and adequate; there should be a context for conversation allowing both children and adults to make the conversation as natural as possible and the relationships between adults and children should be very close. Since conversations were to be tape-recorded, women are unlikely to participate in the study for cultural and religious reasons unless they are assured that the recordings will not be heard by any man except a very close relative of theirs. This means that fathers were the most accessible conversational partners with a close relationship to the child.

3.2.2 Stage II study

This part of the study was performed in Riyadh during the period from 1/9/95 to 1/11/95.

3.2.2.1 Subjects

The subjects of this part of the study were 12 fathers conversing with their children. Fathers were friends or relatives of the researcher who were living in Riyadh during the study period. All recordings took place at participants homes. The following table indicates the details of the children and adults:

Table 3.3 Stage II study subjects' details.

Child no.	Age & gender of the child	Age of the father	Child & Adult relationship	Adult's education
1	2;4 (a boy)	34	Father	Bachelor degree
2	2;10 (a boy)	38	Father	Bachelor degree
3	3;2 (a boy)	35	Father	High school diploma
4	3;8 (a boy)	30	Father	Bachelor degree
5	4;3 (a boy)	41	Father	High school diploma
6	5;1 (a boy)	35	Father	High school diploma
7	3;1 (a girl)	34	Father	Bachelor degree
8	3;8 (a girl)	29	Father	Bachelor degree
9	3;10 (a girl)	37	Father	Bachelor degree
10	4;9 (a girl)	35	Father	High school diploma
11	5;2 (a girl)	38	Father	Bachelor degree
12	5;6 (a girl)	40	Father	High school diploma

The children consisted of 6 boys and 6 girls and every child was either a son or a daughter of the adult performing the conversation with him or her. The ages of the children ranged from 2;4 to 5;6 years with an average age of 3;10 years. Boys ranged in age from 2;4 to 5;1 years with an average age of 3;7 years, while girls ranged in age from 3;1 to 5;6 years with an average age of 4;3 years. Children's ages were purposefully selected to represent the age range of the acquisition of language comprehension's study. A parent questionnaire was filled in and it revealed that none of the children were enrolled in school; however, the oldest girl was enrolled in a kindergarten. With regard to the fathers' dialect, they were selected to represent the dialects of three Saudi regions. The distribution of fathers on these three dialects was: eight fathers use the central region's dialect; two use the western region's dialect and two use the eastern region's dialect. Nine families indicated that a non-Arabic-speaking woman worker was helping the family with house work, but none of these workers helped with children's care and they were not playing a major part in language input. This insured that children were reared by fluent speakers of Arabic.

3.2.2.2 Method

Language samples were collected through a free play situation between the adult and the child. Every adult was presented with a number of different toys and was asked to conduct a conversation while playing with the child, trying to make the conversation as natural as

possible. Adults were told that the goal of the study was to find out how they interacted with their children. This was to divert their attention from considering that their speech was the data to be analysed as this might have led to thinking about their conversation which would not have made the conversation so natural. The real goal of the study was explained to every adult in detail at the end of the session. Conversations were tape-recorded and they ranged in length between 30 and 40 minutes. The first two minutes in every conversation were not analysed to give the adult and the child a chance to adapt to the situation. The rest of the conversation was transcribed for both of the speakers. Ninio's (1992, p. 90-91) definition of an utterance "as a stream of speech which had a sentence intonation contour and which was separated by perceptible pauses from other locutions of the same speaker" was considered when conversations were transcribed.

Stage II study was designed to overcome the shortcomings of Stage I in the following ways:

- The relationship between the adult and the child was very close (Stage II subjects were fathers speaking to their sons).
- A set of toys (a group of blocks, a zoo that included different animals, a children's story book, a phone and a group of cars and a garage) was used to make sure that the two speakers (the adult and the child) had something to talk about so that the conversation would not be converted into an interview as had happened in Stage I.
- When giving instructions to the adults, it was stressed that the aim of the study was not to get a sample of the child's speech, as some of Stage I adults were trying their best to stimulate the child to talk.

After the recording session, parents filled in a questionnaire regarding their child and other related information about the family, especially the language used in the home. (See Appendix 3 for a copy of the questionnaire). The results of this study are fully reported in the results section. However, analysis suggested that some of the initially selected structures to

be used in the language acquisition study need to be modified or removed entirely. In addition, some structures needed to be added to the language acquisition study as they were found to be used by the adults when talking to children.

Child Directed Speech data was analysed for their vocabulary content , morpho-syntactic structures and discourse functions. With regard to vocabulary content, the aim was to find out the most frequent vocabulary items and their frequency of occurrence in every father's speech and the number of times every item was used by all fathers. Frequency was used because it would indicate a hierarchy of suitability of words. Thus, most frequent words (across all children) indicated a higher probability that these would be understood by children in the age range. Similarly, low frequent words might suggest a lower probability. The following rules were used when counting the frequency of occurrence of vocabulary items:

1. Only open class words were considered (which are nouns, verbs, adjectives and adverbs).
2. A vocabulary item was included if it had been repeated by fathers at least twice in the whole corpora.
3. Each different item was counted as 'a type'. When the item was repeated it was considered 'a token' even if it was inflected. An example is the noun /wælæd/ *a boy* which is a type while /ʔæwlad/ *boys* is a token.
4. An item was counted as the same type if it denotes either gender.
5. An item was not counted as a token if it was repeated in the same utterance for the purpose of assertion only.

At the morpho-syntax level, a search for the morpho-syntactic structures present in the speech of fathers to their young children was made. (It was considered that some of the searched categories were not structures- such as prepositions- however, they were called morpho-syntactic structures for the ease of writing). The purpose was to get an idea about:

1) the structure of language expected from children to comprehend and 2) the effect of children's age on fathers' speech complexity. The list of grammatical structures that was searched in the speech of fathers were achieved from the following sources: 1) structures which were selected and modified from the three tests of English language comprehension (Section 3.3.2.1); 2) structures which were thought by the researcher to be suitable to be included in an Arabic test of language comprehension and 3) structures which appeared to be frequent structures used by fathers when Stage I pilot study data was analysed. As regards structures that were recommended by the researcher, they were selected on the basis of the researcher's knowledge of Arabic language and from clinical experience (See Table 4.5 for names of the structures that were searched in fathers' speech to their children and the source that suggested every structure).

After preparing the 33 structures (Tables 4.4 and 4.5) to be searched, every utterance was inspected for the presence of any of these structures. Every structure was given a number from 1-33. These numbers were put above the utterance when the structure was found in that particular utterance. With reference to the procedure used for analysis, there are two points that need to be considered: first, some utterances did not include any of these structures as these utterances were sounds or conversational devices such as *all right*; second, some utterances were marked for more than one structure. (See Appendix 4 for some examples). After all 12 samples were analysed, the total number for the use of every structure was counted and presented in Table 4.4.

The other measure used to determine the complexity of fathers' speech to their children was the number of verbs per utterance. This measure was chosen because it provides a descriptive data that indicates whether father's speech to their children gets more complex as children's age increases or not (as shown by the number of verbs per utterance). As indicated in Section 2.1.5, verbs in Arabic show a three-fold mode-aspect distinction which are perfect (past),

imperfect (present) and imperative. The following rules were applied when counting the number of verbs per utterance.

1. All three types of verbs were counted in fathers' utterances, whereas auxiliaries were not counted.
2. A verb was not counted if it was repeated in the father's speech for assertion purposes only.
3. Common denials such as "I don't know" were not counted (Nelson *et al.*, 1973).

Analysis of the discourse functions present in the CDS data was performed next. The coding system used by Hampson & Nelson (1993) was replicated because it was found to be appropriate for the language samples analysed in the current study. In their analysis, they used 12 different codes to identify the purpose of every utterance used by the adult as indicated in Table 3.4. (See Appendix 5 for some examples from the current study). It was found that this coding system was sufficient to include all fathers' utterances and there was no need to modify any of the codes described by Hampson & Nelson.

Table 3.4 The codes used by Hampson & Nelson (1993) for discourse functions

Function	Explanation	Example(s)
Description	Referring to observable aspects of the environment	*That's a doll* *I'm drinking my tea* *He has a big, long nose* *The cup's over there*
Request for information	Open-ended questions, including specific requests for repetition or elaboration	*Who's that? Huh?*
Performatives	Riddles, nursery rhymes, peekaboo routines, dramatic phone talk, songs, reading	
Elicited imitations		*Can you say...*
Referential repetitions	Exact repetition (or including *yes*) of child's noun or multi-word utterance containing noun	
Conventional recasts	Repeats child' utterance in a more conventional form	
Statements	Express beliefs, attitudes or emotions	*Good; I like that* *I'm sleepy* *You just like to pull those* *You cant touch that* *I'll get you some water*
Requests for permission	Including specific requests for confirmation (Yes/no questions) and repetitions of child's utterance with question intonation	*Can I help you?* *Do you want it?*
Request for action	Elicited action from the child whether in the form of commands, questions or embedded commands	*Why don't you...* *Try that one; look at this* *Let's play with this*
Conversational devices	To establish or maintain contact	*Hi, thank you John* (when not commanding action)
Expressive repetitions	Exact repetition of non-noun utterance by child	
Sounds	Meaningless noises	*Ah; Oh; Ahemm*

Varieties of the dialects spoken by fathers was analysed next. Every father's corpus was studied for the presence of words that are specific to that father's dialect. The final analysis made on CDS data was to look for the presence of unusual or non-standard features. This included the use of BT words and non-standard sentences.

3.3 The study of the acquisition of Arabic language comprehension

3.3.1 Aim

The purpose of this research is to study Saudi children's acquisition of language comprehension. Language comprehension is a broad concept, as indicated in the Introduction chapter. There are many different levels and kinds of comprehension and the kind of comprehension assessed in the present study is that of selected morpho-syntactic structures. The survey made of existing language tests in Arabic revealed that a comprehensive test (which because of the young child's limited span of attention and co-operation) is necessarily limited in number of items of a particular kind that can be included. This in turn limits the depth that ability can be explained decreasing the clinical value of such a test. It is especially useful for intervention to have structures indicated which are not comprehended to provide goals in therapy. Since the evidence is that children with language disorders have been found to show difficulty with syntactic comprehension in situations in which context is controlled (see Section 2.2.6), it was decided that this would be the most valuable to develop. In addition since no studies of this kind have been carried out, especially looking at the Saudi variety, the study would also contribute to knowledge of language acquisition.

Data achieved from the current study will be used in future research to construct a clinical test of the comprehension of morpho-syntax, for use by speech-language therapists. For the purpose of the current study some experimental test materials were devised and will be referred to here as the test. This test used:

- Six miniature toys, where the child was asked to manipulate these toys according to the examiner's instructions. These objects were: a chair, a table, a cup, a spoon, a knife and a shoe.
- Pictures, where a statement was presented to the child and he was asked to point to the correct picture out of four. These four pictures consisted of a target and three distracters.

The distracters were lexical and syntactic. (See Section 4.2.4.2 for the difference between the two types of distracters).

The study of the acquisition of Arabic language comprehension was performed in two phases in which the first phase was a pilot study. The following table presents the time period during which every phase was performed.

Table 3.5 Time periods of the two phases used for testing language comprehension studies.

Version no.	Period of implementation
Pilot study	3/2/1995 to 21/6/1995
Main study	1/1/1996 to 17/4/1996

3.3.2 Pilot study

The first version of the experimental test used drawn pictures only and was closely modelled on three existing tests of English. This experimental version was performed in Riyadh during the period from 3/2/1995 to 21/6/1995. This piloted version consisted of the following:

1. **Practice items:** Two plates to train vocabulary items and three plates to train syntactic structures. A plate is an A4 paper containing pictorial representation of four lexical or grammatical items.
2. **Vocabulary Pre-test:** Ten plates testing nouns, six plates testing verbs and three plates testing adjectives. These were all vocabulary items which were present in the target sentences in the test.
3. **Dialect checklist:** Some of the vocabulary items had different names according to the regional dialect of Saudi Arabia. These items were the nouns: *a sheep, a woman, a truck, a cup, a cat, a box, a sofa and a table* and the verbs: *chase, brush, feed, jump, push and climb* and every child was asked to name them. The regional name provided by the child was used later on in testing his comprehension of syntactic structures in order to ensure that the child's failure was due to his miscomprehension of the syntactic structure itself and not due

to miscomprehending the items used in the structure. An example of these dialectal varieties is the word *cup* in the sentence *small cup* /kub ṣɪɣiṛ/ which is called in some regions of Saudi /kub/ and in some other regions /kas/. The child was shown a picture of *a cup* at the beginning of the test and was asked to name it. Then the word he used for *cup* (either, /kub/ or /kas/ was used to test the sentence *small cup*. This meant that if the child's choice was /kub/ the sentence presented was /kub ṣɪɣiṛ/ and if his choice was /kas/ the sentence presented to him was /kæs ṣɪɣiṛ/). Dialect variations were considered in the current study because the aim of the proposed test is for it to be available throughout Saudi Arabia.

4. **Morpho-syntactic structures test:** It contained the following: 16 plates testing the comprehension of sentences with 2 ICW - Information-Carrying Words is the amount of information carried by a request (Knowles & Masidlover, 1982), 8 plates testing the comprehension of sentences with 3 ICW and 84 plates testing the comprehension of specific syntactic structures.

3.3.2.1 The test construction

Structures selection

The structures used in the test were selected on the basis of the following criteria: to represent a range of sentence structures in Arabic that were equivalent to those found to be comprehended at an early age in children speaking other languages, especially English, and to enable these structures to be tested by picture selection. There were three sources for the structures used in the study. First, the CDS study (Stage I study), where the speech between adults and children was sampled and analysed in order to identify the structures that adults use with children and expect them to comprehend. The second source for the structures used in the test was the examiner's own selection of morpho-syntactic structures and the third source was structures selected and modified to Arabic from three tests of children's language

in English. These tests were the TROG (Bishop, 1989), the DLS (Knowles & Masidlover, 1982) and the SCT (Wheldall *et al.*, 1987). Morpho-syntactic structures which were tested in these language tests were considered and expressed in equivalent terms in Arabic language structure. Some structures used in these English tests, especially the TROG, seemed highly artificial (i.e. they were not usually found in the language directed to children). However, they were initially included in this research study because they might be useful in identifying children who use certain comprehension strategies to understand sentences rather than the structure of the sentences themselves. An example of a comprehension strategy is the probable event strategy whereby a child in a comprehension test will treat the sentence *the girl is brushing the women* as a women brushing a girl. This occurred because it is most common for a child to see a women brushing a girl rather than the opposite. Since there are events that are less probable than other events in the Saudi culture, such as the event mentioned in the above example, Saudi children were predicted to use an event probability strategy if their world knowledge cues were so strong to the extent that they will win the competition when they conflict with their linguistic knowledge (such as the example above). It is not until a later age when the child is expected to use his linguistic knowledge in interpreting less probable sentences even when there are strong world knowledge cues.

The term 'morpho-syntactic structures' was used for simplification purposes, yet some of the structures studied, such as post-modified subject which is purely syntactic, do not fit this term. After morpho-syntactic structures were selected, the following step was to develop a group of items to test every structure. Items were either the target tested item or a distracter to make sure that the child chose the correct picture relying on his knowledge of the language structure, and that he did not use a comprehension strategy, or select the correct picture because of a chance factor. Another advantage of controlling distracters is that they will give evidence of the cues used by children of different ages to comprehend language. More

specifically, such distracters are helpful in identifying whether children use their lexical or syntactic knowledge to interpret sentences or both.

Distracters used at the vocabulary level were all lexical which means that every distracter differs from the target item in its lexical meaning. At the morpho-syntax level, in some items the child will respond correctly if he uses his lexical knowledge only, while in other items the child needs to use both his lexical and morpho-syntactic knowledge to respond correctly (see Section 4.2.4.2 for a detailed item analysis).

Items were then refined and modified to adjust the structures they were representing. An effort was taken to make sure that the vocabulary used in the items and the context in which they were used reflected the experiences of Saudi children. This was done through comparing the items to the vocabulary and context used by the Saudi adult when they spoke to their young children. Four items were used at this stage to represent every structure of the 26 morpho-syntactic structures tested making the total number of items 104 items.

The design of test materials

Since the test was directed at children ranging in age from 3;0 to 6;0 years, both verbal instructions on how to respond and materials used needed to be familiar and easy for that age group to understand. This is an important factor when constructing tests of language comprehension. Gillham *et al.*(1995) expressed the importance of such a factor when they stated that one of the problems in constructing tests of receptive language is when the test instruction is more difficult than the language content of the test. The response required from the child in the current study in reply to the examiner's statement was a pointing task. A pointing task was chosen because it was thought to be an easy task for the child to perform and it was appropriate to the material used in the current study. A pointing task was one of the most suitable task for children with expressive language impairments, and especially

since the study is going to be developed later into a clinical language comprehension test. In children with speech and language disorders it is possible to comprehend spoken language, but they have little control over their spoken language output. Picture-pointing tasks, are suitable, according to Miller & Paul (1995), for 2;0 year-olds the age reported for the development of colour terms and picture-pointing tasks fits the study subjects whose age ranged from 3;0 to 6;0 years. One advantage of using picture-pointing tasks is that distracters can be controlled which enables an examiner who aims to test the decontextualised level of comprehension to manipulate both the target and the distracters used.

Regarding test materials themselves, they were coloured drawings that were specially prepared for this particular study by a professional artist. Studies that compared the performance of black and white drawings with coloured drawings such as Straub's (1978) study, found that younger children may be unable to efficiently interpret the black and white illustrations used in most language comprehension tests (Section 2.3). As regards the development of colour terms, it was found to develop between 2;0 and 3;0 years (Andrick & Tager-Flusberg, 1986) and more specifically around the age of 2;6 years (Shatz *et al.*, 1996) where colours such as blue, green, purple, orange, red and yellow develop.

Special care was taken to make the drawings appropriate to the culture in terms of clothing, people's appearance, actions and materials since this point was emphasised by the Saudi speech-language therapists who participated in the questionnaire (Section 3.1). This was achieved through showing the artist some photographs as references. In addition, the artist was instructed to ensure that the pictures followed important cultural practices, such as making people in the picture use their right hand when eating or drinking because this is followed by Saudi people as a part of Islam. Drawings were chosen to be of cartoon type in order to make them attractive to children; however, they were not so attractive that they distracted the child's attention from the main aim of the test. One of the instructions given to

the artist was to take care not to add any additional lines, shading or decorations as this could distract the child's attention. Every vocabulary or morpho-syntactic item was tested by presenting four pictures, a target and three distracters, on an A4 sheet of paper. Every single sheet was laminated by a transparent plastic cover to give it protection.

The test itself at this stage (the pilot study) was composed of two main sections, the vocabulary pre-test and the comprehension of morpho-syntax. In the vocabulary pre-test, the aim was not to test the child's competence at lexicon, but rather to check if the child comprehends the lexical items used in the test of morpho-syntax. This was to ensure that if the child fails a syntactic item it is not because he did not understand one or more of the lexical items used in that sentence, but because he did not understand the syntactic structure itself. The conditions for including a vocabulary item were that it needed to be, depictable, appropriate to culture and used by fathers in the CDS study. A few vocabulary items such as the verbs *feed*, *push* and *cut* were included even though they were not used by fathers in the CDS study. This is because there were limited options of vocabulary items for testing particular structures such as the reversible active which can be only be tested by the use of verbs such as *feed* or *push*.

3.3.2.2 Criteria for selecting the study subjects

Every child participating in the study was required to fulfil the following criteria before he was included:

1. Each child should have Saudi Arabian parents. The child should be brought up by an Arabic-speaking person.
2. Each child should be aged between 3;0 and 6;0 years at the time of testing.
3. Each child should have no physical or mental handicap or impairment of vision, hearing or speech. Other factors for which children were excluded were: brain injury, long term hospitalisation or history of epilepsy as reported by parents.

4. Each child should be reported to have shown average or close to average milestone development in all areas.
5. Each child should not have a history of social deprivation or any severe problems in human relations (e.g. autism) as shown by the nursery records.
6. Each child should not have been living abroad (in a non-Arabic-speaking country) for more than 6 months.
7. Fathers' regional dialect was not considered as a criterion for selecting study subjects as was the case in the CDS study (Stage II).

Parents were required to fill in a questionnaire before the child was tested which covered all these above points. Before the questionnaires were distributed to nursery children's parents, they were piloted on five fathers and modified after the fathers' comments were considered. Parent questionnaires were thought to be the best method to ensure that the screening criteria were met. The completed questionnaire was reviewed to make sure that the child fitted the set criteria. Children were excluded if their parents were not of Saudi origin because the study sample was supposed to be representing Arabic language as spoken in Saudi Arabia. The child should be brought up by an Arabic-speaking person to exclude any children who were brought up by a non-Arabic-speaking house worker. Children who lived in a non-Arabic-speaking country for more than 6 months were also excluded because being exposed to another language might have affected their first language acquisition. Special care was taken not to include children who suffer from behavioural problems as this may affect linguistic abilities and their ability to co-operate in testing. The other criteria set concerned the health of the children. It was ensured through the questionnaire that the children did not have a history of any impairment that might have a negative effect on their speech or hearing abilities. (A copy of the parent questionnaire is included in Appendix 6). In Saudi Arabia children's hearing is not usually assessed unless parents report a hearing problem, unlike the UK where every child's hearing is tested before he completes his first year of life and in his

first year of school education. Thus, parents' opinion of their child's hearing was taken into consideration. As will be mentioned later (Section 3.3.4.2) every child's speech discrimination was assessed before including him in the study.

3.3.2.3 Performance of the pilot test

A pilot test was performed in Saudi Arabia during the period from 3/2/1995 to 21/6/1995.

Subjects

Seventy-eight children were tested at two nurseries. However, only 41 children were accepted by the criteria of the test as revealed by the questionnaire. Children were excluded for the following reasons: 7 children had related speech or language problems when they were young (delayed language or stuttering); 2 children had stuttering at the time of testing; 13 children had been away from Saudi Arabia for a continuous period of more than 6 months; 4 children were not Saudi nationals; 2 children did not have their date of birth stated in the questionnaire and 9 children did not have their parent questionnaire returned. Those children who were excluded should not have been tested in one case; my restricted access due to cultural reasons to the women who carried out the testing on my behalf had led to the inclusion of such subjects. This indicates that the examiners were not sufficiently aware of the importance of the criteria to be met before testing the child.

Reasons for considering this study as a pilot study

A study of the acquisition of morpho-syntax comprehension was repeated and extended for the following reasons:

1. The previous study, which is now considered a pilot study, did not fulfil the aims set out before because the number of subjects was not sufficient.
2. I was unable to supervise the examiners during the testing process.

3. There were apparent discrepancies in the pattern of results from the three examiners (the two women at nurseries and myself).
4. Through my own observations after giving the test to 15 children of my relatives, I observed that some pictures were misleading for the children. This was because either the drawing itself was not clear or what had been drawn did not represent the structure. Such an example were drawings of a woman and a girl where the difference between the two was not very clear. A recommendation to overcome this problem is to make the girl look younger and the woman look older. An example of an item where the picture drawn does not represent the sentence being tested is the sentence *the man is eating,* where a picture of a man holding an apple was used to represent this structure, whereas a better representation of the sentence would be a man biting into an apple.
5. There were syntactic structures which needed to be removed from the study because they rarely occurred in the CDS Stage II study. In addition, there were some structures which were used by fathers in the CDS Stage II study and they were not included in the pilot study.
6. It was found that some of these structures could be tested by ways other than drawings. For this reason some structures were added which could be tested by verbal command only and some others that could be tested by the use of small handy toys.
7. There were some pitfalls in the administration of the previous study. One of them was the inadequate training that the examiners received. Another one was including some children who did not meet the study criteria.

Method

Before the test was carried out, the test items were shown to three local speech-language therapists to get their opinions and comments regarding the test items and the pictures drawn. They made some comments regarding the appearance of some pictures. One suggestion made by them was that in one of the drawings illustrating the statement *the cows are eating*, it was

not clear whether the cows were eating or just standing. The statement was changed to *the cow is eating* because it seemed clearer and appropriate to the distracters in that plate.

The office responsible for nursery schools, which is the General Presidency of Girls' Education, was then contacted in order to get access to subjects. I was told that my test items and pictures needed to be carefully studied by a committee to make sure that they did not include materials that conflicted with the religion or culture. I was told that it would not be possible for me as a man to perform the test at nurseries because all the teachers and workers were women, and access to nurseries by males was not permitted. The solution offered was to find a woman to do the work for me. On this occasion I did not contact them but they were contacted at a later time.

The Department of Psychology at King Saud University was then contacted because the University runs three nurseries. They agreed to get two of their female students to perform the test at the University nurseries. However, I was told that I would not be able to meet these women to train them and the way to convey my instructions to them was through the Head of the Department. In addition to the instructions given via the Head of the Department, written instructions were also included to be read by the examiners.

In the light of these circumstances, I thought it was important to have some direct experience of performing the test, observing responses and discovering any inherent problems in the materials. I therefore tested 15 children who were the sons and daughters of my relatives and friends.

3.3.3 The main study

As stated earlier, a need emerged to repeat and extend the study of the acquisition of language comprehension of some morpho-syntactic structures as the information provided by

the previous study (which will henceforth be referred to as the pilot study) was insufficient. The main study was performed during the period between 1/1/1996 to 17/4/1996.

3.3.3.1 Subjects

One hundred and twenty subjects were tested in this study. As Table 3.6 shows, 20 children were tested at every age group, each group consisting of 10 boys and 10 girls.

Table 3.6 Study subjects' details including their group number, age range and gender.

Group No.	Age range (y.;m.)	Boys	Girls	Total
Group 1	3;0 to 3;5	10	10	20
Group 2	3;6 to 3;9	10	10	20
Group 3	4;0 to 4;5	10	10	20
Group 4	4;6 to 4;9	10	10	20
Group 5	5;0 to 5;5	10	10	20
Group 6	5;6 to 5;9	10	10	20
Total		60	60	120

With regard to the parents' education, the questionnaire filled in by them revealed that most fathers (60%) had completed their secondary or high school, while the other fathers' education ranged from not being able to read and write (3%) to those who hold higher degrees of Master and Ph.D. (3%). (See Table 3.7). The table also shows that mothers received less education compared to fathers. With regard to the father's occupation, Table 3.8 shows that most fathers were government employees (58%), while only 16% were employed in the private sector and 12% ran their own business. The other fathers (14%) were either unemployed (6%), students (4%) or retired (4%). Most mothers were housewives (63%), while 22% indicated that they were students and the rest (15%) were employed in the government, mostly as teachers. (See Table 3.9). The previous results are shown in the following three tables and indicate that parents were of different educational and occupational levels.

Table 3.7 Educational background of study subjects' parents (n=120).

	Does not read and write	Reads and writes	Elementary	Secondary	High school	University	Higher degree
Fathers	4	7	15	28	43	19	4
Mothers	13	20	19	31	26	11	0

Table 3.8 Occupation of study subjects' fathers (n=120).

	Employed by the government	Employed by the private sector	Private business	Other
No. of fathers	70	19	14	17

Table 3.9 Occupation of study subjects' mothers (n=120).

	Employed by the government	House wives	Other
No. of mothers	27	76	26

3.3.4 Modification of test materials

The method and materials employed in the pilot study were again used in this study, but with the following modifications:

1. New structures which were found in the CDS study Stage II were added. This included the addition of the structures: negation (neg. + adj.) such as the sentence *the boy is not fat* and the agentless passive which is the only passive form present in the Arabic language.
2. Five structures were removed. The following table lists the removed structures and the reason for removing each of them.

Table 3.10 Structures that were removed from the test and the reason for removing them.

Structures removed	Reason for removal
Subject Verb Object sentences (where the subject is inflected for number)	The structure has already been tested in S-V sentences (where S is inflected for number and V is present continuous)
Past verb	Pictorial representation was poor
Relative clause	Not applicable to Arabic
Reversible passive	Not applicable to Arabic
Subject-Verb Sentences (where the subject = det.+adj.+n. and the verb is present continuous)	Not common in the Saudi dialect of Arabic

4. Structures were rearranged according to their difficulty. This was done by using the results of the pilot study where a rough order of acquisition according to the difficulty of the

structures was determined. This was important in order to start testing the easiest structure and proceed to the most difficult ones later in the test. This was particularly important when the test was applied to young children, in order not to confront them with the hard structures at the beginning of the test.

5. Vocabulary items which were found to be difficult to understand in the pilot study were replaced, while items which were misrepresented pictorially were redrawn. The following table indicates vocabulary items which were replaced and items which were redrawn.

Table 3.11 Difficult vocabulary items for children to comprehend and the action recommended to deal with them.

Vocabulary word	Children who got it wrong out of 41 children	Action recommended
A man	5	Redraw
A woman	5	Redraw
A truck	5	Replace
White	5	Replace
Read	6	Redraw
Cut	6	Redraw
Wash	6	Replace
Drop	6	Replace
Black	6	Redraw

6. Miniature toys were added to test materials in order to test certain structures which could not be adequately tested by pictures. The toys were used to test the comprehension of prepositions, possessives and complex commands. The toys used were: a table, a chair, a spoon, a cup, a shoe and a knife. The six toys used were chosen first because they were frequent nouns used by fathers when talking to their children in the CDS study Stage II and second for the availability of a suitable object to represent them. (See Appendix 9 for a photograph of the six toys used).
7. The scoring form which was used for the pilot study was modified to make it easier for the examiner to record failed items easily.
8. Every structure was tested by three items instead of four to reduce the length of the test and thereby allowing toys to be incorporated in the study. By reducing the length of the test, it allowed younger children to complete the test in one session. The procedure of using

three items to represent every structure has been applied before in the literature, for example Layton (1976) used three items to test every structure in his study of the comprehension and production of some grammatical structures (Section 2.2.2.2). A child will be considered as master of a certain structure only if he passes all three items testing for the comprehension of that structure. When testing for mastery of certain structures, two questions need to be considered as mentioned by Anastasi & Urbina (1997); first, how many items must be used for a reliable assessment for each of the specific instructional objectives covered by the test and second, what proportion of items must be appropriate for the reliable establishment of mastery. In relation to this current test the number of items is less than the number used in most language tests such as the TROG (Bishop, 1989) and the SCT (Wheldall *et al.*, 1987). However, requiring children to pass all three items in order to pass a structure is expected to adjust the problem of having three instead of four items. Thus a child can be said to comprehend the tested structures if he passes all three items testing for the comprehension of that structure.

9. A screening speech discrimination test was also conducted at the beginning of every test session to ensure that children taking part did not have a hearing impairment. This was added to overcome limitations of parents' subjective impression of their child's hearing.

3.3.4.1 Steps for carrying out the study

The study was carried out according to the following steps:

1. The GPGE was again contacted in order to get permission to perform the test at nursery schools. After reviewing the test items and pictures, permission was given to a selected woman examiner to perform the test in three nurseries.
2. A female native Arabic speaker (hereafter the examiner) was recruited and paid to perform the test since men do not have access to nurseries in Saudi. She received 6 hours of direct training from the researcher and the training took place at King Abdulaziz University Hospital for three sessions each of them lasting for two hours. One of the training goals was

to familiarise the examiner with some administration procedures. She was then given the test to try out on five children at her own home. After that she tested a child aged 3;8 years in front of the researcher and demonstrated excellent competence in the procedure. Subsequently, there were regular weekly meetings between the examiner and the researcher during the test performance period. Such meetings helped in managing other problems that appeared at that time, which were administrative problems for the most part. All meetings with the examiner were attended by her brother for religious reasons.

3. One hundred and fifty questionnaires for parents were distributed in the three nurseries in order to make sure that the children fitted the criteria of the study. Parent questionnaires were then reviewed by the researcher and the examiner was instructed during the weekly meetings about who should be included in the study. Caution was taken when questionnaires were distributed, so as not to give them to non-Saudi families and children who were not in the age range of 3;0 to 6;0 years of age. This was important to keep the exclusion level to a minimum. A child was not tested until the questionnaire had been filled in by his parents and reviewed to ensure that children who participated in the study met the selection criteria.

3.3.4.2 Test protocol

The test protocol (see Appendix 7 for the detailed instructions given to the examiner) included the following:

1. **Play session:** At the beginning of every subject's testing, there was a period of play lasting 2-3 minutes. This was to decrease the likelihood of apprehension on the child's part about talking with a stranger. It was intended that this might also reduce any anxiety the child might feel about the experimental situation.
2. **Dialect words checklist:** Following the short play session, the child was asked to name four nouns and four verbs which were *a cup, a cat, a table, a baby, brush, climb, chase and push.* These eight lexical items were selected because they have different realisations

in the Saudi dialects. The name provided by the child was used in the rest of the test with that particular child to make sure that the child did not fail because he did not understand the vocabulary. Children were presented with 8 plates containing 8 pictures of these items with one picture on every plate. The child was asked to name the nouns by asking him "What is this?", while for the verbs he was asked, "What is... doing?". Children who refused to name an item were asked to point to that item. In this case two pictures were presented to the child, the picture representing the item in addition to another picture serving as a distracter. After that the examiner mentioned the words representing the item one by one until the name that was understood by the child was reached. The name accepted by the child was then used with that particular child during the whole test. (See Appendix 8 for the form and the plates used for the dialect checklist).

3. **Hearing screening:** Since this is a test of language comprehension, it was essential to test the child's hearing to ensure that failure in a structure was not due to difficulty in hearing. Children's hearing was screened through a speech discrimination test instead of a pure tone audiometry screening because a portable audiometer was not available in nurseries. Another reason was that it would be difficult to get permission to use it on children at nurseries. Speech discrimination could be performed by asking the children to repeat words or by asking them to point to pictures or objects. Since the study subjects were young children, a pointing task was used to test their hearing. For the purpose of the hearing test, the six miniature toys which were used in the objects sub-test (a cup, a table, a chair, a knife, a spoon and a shoe) were put on a table in front of the child, making a straight line with a distance of two inches between each one. Thereafter the child was asked to point to each of them by saying to him "Where is the chair? where is the shoe? etc.". The examiner covered her mouth with a piece of paper to prevent lip reading. The intensity of the examiner's presentation level could not be examined; however it is expected that it was around 45 dB since she was instructed to speak in a voice that is

slightly louder than her conversational level. Five children failed at least one hearing screening item and therefore were excluded from the study.

Comprehension of these 6 nouns was not tested prior to the hearing screening because these nouns were thought to be easy for children to comprehend based on CDS data. Accordingly, it was thought that a child who does not understand any of these six nouns is going to have greater difficulty with the other vocabulary items used in the pictures sub-test.

4. **Objects sub-test:** After passing the hearing screening, the child was asked to act out sentences on the toys provided. These nouns were selected because they were found to be frequent words in the CDS study. Structures were tested by objects in the following order: prepositions *in*, *on* and *under*, possessives, prepositions *in front of*, *behind* and *beside* and finally, complex commands. An example of the commands given was *put the knife on the chair* to test the preposition *on*. Another example is *put the spoon behind the shoe and the knife in the cup*, which was used to test the comprehension of complex commands. (See Appendix 9 for this sub-test's form and a photograph of the six objects used).
5. **Vocabulary pre-test:** The instruction to the child was, "I will show you a group of pictures. I want you to point to the one that matches what I say. Some of the questions are very easy. Some of them are more difficult for you to answer. Do not worry and try to answer them all". There were vocabulary practice items at this stage. Practice items were helpful to make sure that very young children understood instructions. After that, vocabulary items were tested and scored. Children were excluded if they made more than 5 lexical errors because failing more than 10% of the items tested was expected to affect the children's ability to perform in the morpho-syntactic structures tested by pictures which followed the vocabulary pre-test. (See Appendix 10 for the vocabulary pre-test form and plates).
6. **Pictures sub-test:** Practice items for the structures tested by pictures were tried after vocabulary testing and before the morpho-syntactic structures were tested. (See Appendix

11 for the plates and the complete list of items used in this sub-test). The examiner was instructed to do the following:

1. Perform the examination in a second session if the child's attention faded during the first session. The examiner reported that she needed to divide the testing into two sessions with 3 children in the age range 3;0-3;6 years.
2. Show the picture to the child first and wait for a few seconds before presenting the sentence to the child to allow him to scan and comprehend the pictures.
3. Present sentences in a clear voice, a slow to normal speed, natural intonation and stress and in a slightly louder voice.
4. Avoid stressing words within sentences particularly those critical to the structure tested, as this will direct the child's attention toward that word.
5. Make sure that the child does not point to the picture until the examiner has spoken the whole sentence. If the child responded prematurely, she needed to ask him to listen, and repeated the sentence again.
6. Ask the child to chose only one picture if he points to two pictures or says "This picture and this picture". In this case, repeat the sentence again and score the child's response to the second presentation.
7. If the child's attention has been distracted during the delivery of the sentence or if he appeared not to listen carefully to the sentence, repeat the sentence once after directing him to listen carefully
8. Repeat the instructions again if the child seems to have forgotten instructions or requests a repetition.
9. Present pictures in such a way that they are visibly close enough for the child to identify them.
10. Repeat instructions if she observes that the child was persistently pointing to a certain position in a row of pictures.

11. Not to show the child any form of feedback in response to his answers, throughout the study.

3.3.4.3 Testing situation

The testing room in the three nurseries was free of anything that may distract the child's attention (i.e. pictures or toys). The examiner was instructed not to indicate the correct answer by looking at the correct picture. Testing time for the whole test ranged between 40 and 75 minutes.

3.3.4.4 Re-testing:

Nine children were re-tested within 2-3 weeks of the initial testing session for the purpose of estimating test re-test reliability. Reliability is important in that it confirms the stability of the examiner, the test and the testing situation. Care was taken to include children of different age groups of each gender. The following table indicates subjects who were re-tested including their age and gender.

Table 3.12 Age groups and gender of the nine children who were re-tested.

Child	1	2	3	4	5	6	7	8	9
Age group	5;6-5;9	5;0-5;5	5;0-5;5	4;6-4;9	4;6-4;9	4;0-4;5	4;0-4;5	3;6-3;9	3;0-3;5
Gender	Girl	Girl	Girl	Boy	Girl	Boy	Boy	Boy	Boy

3.3.4.5 Scoring

The following rules apply for scoring:

1. In the objects sub-test, the scoring was either correct or incorrect. Precaution was taken to ensure that the way of scoring did not give the child a clue at to whether his response was correct or incorrect. To achieve this, the examiner was asked not to make the recording form visible to the child.
2. In the vocabulary pre-test and the picture sub-test, a box with four sections was put beside every item in the form with the correct answer crossed with a black pen. The examiner's job

was to cross the child's response (whether correct or not) with a red pen. This enabled the examiner to easily recognise whether the child's answer was correct or not.

3. All items were tested. A structure was considered to be understood if the child passed all three examples of that structure in the test.
4. If the child failed three consecutive structures, the first item from the following structures was tested to see if any of these were understood. If the child answered any of these screening items correctly, the other two items in that structure were tested as well. If he failed this item too, the next structure (first item) was attempted until the end of the test was reached. This procedure was used in order to ensure that the child did not feel discouraged if he had to carry on answering difficult items (at the same time). By doing so one was assured that the child would be tested on a sample of all the structures. Although structures were ordered according to the results of the pilot study, we did not know at the time of testing whether this order was the actual order of acquisition or not. Stopping testing after three failures might have meant that data on later structures was omitted.
5. The scoring form was designed to be very simple in a way that allowed the examiner to record the child's answer whether it was the correct answer or not. The form was designed to enable the examiner to determine the type of error (lexical or grammatical) made by the child.
6. A maximum score that a child would get in the objects sub-test was 12, while it was 21 for the pictures sub-test. Accordingly, the maximum total score would be 33. (See Appendices 9 and 11 for these two sub-tests' forms).

Chapter Four

Results

The Results Chapter starts with the results of the Child Directed Speech (CDS) study and follows with results of the main language comprehension study. The language comprehension study results are presented in 3 sub-sections. The first sub-section presents results of the pre-testing procedures which consisted of: dialect words checklist, hearing screening and receptive vocabulary pre-test. The second sub-section deals with the results of the language comprehension test which was done through the use of objects and pictures. An order of acquisition of the tested structures based on the test results is presented next. The final section of this chapter contains reliability results.

4.1 Results of the Child Directed Speech (CDS) study

The results of the CDS presented in this chapter are the results of Stage II CDS study which analysed the speech between 12 fathers and their children. The first 160 utterances of each conversation from Stage II were analysed. Although some conversations produced more utterances, no conversation produced fewer than this number of utterances. The results of the CDS will be divided into three sub-sections: one which studies the vocabulary, another which studies the morpho-syntactic structures and the other that studied the discourse functions present in the CDS data.

4.1.1 Vocabulary structure of fathers' speech in the CDS study

Vocabulary items used in the CDS study were analysed. The frequency of occurrence of only the open class words was counted. All open class words that were repeated at least twice in the whole corpus are presented in Appendix 12. The following table presents only words which were used later in the test of language comprehension. Words were included in the test if they were frequent in the fathers speech and were pictureable. Some low frequency words such as

the noun *table* were included because it was judged that they were likely to meet thecriterion of familiarity and pictureability.

Table 4.1 Vocabulary items and their frequency of occurrence in the speech of the 12 fatherss. (Only items that were included in the comprehension test are presented). B=Boys and G=Girls. Means were calculated by dividing the number of times an item was used by all fathers by the total number of fathers (i.e. 12).

Vocabulary item	B 2;4	B 2;10	G 3;1	G 3;2	B 3;8	G 3;8	G 3;10	B 4;3	G 4;9	B 5;1	B 5;2	B 5;6	Sum	Mean
A car	0	0	0	0	0	0	8	0	0	9	14	15	46	3.83
A horse	12	0	4	11	0	5	3	0	2	1	7	0	45	3.75
Big	0	2	2	2	10	6	0	2	1	0	9	8	42	3.50
A boy	2	0	1	0	2	1	0	2	8	6	7	2	31	2.58
Red	0	7	2	3	0	3	1	0	0	2	5	8	31	2.58
Put something in	0	0	1	0	0	9	0	0	9	0	2	0	21	1.75
Play	0	1	0	0	7	3	0	0	0	0	7	2	20	1.67
Small	0	0	0	1	6	2	0	0	1	4	5	0	19	1.58
Drink	0	1	0	2	8	0	2	3	1	0	0	0	17	1.42
Eat	0	0	0	1	9	0	1	0	2	0	0	0	13	1.08
Sit	2	0	1	1	1	2	1	3	0	0	0	2	13	1.08
A chair	0	0	1	0	0	0	1	0	0	5	3	1	11	0.92
Broken	0	0	0	1	0	0	3	0	0	1	3	2	10	0.83
A ball	0	0	0	0	0	0	0	7	0	1	0	0	8	0.67
A cup	2	0	3	0	1	0	0	0	0	0	0	0	6	0.50
A man	0	0	1	0	0	0	3	0	0	1	0	1	6	0.50
Long	0	0	0	0	0	0	0	0	0	0	3	3	6	0.50
Run	0	0	0	0	0	0	0	0	0	0	5	0	5	0.42
A plate	3	1	0	0	0	0	0	0	0	0	0	0	4	0.33
Tear	0	0	1	3	0	0	0	0	0	0	0	0	4	0.33
Walk	0	0	0	0	0	0	0	0	0	0	0	4	4	0.33
A girl	0	0	0	0	1	0	0	0	0	0	2	0	3	0.25
A women	0	0	0	0	0	0	1	1	0	1	0	0	3	0.25
Brush	0	3	0	0	0	0	0	0	0	0	0	0	3	0.25
Brown	0	0	0	0	0	0	0	0	0	1	2	0	3	0.25
A baby	0	0	1	1	0	0	0	0	0	0	0	0	2	0.17
A bag	0	0	0	0	0	1	0	0	1	0	0	0	2	0.17
A book	0	2	0	0	0	0	0	0	0	0	0	0	2	0.17
A cow	0	0	0	0	0	0	0	0	2	0	0	0	2	0.17
A pen	0	2	0	0	0	0	0	0	0	0	0	0	2	0.17
A shoe	0	0	0	0	0	0	0	1	1	0	0	0	2	0.17
A spoon	0	0	1	1	0	0	0	0	0	0	0	0	2	0.17
Fat	0	0	0	0	0	0	0	0	0	1	1	0	2	0.17
A box	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08
A ladder	0	0	0	0	0	0	0	0	1	0	0	0	1	0.08
A table	0	0	0	0	0	0	0	0	1	0	0	0	1	0.08
Black	0	0	0	0	0	0	0	0	0	1	0	0	1	0.08

A feature noticed in the corpora of three fathers is the use of BT words. Situations where fathers used BT words were recorded and they are presented in the following table.

Table 4.2 Occasions where three of the fathers used BT words.

Child	Utterance no.	BT words used by the father	Explanation of the BT word used
B 3;2	2 - 3 - 27	/nunu/	Baby
B3;2	60 - 61	/ʔæmu/	Uncle
B 3;8	149	/kɪr̩ kɪr̩ kɪr̩ kɪr̩/	Sounds that describe someone laughing
G 4;9	40	/ʔumbaʔ/	Sounds that describe an animal
G 4;9	71	/ʔæl-ʔar̩nub/	The rabbit
G 4;9	73	/dæbdub/	The beer
G 4;9	74	/wæg̩ wæg̩ wæg̩/	The sound of a duck
G 4;9	87	/ku ku ku ku/	The sound of a chicken

4.1.1.1 Dialect variations between fathers

Dialects spoken by the fathers are thus: 8 fathers speak the central region's dialect, 2 fathers use the western region's dialect and 2 fathers the eastern region's dialect. The previous classification of fathers' dialects was based on the region they were from. There were minor dialectal variations between fathers, mainly in the vocabulary they were using. Since most fathers speak the central region's dialect, their dialect will be used as a reference to which the speech of the other 4 fathers can be compared. Thus any variation from the dialect of the 8 fathers was reported. (Although the dialect of these 8 fathers was used for comparison, this does not mean that they speak the standard dialect). The following table demonstrates words that varied according to the father's dialect in the sample.

Table 4.3 Words which vary according to the fathers' dialects.

The child	The father's regional dialect	The word	The other varieties of the word
G 3;1	Western	/daɦin/ *now*	/halɦin/
G 3;1	Western	/kamæn/ *more*	/bæʔæd/
B 3;2	Western	/daɦin/ *now*	/hælɦin/
B 3;2	Western	/tsalɪm/ *to kiss*	/tɦɪb/
B 3;2	Western	/ʔamu/ *uncle*	/ʕam/
5;1	Eastern	/bala/ *yes*	/naʔæm/
5;1	Eastern	/jṭalɪʕ/ to *watch*	/jeʃuf-jnæḍɪr̩/
5;1	Eastern	/wæjæ/ *with*	/mæʕ/
5;1 & 5;6	Eastern	/ʔɪnɦɪṭ/ *we put*	/nɦɪt/
5;1 & 5;6	Eastern	/ʔælɦin/ *now*	/hælɦin/
5;1 & 5;6	Eastern	/ʃɪnhi/ *what is it*	/weʃi/
5;1 & 5;6	Eastern	/ʃɪtsæmih/ *what do you call it?*	/wɪʃ-tsæmih/

4.1.2 Syntactic complexity of fathers' speech in the CDS study

As mentioned earlier, the 12 fathers' speech to their children was analysed in terms of the lexicon and the structure used. Results of the morpho-syntactic structures analysis will be seen in Table 4.4 which represents the frequency of occurrence of the searched structures and Table 4.5 gives the names of the structures that correspond to structure number given in Table 4.4.

Table 4.4 The frequency of occurrence of the searched morpho-syntactic structures produced by each of the 12 fathers. The structures that correspond to every number are presented in Table 4.5. All structures except Structures 30, 31, 32 and 33 were used later in the language comprehension test. Means were calculated by dividing the number of times a structure was used by all fathers by the total number of fathers (i.e. 12).

Structure	B 2,4	B 2,10	G 3,1	B 3,2	B 3,8	G 3,8	G 3,10	B 4,3	G 4,9	B 5,1	B 5,2	B 5,6	Total	Mean
29	78	35	87	63	75	29	106	51	95	56	127	108	910	75.8
1	5	6	26	28	49	29	38	23	55	22	25	45	351	29.3
2	17	22	21	23	21	42	25	27	16	49	38	23	324	27.0
6	14	16	10	16	27	19	13	35	17	26	23	45	261	21.8
18	23	32	11	23	45	20	10	3	8	19	17	21	232	19.3
16	4	5	9	14	7	11	10	12	7	23	23	21	146	12.2
33	2	3	24	14	11	17	14	4	3	12	18	7	129	10.8
28	6	5	3	7	14	3	6	6	14	19	8	18	109	9.1
31	6	5	3	1	14	13	5	7	7	16	10	10	97	8.1
4	0	6	5	1	4	11	8	11	7	11	7	22	93	7.8
24	0	8	19	2	3	5	4	4	0	6	5	6	62	5.2
8	8	2	0	0	5	3	10	4	0	3	2	6	43	3.6
9	1	5	3	7	7	1	2	3	2	6	4	2	43	3.6
20	0	0	2	1	2	5	3	1	0	1	10	7	32	2.7
10	0	0	1	0	0	0	0	0	1	4	5	11	22	1.8
12	0	0	1	0	1	0	0	0	0	8	2	3	15	1.3
15	1	0	0	1	0	0	3	1	3	2	1	2	14	1.2
32	1	3	1	1	0	0	6	1	1	0	0	0	14	1.2
14	0	0	0	0	0	1	2	1	0	2	0	3	9	0.8
19	0	0	0	0	0	0	0	0	0	1	0	7	8	0.7
23	0	1	1	2	0	0	2	0	0	0	1	0	7	0.6
11	0	0	0	0	1	0	0	0	1	2	0	2	6	0.5
27	0	0	0	0	0	1	0	0	0	4	0	0	5	0.4
30	0	0	0	0	0	0	0	1	0	0	0	4	5	0.4
7	0	0	0	0	1	1	0	0	0	1	0	1	4	0.3
17	0	1	0	3	0	0	0	0	0	0	0	0	4	0.3
25	0	0	0	0	0	0	0	0	1	1	1	0	3	0.3
3	0	0	0	0	0	0	0	0	0	0	0	2	2	0.2
5	0	0	0	0	0	0	0	0	0	0	1	0	1	0.1
13	0	0	0	0	0	0	0	0	0	1	0	0	1	0.1
21	0	0	0	0	0	0	0	0	0	0	1	0	1	0.1
26	0	0	0	0	0	0	0	0	0	0	1	0	1	0.1
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0

Table 4.5 Names of structures corresponding to numbers of structures in Table 4.4. The numbers in the source column correspond to: 1) structures selected and modified from the three tests of English language comprehension (Section 3.3.2.1), 2) structures recommended by the researcher and 3) structures which emerged after analysing the CDS data (Stage I pilot study).

No.	Structure	Example	Source
1	Verbs inflected for gender V+(S=0)	/ta-kɪl/ (she eats)	2
2	Objects inflected for gender and the subject is hidden	/ja-kɪl-hæ/ (he eats it)	2
3	Verbs inflected for gender V+(S=0)+O	/ja-gṛa-kɪtab/ (he reads a book)	2
4	Plural nouns	/sajaṛ-at/ (cars)	2
5	Dual nouns	/sajaṛ-tin/(two cars)	2
6	Plural verbs	/ja-kl-un/ (they eat)	2
7	Subject - Plural verbs	/aṛ-ṛigæl ja-kl-un/(men eat)	2
8	V - O (where the object is inflected for number)	/ja-kɪl muztin (he eats two bananas)	2
9	On	/ʔala/ /fug/ (on)	2
10	In	/fi/ (in)	2
11	Behind	/wæṛæ/ (behind)	2
12	In front of	/gɪdam/ (in front of)	2
13	Between	/beɪn/ (between)	2
14	Beside	/ɟæmb/ (beside)	3
15	Under	/tæħæt/ (under)	2
16	Negated Verbs	/ʔæl-wælæd mæ-jæl-ʔæb/ (the boy is not playing)	2
17	Negated adjectives	/ʔs-jaræh mahi ħamṛæ/ (the car is not red)	3
18	Adjective	/kɪbiṛ/ (large)	2
19	Adjective + Adjective	/kɪbiṛ ʔæħmæṛ/ (large red)	1
20	Comparatives	/ʔæs-ʔɪkin ʔaṭwæl mɪn ʔæl-gælæm (the knife is longer than the pen)	2
21	And (V and V or Adj. and Adj.)	/ʔæl-wælæd wagɪf wjaʃṛæb/ (the boy is standing and drinking)	1
22	But	/ʔæl-wælæd wagɪf bæs ma-jæʃṛæb (the boy is standing but not drinking)	1
23	Passive sentences	/ksiṛ ʔæl-gælæm/ (the pen was broken)	2
24	Possessives	/kub-ɪk/ (your cup)	2
25	Subject + Verb + Complement	/ʔæl-wælæd ʔæli θubuh ʔæswæd jæ-ʃṛab/ (the boy with black clothing is drinking)	1
26	Post modified subject within a S-V-C clause	/ʔæl-wælæd ʔæli jælħag ʔalħṣan sɪmin/ (the boy chasing the horse is fat)	1
27	Complex commands (two commands or more)	/ṭæf ʔæl-læmbæh wṣɪk ʔæl-bab/ (put the light off and close the door)	3
28	Prepositions inflected for gender or number	/fuga-ha/ (on her) /fug-hum/ (on them)	3
29	Singular nouns	/sajaṛæh/ (a car)	3
30	Adjectives inflected for gender	/kɪbiṛ-æh/ (she is large)	3
31	Nouns inflected for gender	/kuṛæt-hæ/ (her ball)	3
32	Negated prepositions	/mæhu fug/ (it is not on)	3
33	Past Verbs	/nam/ (slept)	3

Table 4.4 indicates, the most frequent structures used by fathers were singular nouns (structure 29), which was used 910 times (mean frequency 75.8) and verbs inflected for gender (structure 1), which was employed 351 times (mean frequency 29.3), compared to structures selected from the English tests of language comprehension such as Structure 8 which was found to be used by fathers 8 times only. This result indicates that structures recommended by the researcher and structures recommended after analysing the CDS data (Stage I pilot study) were repeated frequently, while structures selected from the English tests of language comprehension were the least repeated structures.

When looking at the total number of times the 33 structures were used by every father (Table 4.6), it was observed that fathers of the older children used more structures compared to fathers of the younger ones (compare, for example father of child 1 who used the searched structures 166 times, to father of child 12 who used them 376 times).

Table 4.6 Number of different structures used by every father and the number of times these structures were used after analysing the first 160 utterances of every father's corpus.

Subject no.	1	2	3	4	5	6	7	8	9	10	11	12
Subjects Gender and age	B 2,4	B 2,10	G 3,1	B 3,2	B 3,8	G 3,8	G 3,10	B 4,3	G 4,9	B 5,1	B 5,2	B 5,6
No. of times the 33 structures were used by every father	7	14	7	9	16	17	20	15	22	16	18	23
No. of different structures out of the 33 used by every father	13	16	17	17	17	17	18	18	16	24	22	23

The other measure used to determine the syntactic complexity of fathers' speech to their children was the number of verbs used by every father per utterance. Studies of children speaking other languages such as English have shown that the number of verbs used by fathers increase as their children get older (for example Hoff-Ginsberg's, 1985 study). The following table demonstrates the number of verbs used in the first 160 utterances of every father's corpus.

Table 4.7 Number of verbs used by every father.

Group	No.	The child's gender and age	Number of verbs said by the father in his first 160 utterances	Number of verb(s) per utterance*
I	1	B 2;4	53	0.33
	2	B 2;10	78	0.49
	3	B 3;1	89	0.56
	4	B 3;2	79	0.49
Mean		2;10	74.75	0.47
II	5	B 3;8	133	0.83
	6	G 3;8	124	0.78
	7	G 3;10	125	0.78
	8	B 4;3	111	0.69
Mean		3;10	123.25	0.77
III	9	G 4;9	119	0.74
	10	B 5;1	139	0.87
	11	B 5;2	103	0.64
	12	B 5;6	113	0.71
Mean		5;1	118.5	0.74

* This was computed by dividing the number of verbs used by the father by the total number of utterances said by the father (i.e. 160).

The relationship between the child's age and the number of verbs per utterance produced by his father was tested statistically by Spearman's rank correlation. Statistical testing resulted in a significant relationship ($r=0.567$ and $p< 0.05$), however the coefficient of determination (r^2), which is the square of the correlation (r), equals to:

$$r^2=(0.567)^2 =0.32$$

this suggests that 32% of the variability in verbs per utterance can be a direct effect of the age factor.

In relation to the syntactic complexity of fathers' speech, it was expected that fathers will try not to use as many inflections as they use when speaking to adults for simplification reasons. However, this was not true as none of the fathers has deleted an inflection from his speech. The other observation in that respect is that one of the fathers (the father of the child B 2;10) replaced the pronoun *me* in the phrase *for me* by a noun *for daddy* and the pronoun *you* in the phrase *for you* by the name of the child *for Suliman*. None of the other 11 fathers was observed to use such a strategy which indicates that it is specific to the father of child B 2;10.

4.1.2.1 The use of non-standard sentences

A striking observation noticed in the speech of 5 out of the 12 fathers is the use of what can be called 'non-standard sentences'. Non-standard sentences will be used here to refer to sentences which include at least an element that violates the rules of Arabic grammar. In most of these sentences the use of the wrong gender caused the sentence to be non-standard. The following table shows the non-standard sentences and the children whose fathers used these sentences.

Table 4.8 The non-standard sentences and children whose fathers said these sentences. Where (m.)= masculine gender and (f.)= feminine gender. The numbers between brackets are the utterance number in the child's (Chi) and father's (Fa) corpora

No.	Child	The ungrammatical sentence	Description of the error
1	B 2;10	Chi (19) /baba hɪna/ *here daddy* Fa (101) /la haθa mateɟi hɪna/ *no this* (m.) *does* (f.) *not fit here*	The father used the wrong gender when he said *this* (m.) - it should be (f.)
2	B 2;10	Fa (106) /ʔwæṛik ʔæl-kutub fih ṛʊsum-æt ħɪlw-æt/ *let me show you the books, it has nice drawings*	The father used the wrong number when he said *it* - it should be *they*
3	B 2;10	Chi (29) /hɪnæ/ *here* Fa (126) /whaði wɪʃu/ *and what* (m.) *is this* (f.)	The father used the wrong gender when he said *what* (m.) - it should be (f.)
4	B 2;10	Fa (109) /taʔal nɪ-ʃuf ʔæl-kutub fih ṛusum-at/ *let me show you the books, it has drawings*	The father used the wrong number when he said *it* - it should be *they*
5	G 3;1	Chi (5) /ħæg ʔæl-ħṣan/ *for the horse* Fa (29) /haða ħæg ħṣæn taħæt/ *this is for the horse* (m.), *it dropped* (f.)	The father used the wrong gender - he said *dropped* (f.) instead of (m.)
6	G 3;8	Chi (34) /madṛi ṣuṛæt lɪʔbat/ *I don't know! pictures toys* Fa (74) /ɟɪbhɪn χ̣æl nɪʃuf/ *bring them to see* Fa (81) /ṣuṛat haði tsæwi zæi kɪðæ/ *these pictures do like this*	In utterance number 34, the child pluralised the two nouns (*pictures* and *toys*) incorrectly. The child's mistake was not repeated by the father immediately; however it was repeated after a few utterances (utterance 81). The kind of error made by the child and the father was pluralising regularly a noun that has an irregular pluralisation
7	G 3;8	Fa (98) /la ʔæli mælæʔæbna bɪhɪn lɪʔb-at ɟɪdid-at/ *no the ones we did not play with are new toys* Fa (125) /wɪʃ mæʔnæ mnæl-ɪʔʔbat/ *what toys do we have*	The father pluralised the noun (*toys*) incorrectly by pluralising it regularly while it should be pluralised irregularly
8	G 3;10	Chi (23) /wbæʔdin nsæwi/ *and then we do* Fa (31) /humɪn bæʔdæh ʔælʔzṛɪgæh/ *and after that* (m.) *the blue one* (f.)	the father used the wrong gender when he said *the blue one* (f.). It should be (m.)
9	G 3;10	Chi (89) /wi/ *the sound of the ambulance* Fa (149) /ʔæl-ʔɪsʔaf ʃalæt ʔæṛ-æɟal/ *the ambulance* (m.) *took* (f.) *the man*	the father used the wrong gender - he said *took* (f.). It should be (m.)
10	B 5;2	Fa (137 & 138) /χ̣ælæh jṭælʔ-un gɪdam/ *let it* (sing.) *look* (pl.) *ahead*	The father used the wrong number - he said *it*; it should be *them*

The above table shows that three reasons caused some the five fathers' sentences to be non-standard. They used the wrong gender, as in 1, 3, 5, 8 and 9, the wrong number, as in 2, 4 and 10 or made incorrect pluralisation, as in 6 and 7. Three fathers used the wrong gender- the fathers of children B 2;10, G 3;1 and G3;10- while two fathers used the wrong number- the fathers of children B 2;10 and B5;2. With regard to the incorrect pluralisation, it was done twice by one father only (the father of the child G 3;8). On all three occasions when fathers used the wrong number, they used the singular in places where they should have used the plural. Such use of non-standard sentences may be attributed to the fathers' attempt to simplify their language when talking to their children. Language simplification was found by many researcher to be a feature of the CDS (See Section 2.2.9). Another proposed reason is that fathers use these non-standard words because they treat inflection (mainly number and gender inflections as shown in the above table) as non-essential to meaning. It is expected that these non-standard sentences are not used in adult directed speech; however, further research needed to investigate this issue.

4.1.3 Discourse functions present in the CDS study

One of the aims of conducting CDS study was to look for discourse functions used by Saudi fathers when speaking to their children. As mentioned in Chapter 3, the coding system used by Hampson & Nelson (1993) was replicated in the current study. It was found that the coding they used was sufficient to code all utterances spoken by the 12 fathers and there was no need to add extra codes. (See Table 3.4 for a description of the 12 codes and Appendix 5 for examples). The following table indicates the number of times every father used these functions in his speech to his child.

Table 4.9 The discourse functions present in the first 160 utterances of every father's speech.

Function	B 2;4	B 2;10	G 3;1	B 3;2	B 3;8	G 3;8	G 3;10	B 4;3	G 4;9	B 5;1	B 5;2	B 5;6	Sum	Mean	Range	Percent	S.D.
Request for information	30	43	46	48	70	39	42	66	63	50	58	43	598	49.8	30-70	31.1	12.0
Statements	46	56	44	37	26	34	35	27	24	31	22	47	429	35.8	22-56	22.3	10.6
Description	23	23	26	32	36	21	22	28	45	29	37	40	362	30.2	21-45	18.9	7.8
Request for action	36	20	22	25	12	40	27	8	15	30	16	22	273	22.8	8-40	14.2	9.5
Conversational devices	22	15	14	15	16	17	13	18	11	15	9	5	170	14.2	5-22	8.9	4.4
Referential repetitions	1	2	1	1	0	1	4	2	0	2	11	0	25	2.1	0-11	1.3	3.0
Conventional recasts	0	1	0	0	0	6	8	0	0	1	4	2	22	1.8	0-8	1.1	2.7
Performatives	0	0	6	0	0	0	7	5	0	0	0	0	18	1.5	0-7	0.9	2.7
Expressive repetitions	1	0	1	1	0	0	1	3	0	0	2	1	10	0.8	0-3	0.5	0.9
Sounds	0	0	0	0	0	0	0	3	2	0	1	0	6	0.5	0-3	0.3	1.0
Request for permission	1	0	0	0	0	2	1	0	0	2	0	0	6	0.5	0-2	0.3	0.8
Elicited imitation	0	0	0	1	0	0	0	0	0	0	0	0	1	0.1	0-1	0.1	0.3

4.2 Results of the Saudi children's language comprehension study

4.2.1 Results of the pre-testing procedure

4.2.1.1 Dialect words checklist

Children were asked to name eight pictures representing four nouns and four verbs which have different names in the Saudi dialects. The name given by the child to each of these eight items was then used all through the test when presenting test sentences. The examiner reported that younger children were hesitant to name these items. However, they selected them out of the two pictures presented when their names were spoken by the examiner (Section 3.3.4.2).

4.2.1.2 Hearing screening

Five children were excluded from the study when they failed at least one of the six pointing tasks in the hearing screening. It must be noted here that some of these five children might have failed for not comprehending the noun being tested and not for a potential hearing problem. However, as indicated in Section 3.3.4.2, a child not comprehending any of these six nouns is expected to have a greater difficulty with the other vocabulary items tested by pictures and therefore was excluded.

4.2.1.3 Results of the receptive vocabulary pre-test

A vocabulary pre-test preceded the language comprehension test in order to check if the child comprehended the lexical items used in the test of morpho-syntax. Fifty-two vocabulary items were tested and they consisted of 25 nouns, 17 verbs and 10 adjectives. Every vocabulary item was tested by presenting four pictures, a target and three distracters, on an A4 sheet and the child was required to point to the correct picture. None of the children were excluded from the study for failing more than 5 items which meant that none of the children made more than 5 wrong choices in the vocabulary pre-test. Forty items out of the 52 were passed by all children, while the remaining 12 were not comprehended by 3 children or more (all vocabulary items are listed in Appendix 12). The 12 items failed consisted of 7 verbs, 5 nouns and no adjectives

as presented in Table 4.10 which shows these 12 items and the numbers of children who failed them in every age group. Boys and girls' scores are presented separately and they are summed up in the bottom row to show the items failed by every age group.

Table 4.10 Number of children who failed the12 lexical items at every age group (n=10 at every age group).

Age groups	3;0 to 3;5		3;6 to 3;11		4;0 to 4;5		4;6 to 4;11		5;0 to 5;5		5;6 to 5;11		Total
Gender	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
Feed	3	3	0	2	1	2	2	1	1	1	0	0	16
Run	2	2	1	2	2	1	1	0	0	0	0	0	11
Cut	1	1	2	1	1	0	0	1	0	1	0	0	8
A girl	1	2	2	0	2	0	0	0	0	0	0	0	7
A woman	0	0	0	1	1	1	0	2	2	0	0	0	7
Read	1	0	1	0	1	0	1	1	0	0	0	0	5
Chase	1	0	1	0	0	0	0	0	0	1	0	0	3
A cow	2	0	1	0	0	0	0	0	0	0	0	0	3
A plate	1	0	1	0	0	0	0	0	0	1	0	0	3
Push	0	1	0	0	0	0	0	1	0	1	0	0	3
A paper	1	1	1	0	0	0	0	0	0	0	0	0	3
Brush	0	1	1	0	0	0	0	1	0	0	0	0	3
Total	13	11	11	6	8	4	4	7	3	5	0	0	
Sum	24		17		12		11		8		0		

As the above 4.10 shows, the verbs *feed*, *run* and *cut* were the most difficult lexical items to comprehend. Out of the 120 children tested, 16 (13%), 11 (9%), 8 (6%) children failed to comprehend these three verbs respectively. The nouns *a woman* and *a girl* came next and were failed by 7 (5.8%) children. Five (4%) children failed the verb *read*, while 3 (2.5%) children failed the lexical items *brush*, *a paper*, *push*, *a plate*, *a cow* and *chase*.

When comparing the performance of girls to that of boys, vocabulary pre-test results do not show any consistent pattern. The girls' performance was superior to that of the boys in the younger age groups, while the opposite occurred in the older groups with boys performing better. (Table 4.10).

The age variable was tested next. The following figure represents the number of vocabulary items passed by every age group.

Figure 4.1 Number of lexical items passed by every age group (n=20).

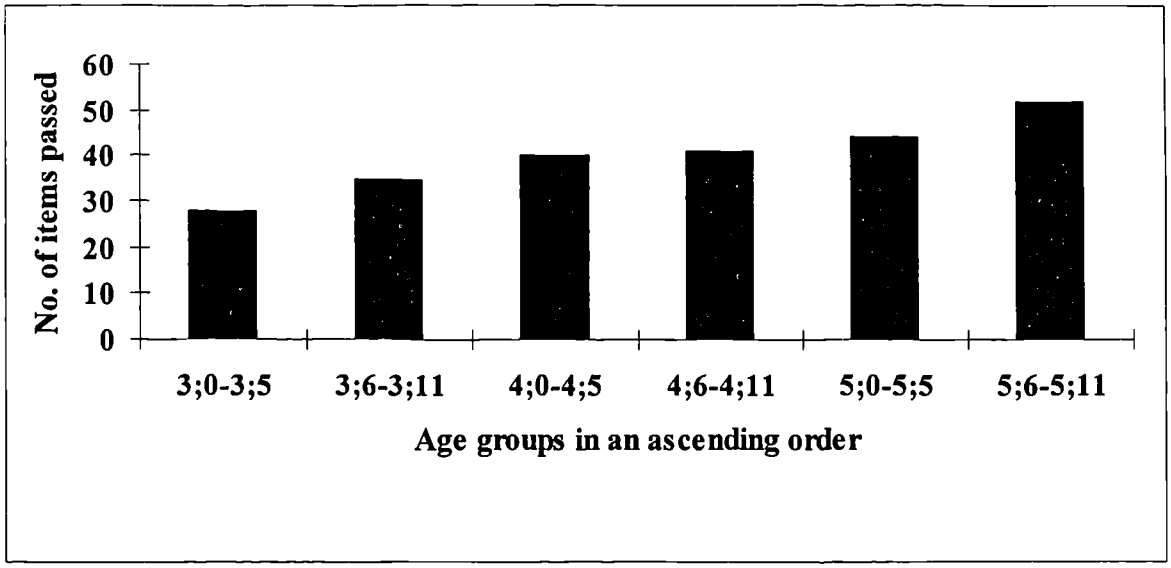


Figure 4.1 clearly shows that older children's performance is superior to that of younger children. Children aged 5;6 to 5;11 years correctly comprehended all the items tested. The number of items passed decreased as children got younger. The number of passes reached its lowest number in the age group 3;0 to 3;5 who passed 28 items out of the 52 items tested. A two way Analysis Of VAriance (ANOVA) was used to test the effect of the age and gender's variables on children's vocabulary pre-test results. Statistical testing results, which is presented in Table 4.11, shows no evidence for the effect of the gender variable but a strong evidence for the effect of the age variable on children's vocabulary scores as children made less lexical wrong choices as they grew older.

Table 4.11 The effect of the age and gender variables as well as their interaction on the scores of the vocabulary pre-test. Significant p-values are identified by a star (*).

Source	DF	SS	MS	F	p-value
Gender	1	0.3	0.3	0.51	0.48
Age	5	16.5	3.3	5.62	0.00*
Interaction of Gender and Age	5	2.6	0.52	0.89	0.49
Error	108	63.4	0.587		
Total	119	82.8			

4.2.2 Results of the test of language comprehension

Results of the two procedures used to elicit children's responses in the test of language comprehension will be presented. In the first procedure, which was testing language comprehension through the use of objects, the total possible score was 12, whereas in the second procedure, which was testing language comprehension through the use of pictures, the total possible score was 21. (See Appendix 13 for the total scores of objects and pictures sub-tests achieved by every child).

The pictures sub-test was designed so that it indicates, in addition to the number of children who pointed to the correct picture, the number of children who pointed to each distracter of the three used. When children's results were analysed, it was noticed that with 6 out of the 63 items used in the pictures sub-test, children were consistent in selecting a certain distracter (distracters will be pointed out later when presenting the results of these 6 items). For this reason the results of these 6 items were excluded from the analysis. (See shaded rows in Table 4.12 and Tables 4.13 to 4.18)

Every item was represented by a target (T) and 3 distracters. An example that illustrates the procedure that was used in recording children's responses is Item 4.1, where 68 children (56.5% of the children tested) selected the second choice (which is one of the distracters), and 2 children selected the first choice (which is another distracter). Having 56.5% children select the wrong choice while their performance was far better in the other two Items (4.2 and 4.3), is an observation that needs further investigation. All structures which appeared to have the problem of over-selecting a certain distracter are presented in Table 4.12.

Table 4.12 Children's choices on the four pictures presented, where the first column represents the number of children who pointed to the target picture and the following three columns represent the number of children who pointed to the distracters. The numbers in the skip column represent the number of occasions which were not tested because earlier items were failed by the child. The shaded cells represent the items that were removed from the test (n=120).

Structure	Target picture	Distracter 1	Distracter 2	Distracter 3	Skip
3-1	97	21	2	0	0
3-2	119	1	0	0	0
3-3	119	1	0	0	0
4-1	50	68	2	0	0
4-2	105	13	2	0	0
4-3	93	22	5	0	0
5-1	102	18	0	0	0
5-2	99	21	0	0	0
5-3	83	30	4	3	0
6-1	117	2	1	0	0
6-2	102	18	0	0	0
6-3	106	14	0	0	0
7-1	116	3	1	0	0
7-2	115	4	1	0	0
7-3	86	28	6	0	0
10-1	102	6	2	0	0
10-2	63	51	4	1	1
10-3	104	15	0	0	1
11-1	94	26	0	0	0
11-2	116	3	0	0	1
11-3	116	2	1	0	1
13-1	62	56	1	1	0
13-2	113	3	2	1	1
13-3	110	7	1	1	1
14-1	49	38	18	15	0
14-2	97	19	3	0	1
14-3	102	12	5	0	1
16-1	65	41	13	1	0
16-2	108	5	3	1	3
16-3	107	6	4	2	3
19-1	84	30	4	2	0
19-2	80	27	6	3	4
19-3	99	8	7	2	4
20-1	83	27	8	2	0
20-2	77	38	2	0	3
20-3	64	53	0	0	3
21-1	12	46	14	T	0
21-2	14	T	19	47	2
21-3	12	4	T	3	2

Pictures representing the items shown in Table 4.12 have been studied and it was found that with Items 3.1, 4.1, 7.3, 10.2, 13.1 and 20.3 the drawings were possibly misleading and did not adequately represent the target sentences. For this reason these 6 items were removed from the test and were not considered when counting test scores. There were some other items such as

Items 11.1 and 16.1 where children consistently selected a certain distracter; however, these items were judged to be represented appropriately by pictures. The following six tables represent the removed items including the target sentences and the sentences used as distracters.

Table 4.13 Item 3.1

Choices	Picture type	The sentence corresponding to the picture	No. of children who selected the picture
1st choice	Lexical distracter	The girl is sitting	0
2nd choice	Target	The woman is walking	97
3rd choice	Lexical distracter	The girl is walking	21
4th choice	Lexical distracter	The woman is sitting	2

Table 4.14 Item 4.1

Choices	Picture type	The sentence corresponding to the picture	No. of children who selected the picture
1st choice	Lexical distracter	A car	2
2nd choice	Lexical distracter	The boy is washing the car	68
3rd choice	Target	The man is washing the car	50
4th choice	Lexical distracter	The man is driving the car	0

Table 4.15 Item 7.3

Choices	Picture type	The sentence corresponding to the picture	No. of children who selected the picture
1st choice	Lexical distracter	A short thin man	6
2nd choice	Lexical distracter	A tall fat man	0
3rd choice	Target	A tall thin man	86
4th choice	Lexical distracter	A tall thin boy	28

Table 4.16 Item 10.2

Choices	Picture type	The sentence corresponding to the picture	No. of children who selected the picture
1st choice	Target	He (a man) is carrying the baby	63
2nd choice	Lexical distracter	A baby	1
3rd choice	Grammatical distracter	She (a woman) is carrying the baby	51
4th choice	Lexical distracter	He is carrying the bag	4
No. of children who have not been tested in this item (i.e. skipped)			1

Table 4.17 Item 13.1

Choices	Picture type	The sentence corresponding to the picture	No. of children who selected the picture
1st choice	Target	The boy is not fat	62
2nd choice	Grammatical distracter	The boy is not thin	1
3rd choice	Lexical distracter	The girl is not fat	1
4th choice	Lexical distracter	The man is not fat	56

Table 4.18 Item 20.3

Choices	Picture type	The sentence corresponding to the picture	No. of children who selected the picture
1st choice	Lexical distracter	A man washing his face	0
2nd choice	Lexical distracter	The boy is washing the car	56
3rd choice	Target	The man is washing the car	64
4th choice	Lexical distracter	The man is driving the car	0

4.2.2.1 The effect of the age and gender variables on the scores of the objects and pictures sub-tests

The effect of the gender and age variables on the scores of the objects and pictures sub-test as well as the interaction between the two variables, gender and age, was investigated. The aim of statistical testing at this stage was to look for a collective effect. Thus a Multivariate Analysis of Variance (hereafter MANOVA) was used. Using MANOVA, which is the multivariate extension of the univariate techniques (such as t-test and ANOVA), enables the researcher to assess whether an overall difference is found between variables and then a separate univariate test such as ANOVA can be employed to address the individual issues for each dependent variable (Hair *et al.*, 1995).Hair *et al.* pointed out that using MANOVA reduces type I error (getting false significance) because one test is performed instead of several ANOVA tests. With reference to the current research, the effect of two independent variables, gender (with two levels, boys and girls) and age (with six levels, see Table 3.6), on the dependent variables (scores of objects and pictures) will be tested. This means that the current research has a 2x6 factorial design and if a main effect is found, a further analysis for each dependent variable (objects and pictures sub-tests scores) will be performed. However, before testing for the effect of the independent variables on test scores, the interaction between the independent variables

will be investigated. Getting a significant interaction between the two variables (gender and age) means that they are related and thus the effect of such variables will not be interpreted separately, whereas getting a non-significant interaction means that the two variables (gender and age) are not related and thus they can be treated separately (Hair *et al.*, 1995). Wilk's Lambda, also referred to as the maximum likelihood criterion, is one of four principal statistics for testing the null hypothesis in MANOVA (Hair, 1995). Hair added that Wilk's test is the most immune to violations of the assumptions underlying MANOVA and yet maintains the greatest power. Therefore Wilk's test will be used in the current research to look for a collective effect for the independent variables (gender and age) on the dependent variable (the scores of objects and pictures sub-tests). The interaction effect of gender and age on the scores of objects and pictures sub-tests was tested by MANOVA and the statistical testing result is presented in the following table.

Table 4.19 The effect of interaction of the gender and age variables on the scores of objects and pictures sub-tests.

Criterion	Test statistics	F	DF	p-value
Wilk's	0.878	1.443	(10, 214)	0.163

As shown in the above table, there were no significant interaction effects for age and gender on the scores of objects and pictures sub-tests. Therefore, the effect of each of them on the scores of objects and pictures sub-tests was tested by MANOVA and the results are presented in the following two tables.

Table 4.20 The effect of the gender variable on the scores of objects and pictures sub-tests.

Criterion	Test statistics	F	DF	p-value
Wilk's	0.988	0.632	(2, 107)	0.533

As indicated in the above table, gender did not have a significant effect on the scores of pictures and objects sub-tests. Therefore, no further testing for the effect of this variable will

be performed. Another implication for such a non-significant result is that boys and girls will be treated as one group since their gender did not affect their scores significantly.

Table 4.21 The effect of the age variable on the scores of objects and pictures sub-test. Significant p-values are identified by a star (*).

Criterion	Test statistics	F	DF	p-value
Wilk's	0.472	9.732	(10, 214)	0.000*

The above table shows very clearly that age had a strong effect on the scores of objects and pictures sub-tests. Since a main effect was found for the age variable, further testing for the effect of age on every sub-test is required.

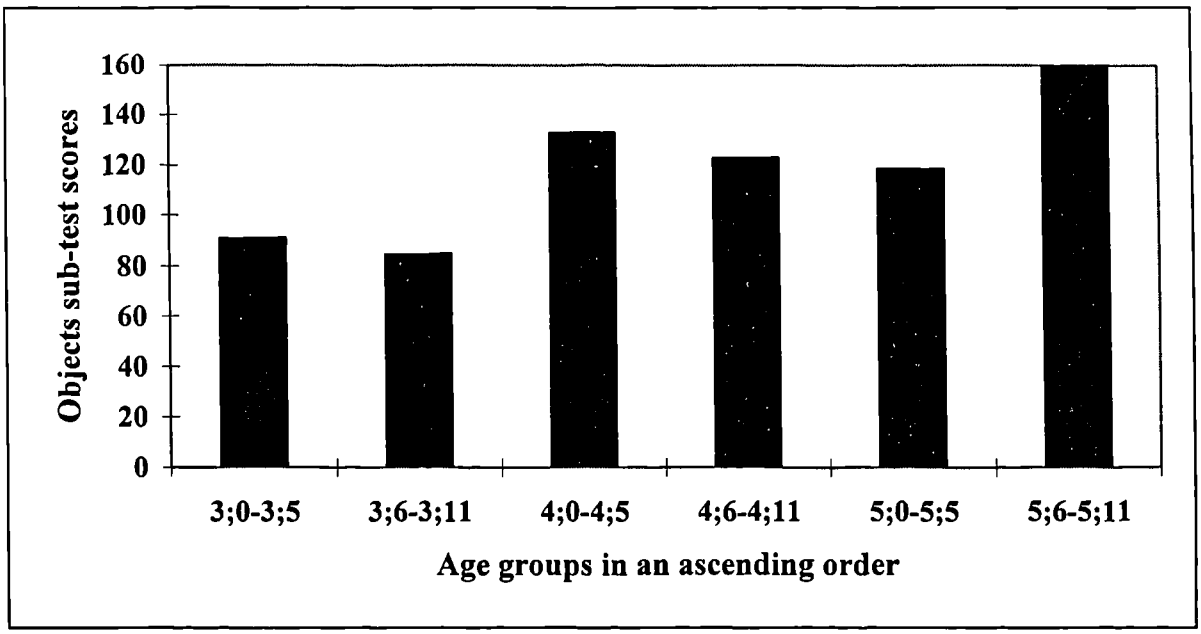
4.2.2.2 Children's performance on the objects sub-test

Children's performance on the objects sub-test is presented in the following table and illustrated in Figure 4.2.

Table 4.22 The mean scores and their standard deviations obtained by the subjects in the objects sub-test (n=20).

	3;0 to 3;5	3;6 to 3;11	4;0 to 4;5	4;6 to 4;11	5;0 to 5;5	5;6 to 5;11
Total	91	85	134	123	119	160
Mean	4.55	4.25	6.7	6.15	5.95	8
S.D.	1.79	1.37	2.05	2.16	1.76	1.41

Figure 4.2 Scores of the objects sub-test achieved by every age group (n=20).



A one-way ANOVA was used to test statistically the effect of age on the scores of the objects sub-test and the results can be seen in the following table.

Table 4.23 The effect of the age variable on the scores of the objects sub-test. Significant p-values are identified by a star (*).

Source	DF	SS	MS	F	p-value
Age	5	193.07	38.61	12.15	0.000*
Error	114	362.40	3.18		
Total	119	555.47			

As Table 4.23 indicates a significant effect for the age variable on the results of the objects sub-test was found, hence the children's scores on the objects sub-test is expected to improve as they get older.

Since a main effect for age on the scores of the objects sub-test was found, a post hoc comparison was implemented. Post hoc comparisons are comparisons of relationships that become evident only after those data have been studied (Lindman, 1974). A post hoc comparison test that is frequently used for testing the null hypothesis that all possible pairs of means are equal, when the samples are all of the same size, is Tukey's Honestly Significant

Difference test (hereafter Tukey's HSD) (Daniel, 1995). Tukey's HSD is designed, according to Pagano (1998), to compare all possible pairs of means while maintaining type I error for making the complete set of comparisons at α. Thus, in the current study children's performance in every age group will be compared to their performance in the other groups by comparing group means. Getting a significant comparison between two groups suggests that the children in the group with the higher mean perform significantly better than those with the lower mean. Comparisons between the performance of age groups are presented in the following table.

Table 4.24 Results of the Tukey's HSD pairwise comparisons between age groups applied on the scores of the objects sub-test. Significant p-values are identified by a star (*) and NS= not significant.

	3;6 to 3;11	4;0 to 4;5	4;6 to 4;11	5;0 to 5;5	5;6 to 5;11
3;0 to 3;5	NS	0.003*	NS	NS	0.000*
3;6 to 3;11		0.000*	0.013*	0.036*	0.000*
4;0 to 4;5			NS	NS	NS
4;6 to 4;11				NS	0.017*
5;0 to 5;5					0.005*

Table 4.24 indicates that 8 of the 15 comparisons made between groups' performance in the objects sub-test was significant, indicating that in these eight comparisons one age group performed significantly better than the other. The rest of the comparisons (seven) were not significant, indicating that in these comparisons age groups' performance was similar. Two comparisons only made between adjacent age groups were significant (3;6-3;11 with 4;0-4;5 and 5;0-5;5 with 5;6-5;11). Significant results were obtained in most of the comparisons made between one group and the other groups that are at least one year older. Comparisons made between the group aged 4;0 to 4;5 years and the three older groups were not significant, which can be attributed to the superior performance demonstrated by the children in the group aged 4;0 to 4;5 years. (See Tables 4.22 and 4.24). The younger two groups seem to show a similar performance as indicated by their non-significant comparison. The older group (5;6 to 5;11) differs from all groups except the one aged 4;0 to 4;5 years.

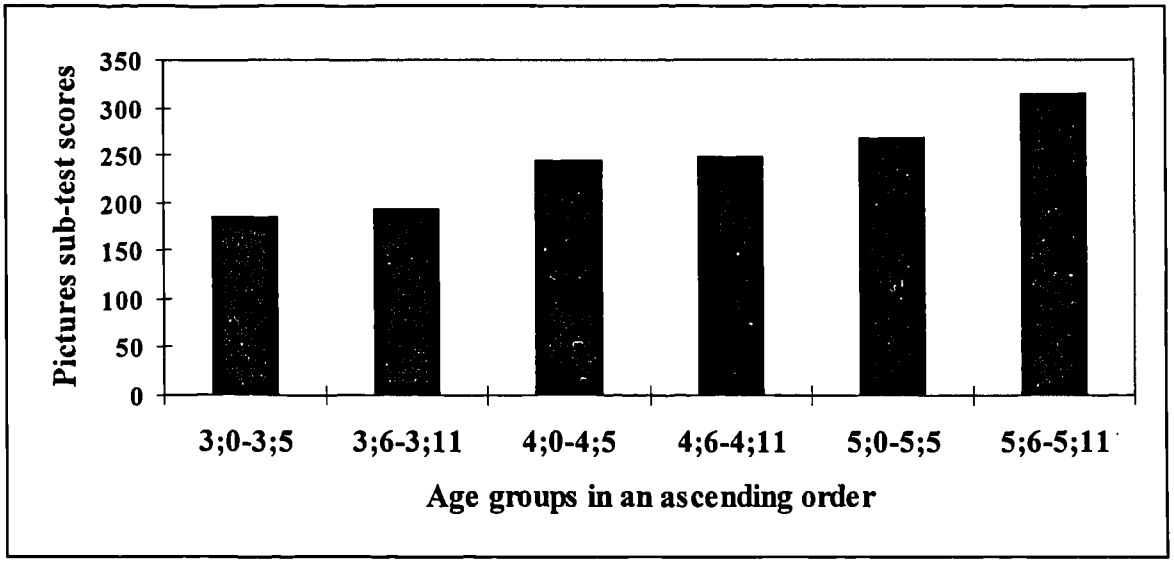
4.2.2.3 Children's performance on the pictures sub-test

Children's performance on the pictures sub-test is presented in the following table and illustrated in Figure 4.3.

Table 4.25 The mean scores and their standard deviations obtained by the subjects in the pictures sub-test (n=20).

	3;0 to 3;5	3;6 to 3;11	4;0 to 4;5	4;6 to 4;11	5;0 to 5;5	5;6 to 5;11
Total	185	197	243	252	268	316
Mean	9.25	9.85	12.15	12.6	13.4	15.8
S.D.	2.71	3.54	2.56	2.41	2.72	2.23

Figure 4.3 Scores of the pictures sub-test achieved by every age group (n=20).



A one-way ANOVA was used to test statistically the effect of age on the scores of the pictures sub-test and the results are presented in the following table.

Table 4.26 The effect of the age variable on the scores of the pictures sub-test. Significant p-values are identified by a star (*).

Source	DF	SS	MS	F	p-value
Age	5	570.60	114.12	14.95	0.000*
Error	114	870.20	7.63		
Total	119	1440.80			

As the above table indicates a significant effect for the age variable on the results of the pictures sub-test was found. Having such a significant effect means that the children's scores on the pictures sub-test is expected to improve as they get older.

Since a main effect for age on the scores of the pictures sub-test was found, a post hoc comparison was implemented to find out the extent of age ranges that demonstrated a sensitivity to the test. Tukey's HSD test was used and results are presented in the following table.

Table 4.27 Results of the Tukey's HSD pairwise comparisons between age groups applied on the scores of the pictures sub-test. Significant p-values are identified by a star (*) and NS= not significant.

	3;6 to 3;11	4;0 to 4;5	4;6 to 4;11	5;0 to 5;5	5;6 to 5;11
3;0 to 3;5	NS	0.015*	0.005*	0.000*	0.000*
3;6 to 3;11		NS	0.025*	0.001*	0.000*
4;0 to 4;5			NS	NS	0.001*
4;6 to 4;11				NS	0.004*
5;0 to 5;5					NS

The above table indicates that 9 of the 15 comparisons made between groups' performance in the pictures sub-test was significant, indicating that in these nine comparisons one age group performed significantly better than the other. The table shows clearly that all comparisons made between adjacent age groups (five comparisons) were not significant. As was the case in the objects sub-test a significant result was obtained in most comparisons made between one group and the other groups that are at least one year older. This suggests that a difference between age groups' performance appears more clearly when the difference between the compared groups is at least one year. Again, comparing children's performance in age group 4;0 to 4;5 with the older groups seems not to yield significant results except when compared with the older group aged 5;6 to 5;11 years. Children in the youngest two groups appear to perform similarly and their performance differs significantly from that of the older four groups. No significant comparison was obtained when comparing children's performance in

the groups 4;0 to 4;5, 4;6 to 4;11 and 5;0 to 5;5. Children in the oldest group differ from children in the other groups, except the one aged 5;0 to 5;5 years.

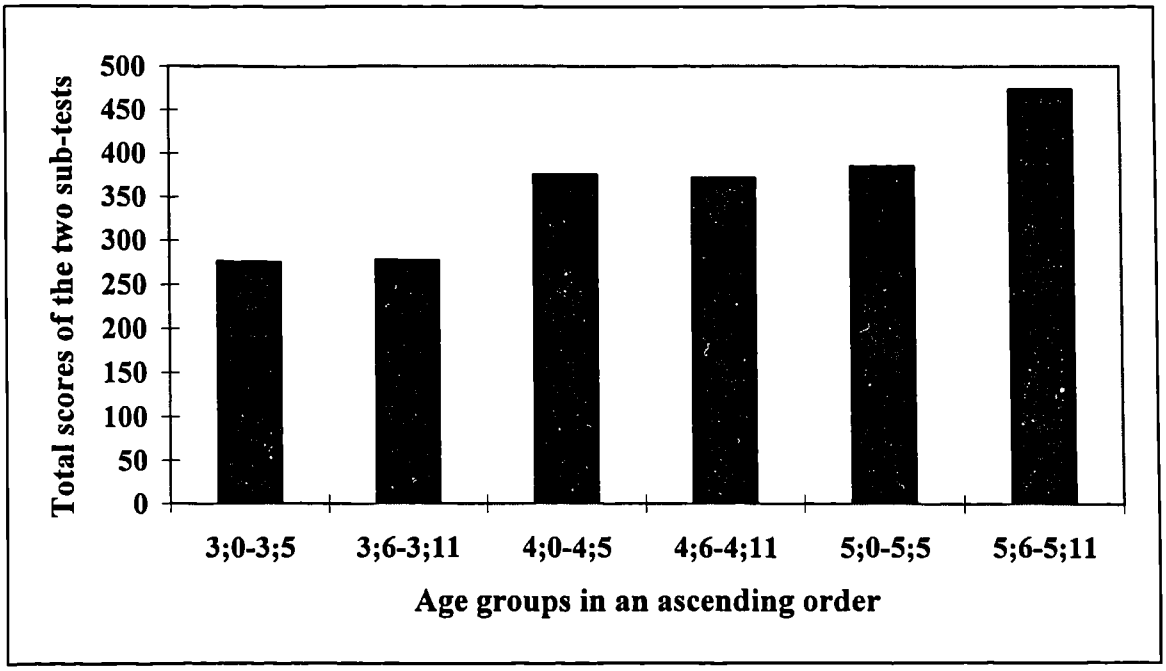
4.2.2.4 Children's performance on the sum of the scores of objects and pictures sub-tests

A broader way of looking at children's performance in the present study is to look at the sum of their scores in the objects and pictures sub-tests. Having the children's scores in the two sub-tests added together enables us to look at their overall performance in the test as a whole. The children's performance on the sum of the scores of objects and pictures sub-tests is presented in the following table and illustrated in Figure 4.4.

Table 4.28 The mean scores and their standard deviations obtained by the subjects in the sum of the objects and pictures sub-tests (n=20).

	3;0 to 3;5	3;6 to 3;11	4;0 to 4;5	4;6 to 4;11	5;0 to 5;5	5;6 to 5;11
Total	276	282	377	375	387	476
Mean	13.8	14.1	18.85	18.75	19.35	23.8
S.D.	3.56	3.43	3.72	3.61	3.96	2.91

Figure 4.4 Total scores achieved by every age group (n=20).



A one-way ANOVA was used to test statistically the effect of age on the sum of the scores of objects and pictures sub-tests and the results can be seen in the following table.

Table 4.29 The effect of the age variable on the sum of the scores of the pictures and objects sub-tests. Significant p-values are identified by a star (*).

Source	DF	SS	MS	F	p-value
The effect of the age variable	5	1386	277.2	21.44	0.000*
Error	114	1473.9	12.9		
Total	119	2859.9			

As Table 4.29 indicates a highly significant effect for the age variable on the sum of the scores of objects and pictures sub-tests was found. Having such a significant effect means that the children's scores on the two sub-tests will increase as they get older.

Since a main effect for age on the sum of the scores of the objects and pictures sub-tests was found, a post hoc comparison was implemented to find out the extent of the age ranges that demonstrated a sensitivity to the test. Tukey's HSD test was used and the are as follows.

Table 4.30 Results of the Tukey's HSD pairwise comparisons between age groups applied on the sum of the scores of the objects and pictures sub-tests. Significant p-values are identified by a star (*) and NS= not significant.

	3;6 to 3;11	4;0 to 4;5	4;6 to 4;11	5;0 to 5;5	5;6 to 5;11
3;0 to 3;5	NS	0.000*	0.001*	0.000*	0.000*
3;6 to 3;11		0.000*	0.001*	0.000*	0.000*
4;0 to 4;5			NS	NS	0.001*
4;6 to 4;11				NS	0.000*
5;0 to 5;5					0.002*

Table 4.30 indicates that only four comparisons were not significant out of the 15 made between age groups' performance in the sum of the objects and pictures sub-tests. A significant comparison was obtained even between some adjacent age groups, such as the ones between 3;6 to 3;11 and 4;0 to 4;5. All comparisons made between an age group and the groups older by at least one year were significant except the one made between 4;0-4;5 and 5;0-5;5. Children can be divided into three levels based on their performance as indicated by

the comparisons between age groups applied on the sum of the scores of the objects and pictures sub-tests. The first level includes the younger two groups who show a similar performance and differ from the other groups significantly. The second level includes the next three older groups (i.e. 4;0 to 4;5, 4;6 to 4;11 and 5;0 to 5;5) which differ from both the oldest group (5;6 to 5;11) and the two youngest groups. The third level includes the oldest group, which differs from all other groups as indicated by the results of the comparisons (see Table 4.30).

4.2.2.5 The relationship between the objects and pictures sub-tests

Since both the objects and pictures sub-tests were sensitive to age, further testing was required to investigate the relation between the two sub-tests. If there is a direct relationship between the two, children who show a good performance on the objects sub-test should show a good performance on the pictures sub-test as well, although this is not altogether to be expected.

Spearman's rank correlation was used to correlate the children's scores in objects to their scores in pictures. At this stage correlation of the objects and pictures scores was performed for every age group separately. Statistical results as well as their significance level are presented in the following table.

Table 4.31 Statistical results of correlating the objects with pictures scores at each age group. Significant p-values are identified by a star (*). NS= not significant.

Age group	r	Significance level
3;0 to 3;5	0.206	NS
3;6 to 3;11	-0.252	NS
4;0 to 4;5	0.200	NS
4;6 to 4;11	0.295	NS
5;0 to 5;5	0.608	p<0.01*
5;6 to 5;11	0.201	NS

As we see in Table 4.31, the objects scores did not correlate significantly with the pictures scores, except at the 5;0 to 5;5 age group. However, in the above statistical test every age

group was tested separately which means that age was not considered as a variable. The other way of looking at this data was to consider the age variable. By considering the age variable, data would have been treated as they were ordered according to the children's age, going up from the youngest group to the oldest. The following table demonstrates the scores achieved by each age group on the objects and pictures sub-tests.

Table 4.32 Scores achieved by every age group in the objects and pictures sub-tests (n=20).

Age group	Objects sub-test	Pictures sub-test
3;0 to 3;5	91	185
3;6 to 3;11	85	193
4;0 to 4;5	133	243
4;6 to 4;11	123	249
5;0 to 5;5	119	267
5;6 to 5;11	160	314

A test that considers the age variable is the partial correlation test, where the objects score (a) will be correlated with the pictures scores (b) controlling for the age variable (c). The formula used to compute the partial correlation is:

$$r_{ab.c} = \frac{r_{ab} - r_{ac} * r_{bc}}{\sqrt{(1 - r_{ac} * r_{ac})} * \sqrt{(1 - r_{bc} * r_{bc})}}$$

Source: Daniel (1995, p341).

We need to compute the student's *t* in order to get the statistical significance of the partial correlation, the formula of the student's t is:

$$t = \frac{r * \sqrt{(N-3)}}{\sqrt{(1-r^2)}}$$

Source: Daniel (1995, p341). (See Appendix 14 for the detailed procedure).

The following table represents the results of the partial correlation test:

Table 4.33 Results of the partial correlation of objects with pictures scores controlling for the age group variable. Significant p-values are identified by a star (*).

Test	DF	r	t	p-value
Partial correlation	117	0.242	2.70	0.00396*

Results of the partial correlation test indicate that there was a highly significant correlation between the objects and pictures scores when the age variable was held constant with $p<0.01$. This means that although the objects and pictures scores were not significantly correlated with each other when every age group was tested separately; they do correlate with each other with high significance when the age variable was included.

4.2.2.6 Sensitivity of individual structures to the age variable

After testing the sensitivity of the objects sub-test, pictures sub-test and their sum to the age variable, it was necessary to consider whether individual structures used in the test were sensitive to the age variable or not. The aim was to know whether a certain structure was sensitive to age differences or not. Fisher's exact test (F) was used to test the structures' sensitivity by applying the test on the number of passes and failures for every structure. Fisher exact test along with the chi-square are two dimensional contingency tables and they are used when there are two variables both of which are categorical. Fisher exact test is used instead of the chi-square test if more than 20% of the scores are less than 5, which was applicable in the case of the current study (Selkirk, 1980).

The following table represents all the structures in the objects and pictures sub-tests in one column and the significance level of their sensitivity to the age variable in another column.

Table 4.34 Structures tested by the objects' sensitivity to age. Significant p-values are identified by a star (*).

No.	Structure	p-value
1	Possessive	0.5576
2	Preposition *in*	0.4407
3	Preposition *on*	0.5080
4	Preposition *under*	0.0073*
5	Preposition *in front of*	0.0018*
6	Preposition *behind*	0.0006*
7	Preposition *beside*	0.0006*
8	Preposition *between*	0.2798
9	Complex commands I	0.0001*
10	Complex commands II	0.0978
11	Complex commands III	0.0098*
12	Complex commands VI	0.4407

Table 4.35 Structures tested by the pictures' sensitivity to the age variable. Significant p-values are identified by a star (*).

No.	Structure Description	p-value
1	Adj.-N	0.5259
2	Nouns inflected for number	0.0081*
3	S-V sentences (where the verb is present continuous and the sentence carries two ICW)	0.3935
4	S-V-O sentences (where the verb is present continuous and the sentence carries two ICW)	0.4648
5	Reversible active	0.0685
6	Verbs inflected for gender and the subject is hidden	0.968
7	Adj.-Adj.-N sentences	0.1034
8	Verbs inflected for number and the subject is hidden	0.1030
9	Comparatives	0.236
10	V-O sentences (where the verb is inflected for gender and the subject is hidden)	0.6004
11	Passive sentences	0.6413
12	S-V sentences (where the verb is a negated present continuous)	0.0000*
13	S-V-C sentences (where the complement is a negated adjective)	0.0153*
14	S-V (where the subject and the verb are inflected for number)	0.0015*
15	V-O (where the verb and the object are inflected for number)	0.0011*
16	X and Y	0.0440*
17	S-V-O sentences (where the object is inflected for gender)	0.0304*
18	Post modified subject within a S-V clause	0.0001*
19	X but not Y	0.0004*
20	S-V-O sentences (where the verb is present continuous and the sentence carries three ICW)	0.0168*
21	Post modified subject within a S-V-C clause	0.3159

The above two tables indicate that 50% of the structures tested by objects and 52% of the structures tested by pictures were not sensitive to the age variable at $p<0.05$. One possible reason for some of the tested structures not being sensitive to the age variable is that the structure was either passed by too many or too few children. For example, this is true for

possessives and S-V sentences (where the verb is present continuous) which were passed by almost all subjects (118 and 119 out of the 120 children tested respectively). The other case is when the structure was failed by almost all children. For example, this is true for the complex commands IV which was failed by 117 children out of the 120 children tested. Four structures tested by pictures were significantly sensitive to the age variable with $p<0.05$. One quarter of the structures tested by objects and 3 structures tested by pictures were highly significantly sensitive to the age variable with $p<0.01$. In addition, there are 3 structures tested by objects and 3 structures tested by pictures which were even more sensitive to the age variable ($p<0.001$).

4.2.2.7 The order and age of acquisition of the tested structures

One of the main aims of the study was to find the order of acquisition of the tested structures according to age. The age variable was found to be significant both to the objects and pictures sub-tests. The argument is that a structure that is passed by most children is easier to comprehend than a structure passed by fewer children. Based on this argument the following two tables demonstrate the order of acquisition of the tested structures. Initially, structures tested by objects will be presented and then structures tested by pictures.

Table 4.36 The order of acquisition of the structures tested by objects when the whole group's performance is considered. (n=120).

Structure	Children passed
Possessive	118
Preposition *in*	117
Preposition *on*	109
Preposition *under*	77
Preposition *beside*	72
Preposition *behind*	58
Preposition *in front of*	54
Complex commands III	48
Complex commands I	29
Complex commands II	17
Preposition *between*	9
Complex commands VI	3

Table 4.37 The order of acquisition of structures tested by pictures when the whole group's performance is considered. (n=120).

Structure	Children passed
S-V sentences (where the verb is present continuous and the sentence carries two ICW)	119
Adj.-N	116
Adj.-Adj.-N sentences	111
S-V-C sentences (where the complement is a negated adjective)	110
V-O sentences (where the verb is inflected for gender and the subject is hidden)	97
Passive sentences	92
Verbs inflected for gender and the subject is hidden	88
S-V sentences (where the verb is a negated present continuous)	87
S-V-O sentences (where the verb is present continuous and the sentence carries two ICW)	81
Verbs inflected for number and the subject is hidden	73
Nouns inflected for number	70
Post modified subject within a S-V clause	70
Reversible active	60
X and Y	57
X but not Y	56
Comparatives	38
S-V-O sentences (where the verb is present continuous and the sentence carries three ICW)	38
S-V (where the subject and the verb are inflected for number)	32
V-O (where the verb and the object are inflected for number)	29
S-V-O sentences (where the object is inflected for gender)	25
Post modified subject within a S-V-C clause	11

After looking at the order of acquisition of the tested structures as obtained from the study subjects' scores, a rough index of the age range at which each structure develops will be presented. A structure will be considered passed by an age group if it has been passed by at least 60% of the children tested (i.e. 12 out of the 20 children tested at every age group). If a structure is passed by a younger age group, it will be considered passed by all older age groups even if one of the older age groups scored below the cut-off score. The following two tables indicate the number of children who passed the tested structures at every age group.

Table 4.38 The number of children who passed structures tested by objects at every age group. Structures are ranked according to their acquisition order when every age group's performance is considered. Shaded cells represent age groups where 60% of the children passed the structure (n=20).

Structure	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	Total
Possessive	20	19	20	19	20	20	118
Preposition *in*	18	19	20	20	20	20	117
Preposition *on*	17	18	20	17	18	19	109
Preposition *under*	10	10	13	10	15	19	77
Preposition *beside*	9	7	13	11	14	18	72
Preposition *behind*	6	3	12	11	10	16	58
Complex command III	4	4	13	7	8	12	48
Preposition *in front of*	7	3	11	13	6	14	54
Complex command I	0	0	3	9	5	12	29
Complex command II	0	1	4	3	3	6	17
Preposition *between*	0	1	2	3	0	3	9
Complex command VI	0	0	2	0	0	1	3
Total	91	85	133	123	119	160	

Table 4.39 The number of children who passed structures tested by pictures at every age group. Structures are ranked according to their acquisition order when every age group's performance is considered. Shaded cells represent age groups where 60% of the children passed the structure (n=20).

Structure*	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	Total
3	19	20	20	20	20	20	119
1	19	18	19	20	20	20	116
7	20	15	18	20	19	19	111
13	14	17	20	20	20	20	111
10	13	17	16	17	17	17	97
11	14	15	15	16	14	18	92
6	13	13	17	13	16	18	88
4	11	13	13	14	13	17	81
12	7	9	18	17	16	20	87
8	11	8	12	12	13	17	73
2	8	6	13	15	12	16	70
18	5	7	13	13	13	19	70
5	6	7	9	13	14	11	60
16	7	6	8	9	15	12	57
19	5	7	7	8	11	18	56
20	3	8	3	4	8	12	38
14	3	1	8	5	3	12	32
15	3	1	2	4	7	12	29
9	4	3	6	8	8	9	38
17	2	5	2	1	7	8	25
21	0	1	4	2	3	1	11
Total	186	214	248	268	274	333	

*See Table 4.35 for structures names.

4.2.3 Comprehension patterns of the structures tested by objects

Three structures were tested by the use of objects which are possessives, prepositions and complex commands. Children's results in the items testing for the comprehension of these three structure, will be presented below. Each age group's results will be presented separately and the numbers from 1 to 6 are used to refer to age groups (see Table 3.6).

4.2.3.1 Possessives

The form of possessive tested in the current study was the possessive determiner and it was tested by asking the child to point to five items, where each item consisted of a noun followed by an inflected pronoun (in SA the noun precedes the pronouns in a possessive determiner sentence, for example the phrase *your head* will be said as /ɾˌas-ɪk/). Commands used to test possessives along with their Arabic counterparts are presented in Table 4.40, which also includes the children's results in possessives.

Table 4.40 Children results in every item testing for the comprehension of possessives

/win/	*Show me...*	**The inflected pronoun**	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
/ɾˌas-ɪk/	Your head	2nd person	20	20	20	20	20	20	120
/nʔæl-ɪk/	Your shoes	2nd person	20	19	20	20	20	20	119
/ʃaʔɾˌ-i/	My hair	1st person	20	20	20	20	20	20	120
/ʔid-i/	My hand	1st person	20	20	20	20	20	20	120
/χæʃm-ɪk/	Your nose	2nd person	20	19	20	19	20	20	118

A child was considered to have passed the possessive structure only if he pointed correctly to all the five tasks. As the above table indicates, almost all children passed this structure (98% of those tested). Only one child (0.8%) could not point to his shoes and two children (1.7%) could not point to their nose whereas the rest pointed correctly to the possessives tested.

4.2.3.2 Prepositions

Two items were used to test every preposition and the child was deemed to have passed the preposition if both items were answered correctly. Care was taken not to include items that are so probable that the child will perform the command correctly relying only on his extra-linguistic knowledge, although one of the two commands testing for the preposition *in* which was *put the spoon in the cup* might be considered as an expected command. (See Section 2.2.5 for a detailed discussion on comprehension strategies). It was also decided not to use sentences that conflict with the child's world knowledge, such as asking the child to put the table on the shoes.

Table 4.41 Children results in every item testing for the comprehension of possessives

Put the:	1	2	3	4	5	6	Total
Spoon *in* the cup	18	19	20	20	20	20	117
Knife *in* the shoe	20	20	20	20	20	20	120
Knife *on* the table	19	20	20	19	19	20	117
Spoon *on* the chair	18	18	20	17	19	19	111
Knife *under* the chair	12	11	15	10	15	19	82
Spoon *under* the table	14	12	16	17	19	20	98
Shoe *in front of* the table	13	6	13	14	15	15	76
Cup *in front of* the chair	9	5	15	14	7	5	55
Knife *behind* the shoe	7	4	14	13	16	18	72
Spoon *behind* the cup	6	4	14	13	11	18	66
Knife *beside* the spoon	19	18	18	18	18	20	111
Shoe *beside* the table	9	7	15	12	15	18	76
Knife *between* the cup and the table	1	1	3	4	3	4	16
Spoon *between* the table and the chair	1	1	2	3	3	7	17

As Table 4.41 shows, the preposition *in* was comprehended by all but 3 children, while 11 children failed the preposition *on*. The difference between the two prepositions was found to be significant when a one-sample t-test (one-tailed) was performed on the results of the two prepositions. This result indicates that the preposition *in* is significantly easier than the preposition *on* to comprehend. With reference to the results of the items testing for the preposition *in*, the first item *put the spoon in the cup* was slightly more difficult for the subjects to comprehend (see Table 4.41) as it was failed by three children, while all subjects

passed the second item *put the knife in the shoe*. The two items testing for the preposition *on* were passed by 117 and 111 children respectively (see Table 4.41).

As regards the preposition *under*, it was passed by 77 children (64%) and was not mastered by 60% of the subjects until the age group 4;0 to 4;5 years. However, it was comprehended correctly by 50% of the two youngest age groups (see Table 4.38)The first item, *put the knife under the chair*, was passed by 82 children (68%), while the second item, *put the spoon under the chair*, was passed by 98 children (82%). When the difference between the prepositions *under* and *on* was compared using a one-sample t-test (one-tailed), there was a highly significant difference.

Prepositions *beside* and *behind* were similar to the preposition *under* in that all three were not mastered by 60% of the children until the age group from 4;0 to 4;5 years. However, *behind* and *beside* were comprehended by 58 (48%) and 72 (60%) children respectively, compared to *under* which was comprehended by 77 (64%) children. Statistical testing was performed to test the significance of these differences. The one-sample t-test (one-tailed) was performed on the difference between *under* and *beside* first and then on the difference between *beside* and *behind*. As regards *under* and *beside*, the difference between them was not significant which indicated that these two prepositions have similar difficulty. With regard to *beside* and *behind*, the difference was significant indicating that *beside* is easier to comprehend than *behind*, even though they have been mastered by the same age groups when the 60% passing criterion was considered. Children performed similarly in the two items testing for the preposition *behind* as 72 children passed the first item and 66 children passed the second one. Children demonstrated a variable performance in the two items testing for the preposition *beside* (Table 4.41) as most of them (92.5%) passed the first item *put the knife beside the spoon*, while 63% children passed the second item *put the shoe beside the table*.

The preposition *in front of* was found to be slightly more difficult compared to the preposition *behind*, as less than half of the subjects (54 children) were able to comprehend *in front of* correctly. At the age groups level, *in front of* was understood by 11 (55%) children in the age group 4;0 to 4;5 which is less than the 60% criterion; however, the criterion was exceeded in the next age group where 13 (65%) children passed this structure. Since the children's results in this preposition seemed very close to their results in the preposition *behind*, it was interesting to know whether the difference between the two was significant or not. The one-sample t-test (one-tailed) revealed a non-significant difference. This indicates that the prepositions *behind* and *in front of* have a similar level of difficulty, even though more age groups passed the preposition *behind*; however, the performance of the age group 4;0 to 4;5 years in the preposition *in front of* was 5% below the criterion. The first item testing for the preposition *in front of* was passed by 76 children compared to the second item which was passed by 55 children (see Table 4.41).

The most difficult preposition for the study subjects to comprehend was the preposition *between*, which was comprehended by 7.5% of the subjects only (See Table 4.38). Consequently, none of the age groups reached the criterion and the maximum number of children passing this preposition in any age group was 3 out of 20 in age groups 4;6 to 4;11 and 5;6 to 5;11 years. Children performed similarly in the items testing for the preposition *between* as 16 and 17 children passed the two items respectively.

4.2.3.3 Complex commands

Comprehension of complex commands was tested by asking children to act out four commands each consisting of two conjoined orders, such as *put the spoon behind the shoe and the knife in the cup*. Two commands contained two prepositions (commands I and III) and the other two contained one preposition only (commands II and IV). The scoring of the complex commands structure is slightly different from that of the other structures tested by objects in

that every single correct response was credited a score which meant that if a child passes three out of the four commands, he will be credited a score of three - unlike possessives, for example, where a child was required to pass all five items in order to be given a score. This decision was made after the children's results were reviewed and it was found that none of the children tested had acted out all four commands correctly, which meant that if the scoring method used in the other structure was used with the complex commands, all children would receive a score of zero even though some of them have had acted out three commands correctly.

Table 4.42 Children's results in every item testing for the comprehension of complex commands.

	Command	1	2	3	4	5	6	Total
I	Put the spoon behind the shoe and the knife in the cup	0	0	3	9	5	12	29
II	Give me the spoon and put the cup on the chair	0	1	4	3	3	6	17
III	Put the cup on the table and the knife under the chair	4	4	13	7	8	12	48
IV	Put the spoon between the cup and the shoe and give me the knife	0	0	2	0	0	1	3

Children's comprehension of the tested commands was found to be poor for two of the four commands tested (commands-II and -IV) as they were passed by 14% and 2.5% of the children. A relatively better performance was demonstrated in the other two structures (commands-I and -III) as they were passed by 24% and 40% respectively. Regarding the performance of age groups, the oldest age group only passed command-I (12 children passed). Command-III was found to be easier than the other three to comprehend as it was passed by 65% of the children in the group from 4;0 to 4;5 years and 60% of the children in the oldest group from 5;6 to 5;11.

4.2.4 Comprehension patterns of the structures tested by pictures

As mentioned when language comprehension was defined (Section 2.2.2.1), it is believed that a listener will use all the possible cues to interpret an incoming message. It is difficult to determine what cues a listener uses to interpret a sentence used in a conversation situation.

However, the job of determining such cues becomes easier in a controlled language test situation. This is because the child's response to the tested sentence can be analysed even if an incorrect answer has been given by that child. Controlled test situations also allow for varying the type and complexity of the cues. In a picture-pointing task, for example, the tested sentence and the accompanying distracters can be varied so that the child can respond to the tested sentence by using a lexical cue only and they too can be varied so that the child will need to use more than one to respond correctly to a sentence. Similarly sentences can be varied so that the child will need to use both lexical and syntactic cues to respond correctly to a tested sentence (see Section 2.2.3). With reference to the current study, results of the pictures sub-test will be used to analyse the cues used by children to comprehend the tested sentences. Results of the objects sub-test were not used for that purpose because the design of the objects sub-test did not allow for children's responses to be recorded in a way that identifies all the cues children used in their responses.

As mentioned earlier in the Method Chapter (Section 0), three items were used to test for the comprehension of every structure, and four pictures representing four sentences were used in testing every item. These four pictures contained a target and three distracters. Distracters were varied depending on the structure being tested. For example, when the structure in question was plural nouns a picture of three boys was the target, while distracters were a picture of a single boy, a picture of two boys and a picture of three girls (see Table 4.79). Therefore in this particular example, distracters were controlled in such a way that the child will need to use two cues to reach the correct answer. These two cues are a lexical one (the child's knowledge of the meaning of the noun *boy*) and a morpho-syntactic one (the child's knowledge of the plural inflection on the noun). The first sentence in Table 4.79 is the target sentence and the two cues (lexical meaning of the noun and plural inflection on the noun) were given a (+) sign because both of them need to be used to respond to the tested sentence correctly. There are occasions when the child will use either a lexical or a morpho-syntactic cue to respond to the sentence.

The child used one of the cues only either because the other cue is not available to him or because these two cues compete with each other and one of them won the competition. If the child uses only the lexical meaning of the noun cue to interpret the tested sentence, it is expected that he will point either to the second picture (one boy) or the third picture (two boys). That is why a (+) sign was put under the lexical cue and a (-) sign was put under the morpho-syntactic cue in these two sentences. Similarly, if the child uses only the plural inflection on the noun cue to interpret the tested sentence, it is expected that he will point to the fourth picture (three girls) since this noun is inflected for plural. In the fourth sentence a (+) sign was put under the morpho-syntactic cue, while a (-) sign was put under the lexical cue. All the other items used in the study will be analysed in the same way presented above with the first sentence in every table being the target sentence.

An analysis of the cues contained in the target sentences as well as those contained in the sentences used as distracters will be presented in Tables 4.41 to 4.99. The tables will also include the number of children who answered correctly by pointing to the pictures representing the target sentences in addition to the number of children who pointed to the pictures used as distracters. Each age group's results will be presented separately and the numbers from 1 to 6 were used to refer to age groups (see Table 3.6). On occasions where less than 20 children were tested in the age group, the sample size is identified by a star. The reason for having some children not tested on certain items was that particular items were not tested . This happened when a child showed consecutive errors (see Section 3.3.4.5 for more details). The structure number (as it appears on the test form) which is given before the name of the structure, helps when referring to Tables 4.43 to 4.99 to identify the age groups' scores in every individual structure. The children's performance will be evaluated in terms of the total number of children passing every structure and the items representing the structure as well as the number of children passing in every age group. Structures were grouped according to the

cues required for their comprehension into those that require lexical knowledge only and structures the require both lexical and grammatical knowledge.

4.2.4.1 Structures that require lexical knowledge only

In seven of the tested structures, the child's use of his lexical knowledge will enable him to point to the correct picture. Lexical knowledge when used in the current research refers to the knowledge of the meaning of the words contained in a sentence. Three of these structures require the knowledge of two lexical cues while in the other four structures, the child will need to know the meaning of at least three lexical cues in order to point to the correct picture.

Structures that require the knowledge of two lexical cues:

This group includes structures which require the knowledge of two lexical cues to be comprehended. The following structure were included in this group:

Structure-1. Adj.-N.

Structure-3. S-V sentences where the verb is present continuous and the sentence carries 2 ICW.

Structure-4. S-V-O sentences where the verb is present continuous and the sentence carries 2 ICW.

In the above three structures, the procedure for measuring information-carrying words (ICW) was used. This was devised and used successfully in the DLS. As mentioned in Section 2.3.2.4, 2 ICW mean that distracters will be manipulated so that the two parts of the sentence are varied. The way children performed in the items testing for these three structures is presented in the following tables.

Structure-1. Adj.-N:

Table 4.43 Item 1.1

Sentence presented: Big cup								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Lexical meaning of the adjective	1	2	3	4	5	6
A big cup	+	+	20	20	20	20	20	20
A small cup	+	-	0	0	0	0	0	0
A big box	-	+	0	0	0	0	0	0
A small box	-	-	0	0	0	0	0	0

Table 4.44 Item 1.2

Sentence presented: Tall boy								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Lexical meaning of the adjective	1	2	3	4	5	6
A tall boy	+	+	19	19	19	20	20	20
A short boy	+	-	1	1	0	0	0	0
A long pen	-	+	0	0	0	0	0	0
A short pen	-	-	0	0	1	0	0	0

Table 4.45 Item 1.3

Sentence presented: Red ball								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Lexical meaning of the adjective	1	2	3	4	5	6
A red ball	+	+	20	19	20	20	20	20
A grey ball	+	-	0	1	0	0	0	0
A red pen	-	+	0	0	0	0	0	0
A white pen	-	-	0	0	0	0	0	0

Structure-3. S-V sentences (where the verb is present continuous):

Table 4.46 Item 3.2

Sentence presented: The boy is running								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Lexical meaning of the verb	1	2	3	4	5	6
A boy running	+	+	19	20	20	20	20	20
A boy sitting	+	-	1	0	0	0	0	0
A horse running	-	+	0	0	0	0	0	0
A horse lying down	-	-	0	0	0	0	0	0

Table 4.47 Item 3.3

Sentence presented: The girl is drinking								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A girl drinking	+	+	20	20	20	20	20	20
A girl standing	+	-	0	0	0	0	0	0
A cat standing	-	-	0	0	0	0	0	0
A cat drinking	-	+	0	0	0	0	0	0

Structure-4. S-V-O sentences (where the verb is present continuous):

Table 4.48 Item 4.2

Sentence presented: The boy is climbing a ladder								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the noun *ladder*	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A boy climbing a ladder	+	+	18	17	16	18	18	18
A boy climbing a tree	-	+	0	0	2	0	0	0
A boy cutting a tree	-	-	0	0	0	0	0	0
A boy painting a ladder	+	-	2	3	2	2	2	2

Table 4.49 Item 4.3

Sentence presented: The girl is eating an apple								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the noun *apple*	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A girl eating an apple	+	+	12	16	17	15	15	18
A girl eating a banana	-	+	0	0	0	0	0	0
A girl cutting an apple	+	-	8	4	3	5	4	2
A girl cutting a banana	-	-	0	0	0	0	1	0

Children's results in Structures 1 and 3 are similar in that almost all of them pointed to the target picture (see Tables 4.43 to 4.47). However, the study subjects' high performance in Structures 1 and 3 was not maintained in Structure 4 as some of the children were not able to select the target picture (see Tables 4.48 and 4.49).

Structures that require the knowledge of three lexical cues:

Structures that require the use of three lexical cues for their comprehension are included in this group and they are:

Structure-7. Adj.-Adj.-N sentences.

Structure-16. X and Y.

Structure-20. S-V-O sentences where the verb is present continuous and the sentence carries 3 ICW.

The above three structures all have at least 3 ICW in common. Having 3 ICW means that distracters will be manipulated so that three parts of the sentence are varied. An example that illustrates how 3 ICW works is the sentence *the man is eating an apple*, where the three parts of the sentence that can be varied are *the man*, *eating* and *an apple*. This means that the three distracters that can be used with the target sentence *the man is eating an apple* in the case of 3 ICW, for example, are *the man is eating a sandwich*, *the boy is eating an apple* and *the man is cutting an apple*. Children's responses to the items testing for the three structures that require the knowledge of three lexical cues are presented next.

Structure-7. Adj.-Adj.-N sentences:

Table 4.50 Item 7.1

Sentence presented: Big red car										
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the adjective *big*	Lexical meaning of the adjective *red*	Lexical meaning of the noun	**1**	**2**	**3**	**4**	**5**	**6**
A big red car	+	+	+	20	18	20	20	19	19
A small red car	-	+	+	0	0	0	0	0	0
A big blue car	+	-	+	0	2	0	0	1	1
A big red air plane	+	+	-	0	0	0	0	0	0

Table 4.51 Item 7.2

Sentence presented: Broken long pen									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the adjective *broken*	Lexical meaning of the adjective *long*	Lexical meaning of the noun	**1**	**2**	**3**	**4**	**5**	**6**
A broken long pen	+	+	+	20	17	18	20	20	2
A broken short pen	+	-	+	0	3	1	0	0	0
An unbroken long pen	-	+	+	0	0	0	0	0	0
A broken long ruler	+	+	-	0	0	1	0	0	0

Structure-16. X and Y:

Table 4.52 Item 16.1

Sentence presented: The boy is standing and eating										
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb *stand*	Lexical meaning of the verb *eat*	**1**	**2**	**3**	**4**	**5**	**6**
A boy standing and eating	+	+	+	7	7	8	9	16	14
A boy standing but not eating	+	+	-	1	0	0	0	0	0
A boy sitting and eating	+	-	+	4	2	3	4	0	0
A man standing and eating	-	+	+	8	11	9	7	4	6

Table 4.53 Item 16.2

Sentence presented: The cup is small and red									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the adjective *small*	Lexical meaning of the adjective *red*	**1***	**2***	**3**	**4**	**5**	**6**
A small red cup	+	+	+	17	16	20	18	20	19
A small blue cup	+	+	-	1	3	0	1	0	0
A large red cup	+	-	+	0	0	0	1	0	1
A small red plate	-	+	+	0	0	0	0	0	0

Table 4.54 Item 16.3

Sentence presented: The cat is black and big									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the adjective *black*	Lexical meaning of the adjective *big*	**1***	**2***	**3**	**4**	**5**	**6**
A black big cat	+	+	+	14	15	20	20	19	19
A black small cat	+	+	-	1	1	0	0	0	0
A brown big cat	+	-	+	1	2	0	0	0	1
A black big sheep	-	+	+	2	1	0	0	1	0

Structure-20. S-V-O sentences (where the verb is present continuous):

Table 4.55 Item 20.1

Sentence presented: The man is eating an apple									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *boy*	Lexical meaning of the noun *apple*	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A man eating an apple	+	+	+	12	12	15	11	15	18
A man eating sandwiches	+	+	-	0	2	0	0	0	0
A man cutting an apple	+	-	+	3	2	0	1	2	0
A boy eating an apple	-	+	+	5	4	5	8	3	2

Table 4.56 Item 20.2

Sentence presented: The man is climbing a ladder										
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *man*	Lexical meaning of the noun *ladder*	Lexical meaning of the verb	**1***	**2**	**3**	**4**	**5**	**6**
A man climbing a ladder	+	+	+	10	12	12	9	15	19
A man carrying a ladder	+	-	+	0	0	0	0	0	0
A man climbing a tree	+	+	-	0	0	0	0	1	1
A boy climbing a ladder	-	+	+	7	8	8	11	4	0

All children in this study exceeded the 60% criterion in passing sentences containing double adjectives and a noun both in Structure 7 and Items 16.2 and 16.3. Children's performance in Structure 7 (Tables 4.50 and 4.51) is slightly better than their performance in Items 16.2 and 16.3 (Tables 4.53 and 4.54) although they all have two adjectives and a noun as cues to understand their meaning. With reference to Item 16.1, study subjects demonstrated a poor performance here (Table 4.52) compared to Items 16.2 and 16.3.

The last and most difficult structure for the children in this group is Structure 20 and their results in this structure are presented in Tables 4.55 and 4.56. As the tables show, younger children performed around the criterion of 60% while the performance improved in the older groups. A closer look at results in Item 20.1 reveals that most children who did not point to the correct picture selected the distracter of *the boy eating an apple* instead of the target of *a man eating an apple*. The case is clearer in Item 20.2 when almost all children who did not point to the correct picture selected the distracter of *the boy climbing a ladder* instead of *a man climbing a ladder*.

4.2.4.2 Structures that require the use of both lexical and syntactic knowledge

Negation

Structure-12. S-V sentences where V is a negated present continuous.

Structure-13. S-V-C sentences where C is a negated adjective.

Structure-19. X but not Y.

The above three structures test for the comprehension of negation. The first tests negated adjectives such as *the car is not red*, while the second tests negated verbs such as *the man is not eating*. Structure 19 tests for the comprehension of the conjunction *but not* and the letters X and Y refer to either two adjectives or two verbs in the present progressive tense. Children's results in the items testing for the comprehension of these three structures is shown in the following tables.

Structure-12. S-V sentences (where the verb is a negated present continuous):

Table 4.57 Item 12.1

Sentence presented: The boy is not running									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb	Negation *(not running)*	**1**	**2**	**3**	**4**	**5**	**6**
A boy sitting	+	+	+	13	16	18	19	19	20
A boy running	+	+	-	3	1	0	1	1	0
A horse standing	-	+	+	0	0	0	0	0	0
A man sitting	-	+	+	4	3	2	0	0	0

Table 4.58 Item 12.2

Sentence presented: The cat is not drinking									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb	Negation *(not drinking)*	**1***	**2**	**3**	**4**	**5**	**6**
A cat sitting	+	+	+	16	15	20	19	17	20
A cat drinking	+	+	-	0	1	0	0	0	0
A cow lying down	-	+	+	3	3	0	1	2	0
A duck drinking	-	+	-	0	1	0	0	1	0

Table 4.59 Item 12.3

Sentence presented: The man is not eating									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb	Negation *(not eating)*	**1***	**2**	**3**	**4**	**5**	**6**
A man sitting	+	+	+	13	12	20	18	20	20
A man eating	+	+	-	2	3	0	0	0	0
A boy sitting	-	+	+	4	5	0	2	0	0
Sandwiches	-	-	-	0	0	0	0	0	0

Structure-13. S-V-C sentences (where the complement is a negated adjective):

Table 4.60 Item 13.2

Sentence presented: The pen is not long									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the adjective	Negation *(not long)*	**1***	**2**	**3**	**4**	**5**	**6**
A small pen	+	+	+	17	19	20	20	20	20
A big pen	+	+	-	2	0	0	0	0	0
A small cup	-	+	+	0	1	0	0	0	0
A small box	-	+	+	0	0	0	0	0	0

Table 4.61 Item 13.3

Sentence presented: The car is not red									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the adjective	Negation *(not red)*	**1***	**2**	**3**	**4**	**5**	**6**
A blue car	+	+	+	16	17	20	20	20	20
A red car	+	+	-	3	3	0	0	0	0
A blue air plane	-	+	+	0	0	0	0	0	0
A red air plane	-	+	-	0	0	0	0	0	0

Structure-19. X but not Y:

Table 4.62 Item 19.1

Sentence presented: The boy is sitting but not eating									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb *sit*	Negated verb *(not eating)*	**1**	**2**	**3**	**4**	**5**	**6**
A boy who is sitting but not eating	+	+	+	9	10	13	15	18	19
A boy who is sitting and eating	+	+	-	0	4	0	0	0	0
A boy who is standing but not eating	+	-	+	0	0	1	0	0	0
A man who is sitting but not eating	-	+	+	11	6	6	5	2	1

Table 4.63 Item 19.2

Sentence presented: The boy is short but not fat									
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**						
	Lexical meaning of the adjective *short*	Negated adjective *(not fat)*	**1***	**2***	**3**	**4**	**5**	**6**
A boy who is short but not fat	+	+	9	14	10	14	13	20
A boy who is short and fat	+	-	2	1	0	3	0	0
A boy who is tall and fat	-	+	2	0	2	0	0	0
A boy who is tall and thin	-	+	4	4	8	3	7	0

Table 4.64 Item 19.3

Sentence presented: The girl is reading but not standing									
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**						
	Lexical meaning of the verb *read*	Negated verb *(not standing)*	**1***	**2***	**3**	**4**	**5**	**6**
A girl who is reading but not standing	+	+	11	16	20	17	16	19
A girl who is reading and standing	+	-	2	1	0	3	3	0
A girl who is neither reading nor standing	-	+	4	2	0	0	1	0
A girl who is standing but not reading	-	-	0	0	0	0	0	1

As regards Structures 12 and 13, results show that children were able to comprehend negated adjectives slightly better than negated verbs. While 115 children (96%) passed Structure 13, 111 children (92.5%) passed Structure 12. However, it must be noted that this comparison was made after lowering the pass rate to 2 items instead of all 3 in these two structures. This was done to give them the equal opportunity of having the same pass rate as Item 13.1, which is one of three items testing for the comprehension of Structure 13, was excluded when computing the test results (See Section 4.2.2). Lowering the criterion was performed for comparison purposes only and it will not be considered when mentioning individual results of these 2 structures. With reference to Structure 19, it was passed by nearly half of the subjects (47%) which indicates that it was more difficult compared to Structures 12 and 13. With regard to children's performance in individual age groups, negated adjectives were passed by all groups indicating that this structure develops before children are 3;0 years. Sentences containing negated verbs were failed by the youngest two age groups; however, the four older groups passed them with a high rate of success. Structure 19 (X but not Y) was passed with a 60% criterion by the oldest age group (5;5 to 5;11) only.

Gender inflection:

Structure-6. Verbs inflected for gender and the subject is hidden.

Structure-10. V-O sentences where the verb is inflected for gender and the subject is hidden.

Structure-17. S-V-O sentences where the object is inflected for gender.

The grammatical feature shared by the above structures is that they are all inflected for gender. In Structure 10 the sentence starts with a present progressive verb that is inflected for gender followed by an object while the subject is hidden, which means that the subject of the sentence does not appear as a morpheme in the sentence. However, the speaker and the listener know who the subject is by inferences. Although the English translation of the sentence appears as if

it starts with a subject, for example the Arabic sentence /jæ-ɡr̩æ kɪtab/ is translated as *he (a boy) is reading a book*, but the prefix (jæ-) at the beginning of the verb signifies the gender of the subject and is not considered as a subject in Arabic. The grammatical distracter for the previous sentence was *she (a girl) is reading a book*, while the other two distracters are lexical: a boy drinking juice and a picture of a book. In the second structure (Structure 6), the sentence contains a verb inflected for gender only and the subject is hidden and that is why the English translation of the sentence appears as if it contains a subject as well. The Arabic sentence /tæ-ʃr̩æb/ is translated as *she (a woman) drinks*, but the prefix at the beginning of the verb signifies the gender and is not considered as a subject. The grammatical distracter for this structure was *he (a man) drinks*, while the other two distracters are lexical ones: *she eats* and *she washes*. As regards Structure 17, sentences representing this structure are expected to be more difficult for the study subjects to comprehend compared to Structures 6 & 10. A sentence that represents this structure is /ʔær-r̩ægal ji-dɪf-æh/ *the man is pushing him*, with the gender being an inflected suffix working as the object of the sentence and attached to the verb. Results of the items testing for the comprehension of the structures that assess gender inflection are presented next.

Structure-6. Verbs inflected for gender and the subject is hidden:

Table 4.65 Item 6.1

Sentence presented: She (a woman) drinks								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Feminine gender inflection on the verb	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A woman drinking	+	+	17	19	20	20	20	20
A man drinking	-	+	2	1	0	0	0	0
A woman eating	+	-	1	0	0	0	0	0
A woman washing	+	-	0	0	0	0	0	0

Table 4.66 Item 6.2

Sentence presented: She (a girl) plays									
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**						
	Feminine gender inflection on the verb	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A girl playing	+	+	16	16	18	16	18	20
A boy playing	-	+	4	4	2	4	2	0
A girl eating	+	-	0	0	0	0	0	0
A girl drinking	+	-	0	0	0	0	0	0

Table 4.67 Item 6.3

Sentence presented: He (a boy) reads									
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**						
	Masculine gender inflection on the verb	Lexical meaning of the verb	**1**	**2**	**3**	**4**	**5**	**6**
A boy reading	+	+	16	18	19	17	18	18
A girl reading	-	+	4	2	1	3	2	2
A boy playing	+	-	0	0	0	0	0	0
A boy eating	+	-	0	0	0	0	0	0

Structure-10. V-O sentences (where the verb is inflected for gender and the subject is hidden):

Table 4.68 Item 10.1

Sentence presented: He (a boy) is reading a book									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Masculine gender inflection on the verb	Lexical meaning of the verb	Lexical meaning of the noun book	**1**	**2**	**3**	**4**	**5**	**6**
A boy reading a book	+	+	+	16	19	18	19	20	19
A girl reading a book	-	+	+	2	1	2	0	0	1
A book	-	-	+	2	0	0	0	0	0
A boy drinking	+	-	-	0	0	0	1	0	0

Table 4.69 Item 10.2

Sentence presented: She (a woman) is watching TV									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Feminine gender inflection on the verb	Lexical meaning of the verb	Lexical meaning of the noun *TV*	**1***	**2**	**3**	**4**	**5**	**6**
A woman watching TV.	+	+	+	15	18	18	18	17	1
A man watching TV.	-	+	+	4	2	2	2	3	2
A woman watching horses	+	+	-	0	0	0	0	0	0
A TV.	-	-	+	0	0	0	0	0	0

Structure-17. S-V-O sentences (where the object is inflected for gender):

Table 4.70 Item 17.1

Sentence presented: The woman is carrying him (a very young boy)										
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *woman*	Lexical meaning of the verb	Feminine gender inflection on the object	**1**	**2**	**3**	**4**	**5**	**6**
A woman carrying a very young boy	+	+	+	10	10	11	11	15	12
A woman carrying a very young girl	+	+	-	9	6	6	7	5	6
A horse carrying a very young boy	-	+	+	0	0	0	0	0	1
A woman holding a very young boy	+	-	+	1	4	3	2	0	1

Table 4.71 Item 17.2

Sentence presented: The man is pushing him									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *man*	Lexical meaning of the verb	Masculine gender inflection on the object	**1***	**2***	**3**	**4**	**5**	**6**
A man pushing a boy	+	+	+	10	10	9	11	14	14
A man pushing a girl	+	+	-	5	6	9	7	5	5
A woman pushing a boy	-	+	+	3	2	2	1	1	1
A man and a boy sitting together	+	-	+	0	1	0	1	0	0

Table 4.72 Item 17.3

Sentence presented: The woman is feeding her (a very young girl)									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *woman*	Lexical meaning of the verb	Feminine gender inflection on the object	**1***	**2***	**3**	**4**	**5**	**6**
A woman feeding a very young girl	+	+	+	12	13	13	13	12	12
A woman feeding a very young boy	+	+	-	6	5	7	6	8	8
A man feeding a very young girl	-	+	+	0	1	0	0	0	0
A very young girl eating by herself	-	+	-	0	0	0	1	0	0

Children demonstrated a slightly better performance in Structures 6 as 99% passed it compared to the 89% who passed Structure 10. This result was obtained after lowering the pass rate to 2 items instead of all 3 in these two structures, as one of the items testing for Structure 10 (Item 10.2) was excluded when computing the test results (See Section 4.2.2). Structure 17 was one of the most difficult structures for the children to comprehend and only 25 (21%) children

were able to pass it. Consequently, none of the age groups was able to reach the passing criterion and the maximum pass rate was in the oldest age group (5;6 to 5;11) where only 8 (40%) children passed.

Active and passive verbs:

Structure-5. Reversible active.

Structure-11. Passive sentences.

Arabic takes both the reversible and non-reversible forms of the active verb, but it only takes the agentless form of the passive verb. The comprehension of the agentless passive is assessed by Structure 11 while the comprehension of reversible active is assessed by Structure 5. Children's results in the items testing for these structures can be seen below.

Structure-5. Reversible active:

Table 4.73 Item 5.1

Sentence presented: The woman is pushing the girl									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *girl*	Lexical meaning of the verb	Agent-action-object	**1**	**2**	**3**	**4**	**5**	**6**
A woman pushing a girl	+	+	+	17	13	17	17	18	19
A girl pushing a woman	+	+	-	3	6	3	3	2	1
A woman talking with a girl	+	-	+	0	0	0	0	0	0
A woman pushing a table	-	+	+	0	1	0	0	0	0

Table 4.74 Item 5.2

Sentence presented: The girl is chasing the sheep (sing.)									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *girl*	Lexical meaning of the noun *sheep*	Agent-action-object	**1**	**2**	**3**	**4**	**5**	**6**
A girl chasing a sheep	+	+	+	17	15	15	18	18	15
A sheep chasing a girl	+	+	-	3	5	5	2	2	5
A girl chasing A boy	+	-	+	0	0	0	0	0	0
A cow chasing a sheep	-	+	+	0	0	0	0	0	0

Table 4.75 Item 5.3

Sentence presented: The man is chasing the horse									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *man*	Lexical meaning of the noun *horse*	Agent-action-object	**1**	**2**	**3**	**4**	**5**	**6**
A man chasing a horse	+	+	+	11	11	14	15	17	17
A horse chasing a man	+	+	-	7	7	4	5	3	3
A man chasing a boy	+	-	+	1	2	1	0	0	0
A dog chasing a horse	-	+	+	1	0	1	0	0	0

Structure-11. Passive sentences:

Table 4.76 Item 11.1

Sentence presented: The plate is broken								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the noun	The verb in the passive form*	**1**	**2**	**3**	**4**	**5**	**6**
A broken plate	+	+	14	16	15	16	15	18
A plate	+	-	0	0	0	0	0	0
A broken cup	-	+	6	4	5	4	5	2
A plate falling from a table	+	-	0	0	0	0	0	0

*or the cue might be the lexical meaning of the verb.

Table 4.77 Item 11.2

Sentence presented: The book is torn								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the noun	The verb in the passive form*	**1***	**2**	**3**	**4**	**5**	**6**
A torn book	+	+	19	19	19	19	20	20
A book	+	-	0	0	0	0	0	0
A torn dress	-	+	0	1	1	1	0	0
A broken pen	-	-	0	0	0	0	0	0

*or the cue might be the lexical meaning of the verb.

Table 4.78 Item 11.3

Sentence presented: The car is crashed								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the noun	The verb in the passive form*	**1***	**2**	**3**	**4**	**5**	**6**
A crashed car	+	+	19	18	20	20	19	20
A car	+	-	0	0	0	0	0	0
A crashed motorcycle	-	+	0	1	0	0	1	0
A truck	-	-	0	1	0	0	0	0

*or the cue might be the lexical meaning of the verb.

More than three quarters of the children (77%) passed the agentless passive structure. All age groups passed this structure according to a 60% criterion. When checking the children's overall performance in the reversible active structure, it appeared very clearly that this structure was not an easy one to comprehend as only 60 (50%) children were able to pass it.

With regard to the performance of age groups, this structure was not mastered by at least 60% of the children until the group from 4;6 to 4;11 years.

Number inflection

Structure-2. Nouns inflected for number.

Structure-8. Verbs inflected for number and the subject is hidden.

Structure-14. S-V sentences where the subject and the verb are inflected for number.

Structure-15 V-O sentences where the verb and the object are inflected for number and the subject is hidden.

The above four structures test for the comprehension of sentences inflected for number. As mentioned in Section 2.1.5,in Arabic spoken in Saudi Arabia there are 3 number inflections for nouns (singular, dual and plural), whereas verbs and adjectives have 2 number inflections (singular and plural only). Number inflections come as suffixes for the words they are inflecting, such as the word /gælæm-in/ *two pens* which is a dual of the singular noun /gælæm/ *a pen.*

As regards Structures 2 & 8, they test for the comprehension of verbs and nouns inflected for number. The example of the pen mentioned in the previous paragraph represents Structure 8, while an example that illustrates Structure 2 is the plural verb /jæ-lʔæb-un/ *they (boys) play*, which is the plural of the singular verb /jæ-lʔæb/ *he (a boy) plays*. As mentioned earlier in the structures inflected for gender section, the prefix denoting the gender inflection which is /jæ-/ in the previous example, is used to distinguish feminine from masculine gender and is not the subject of the sentence as that is hidden.

The other two structures inflected for number are Structures 14 and 15. The first Structure (14) contains a subject and an intransitive verb that does not require an object, such as the sentence /ʔæɾ-ɾɪgal jæ-kl-un/ *the men are eating*. The subject of the sentence has been pluralised by changing its internal structure from the singular /ɾægal/ *a man* to the plural /ɾɪgal/ *men*, while the prefix /ʔa-/ at the beginning of the plural denotes the determiner *the*. In Structure 15 which is a V-O sentence (where the verb and the object are inflected for number), the subject of the sentence is hidden although it appears when the sentence is translated into English, for example /jæ-lʔæb bælkuɾ-teɪn/ *he (a boy) plays with cars (two cars)*. Children's results in the items testing for the comprehension of number inflection can be seen below.

Structure-2. Nouns inflected for number:

Table 4.79 Item 2.1

Sentence presented: The boys									
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Plural inflection on the noun	1	2	3	4	5	6
Three boys	+	+	13	14	17	19	16	19
One boy	+	-	0	2	1	0	0	1
Two boys	+	-	5	3	1	1	4	0
Three girls	-	+	2	1	1	0	0	0

Table 4.80 Item 2.2

Sentence presented: The two pens								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Dual inflection on the noun	1	2	3	4	5	6
Two pens	+	+	16	15	18	18	19	20
One pen	+	-	0	0	0	0	1	0
Four pens	+	-	4	5	2	2	0	0
Two books	-	+	0	0	0	0	0	0

Table 4.81 Item 2.3

Sentence presented: The cat								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the noun	Absence of a number inflection on the noun	1	2	3	4	5	6
One cat	+	+	13	13	15	17	14	17
Four cats	+	-	7	6	4	3	6	3
One sheep	+	+	0	0	1	0	0	0
One girl	-	+	0	1	0	0	0	0

Structure-8. Verbs inflected for number and the subject is hidden:

Table 4.82 Item 8.1

Sentence presented: They (boys) play									
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the verb	Plural inflection on the verb	1	2	3	4	5	6
Three boys playing	+	+	19	16	18	18	19	19
One boy playing	+	-	1	0	1	1	0	0
Four boys standing together	-	+	0	3	1	1	1	1
A group of toys	-	-	0	1	0	0	0	0

Table 4.83 Item 8.2

Sentence presented: She (a girl) eats								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the verb	Absence of a plural inflection on the verb	1	2	3	4	5	6
One girl eating	+	+	14	15	16	16	14	19
Three girls eating	+	-	6	5	4	4	6	1
One girl playing	-	+	0	0	0	0	0	0
Two Sandwiches	-	-	0	0	0	0	0	0

Table 4.84 Item 8.3

Sentence presented: He (a boy) walks								
Sentences illustrated by the picture	Cues		Children who selected the picture in every age group					
	Lexical meaning of the verb	Absence of plural inflection on the verb	1	2	3	4	5	6
One boy walking	+	+	13	9	17	17	17	19
Three boys walking	+	-	7	10	2	3	3	1
One boy drinking	-	+	0	0	0	0	0	0
One boy playing	-	+	0	1	1	0	0	0

Structure-14. S-V (where the subject and verb are inflected for number):

Table 4.85 Item 14.1

Sentence presented: The men are eating									
Sentences illustrated by the picture	Cues			Children who selected the picture in every age group					
	Lexical meaning of the noun	Plural inflection on the verb	Plural inflection on the noun	1	2	3	4	5	6
Three men are eating	+	+	+	8	4	9	6	4	12
One man eating	+	-	-	0	3	3	4	4	1
Two men eating	+	+	-	2	3	5	1	6	2
Three boys eating	-	+	+	10	10	3	9	6	5

Table 4.86 Item 14.2

Sentence presented: The boy is drinking									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun	Lexical meaning of the verb	Absence of a plural inflection on the noun and the verb	**1***	**2**	**3**	**4**	**5**	**6**
One boy drinking	+	+	+	14	11	20	17	19	20
Three boys drinking	+	+	-	5	8	0	3	1	0
One horse drinking	-	+	+	0	0	0	0	0	0
One boy walking	+	-	+	0	1	0	0	0	0

Table 4.87 Item 14.3

Sentence presented: The girls (two) are walking									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the verb	Dual inflection on the noun	Plural inflection on the verb	**1***	**2**	**3**	**4**	**5**	**6**
Two girls walking	+	+	+	13	14	19	20	19	20
Three girls walking	+	-	+	6	4	1	0	1	0
One girl walking	+	-	-	0	0	0	0	0	0
Two girls sitting	-	+	+	0	2	0	0	0	0

Structure-15. V-O (where the object is inflected for number and the subject is hidden):

Table 4.88 Item 15.1

Sentence presented: He (a boy) plays with cars (two cars)									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Dual inflection on the noun	Lexical meaning of the noun	Lexical meaning of the verb	**1***	**2**	**3**	**4**	**5**	**6**
A boy playing with two cars	+	+	+	3	3	8	9	9	14
A boy playing with five cars	-	+	+	6	5	6	2	5	4
A boy playing with one car	-	+	+	3	3	1	2	2	0
Two toy cars	+	+	-	8	8	5	7	4	2

Table 4.89 Item 15.2

Sentence presented: She (a girl) is holding a ball									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Absence of a number inflection on the noun	Lexical meaning of the noun	Lexical meaning of the verb	**1***	**2**	**3**	**4**	**5**	**6**
A girl holding a ball	+	+	+	10	6	7	9	14	16
A girl holding two balls	-	+	+	7	9	8	4	4	0
A girl holding four balls	-	+	+	2	4	5	7	2	4
A ball	+	+	-	0	1	0	0	0	0

Table 4.90 Item 15.3

Sentence presented: He (a boy) carries the bags									
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Plural inflection on the noun	Lexical meaning of the noun	Lexical meaning of the verb	**1***	**2**	**3**	**4**	**5**	**6**
A boy carrying three bags	+	+	+	17	15	20	19	20	20
A boy carrying one bag	-	+	+	2	4	0	1	0	0
A boy carrying three cups	+	-	+	0	0	0	0	0	0
A group of bags on the ground	+	+	-	0	1	0	0	0	0

The results of Structures 2 & 8, which are presented in Table 4.37 show that 73 children (61%) passed Structure 8 and 70 children (58%) passed Structure 2, indicating that their performance in these two structures is similar. Children's scores in the individual age groups showed a similar performance as well, where these 2 structures were passed by the oldest four groups and failed by the youngest two. Every single item in Structure 2 assessed a different type of number inflection: Item 2.1 assessed plural, Item 2.2 assessed dual and Item 2.3 assessed the absence of a number inflection on the noun (i.e. singular). Ninety-eight children (82%) responded correctly to Item 2.1 (the boys), while most of the rest of the children (12%) selected the distracter that signifies the dual inflection on the noun (two boys). The case is reversed in Item 2.2 where the dual inflection was the target sentence (two pens) and was selected by 88% of the children, but almost all the remaining children (11%) selected the distracter that signifies plural inflection on the noun (the pens). Item 2.3 was failed by more children as only 74% of them pointed to the correct picture (the cat). Two items in Structure 8 tested for the comprehension of singular verb (Items 8.2 and 8.3) and the third item in the structure (Item 8.1) tested for the comprehension of plural verbs. Children's performance in Item 8.1 was superior to their performance in the other two items as 89% of them passed, while Items 8.2 and 8.3 were passed by 78% and 77% of the children respectively.

Structure 14 was passed by 32 (27%) children which indicates that it was a difficult structure to comprehend for the study subjects. Considering the performance of the different age groups, this structure was only passed by 12 (60%) in the oldest group aged 5;6 to 5;11 years. The

performance of children in Structure 15 was very similar to the previous structure with a pass rate of 29 (24%) children. At the age groups level, results of these two structures are identical in that the only group that passed these two structures was the group aged 5;6 to 5;11 years again remembering the 60% criterion for passing.

Only 43 children (36%) passed Item 14.1 whereas Items 14.2 and 14.3 were passed by 101 (84%) and 105 (87.5%) children respectively. (See Tables 4.85 to 4.87). Singular, dual and plural number inflections on the object of the sentence were used in Items 15.2, 15.1 and 15.3 respectively, and results are shown in Tables 4.88 to 4.90. Children had a superior performance in the plural inflection on the object (Item 15.3) as 92.5% of the children pointed to the correct picture. A worst performance was shown in the other two items as only 38% of the children pointed to the correct picture in Item 15.1 and 43% in Item 15.2.

Comparatives:

Adjectives, *longer*, *bigger* and *shorter* were used in three sentences testing for the comprehension of comparatives (Structure 9) in the current study. The sentence that represented the adjective *longer*, for example, was *the knife is longer than the pen.* Children's responses to the three items testing for this structure are presented in the following tables.

Structure-9. Comparatives:

Table 4.91 Item 9.1

Sentence presented: The knife is longer than the pen								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	The meaning of the comparative *longer*	Lexical meaning of the noun *knife*	**1**	**2**	**3**	**4**	**5**	**6**
A long knife and a short pen	+	+	12	13	16	15	16	18
A short knife and a long pen	-	+	1	4	0	0	2	0
A knife and a pen having equal length	-	+	7	3	4	5	2	2
A long flower and a short pen	+	-	0	0	0	0	0	0

Table 4.92 Item 9.2

Sentence presented: The box is bigger than the cup								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	The meaning of the comparative bigger	Lexical meaning of the noun *box*	**1***	**2**	**3**	**4**	**5**	**6**
A big box and a small cup	+	+	13	18	18	19	20	17
A small box and a big cup	-	+	1	0	1	1	0	1
A box and a cup having equal size	-	+	5	2	1	0	0	2
A big apple and a small cup	+	-	0	0	0	0	0	0

Table 4.93 Item 9.3

Sentence presented: The girl is shorter than the boy								
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	The meaning of the comparative *shorter*	Lexical meaning of the noun *boy*	**1***	**2**	**3**	**4**	**5**	**6**
A tall boy and a short girl	+	+	9	7	9	12	10	13
A short boy and a tall girl	-	+	4	6	6	4	3	5
A boy who is as tall as a girl	-	+	3	2	3	4	5	1
A tall woman and a short girl	+	-	3	5	2	0	2	1

Only 38 (32%) children passed this structure. None of the age groups exceeded a pass rate of 60%, which meant that this structure was not passed by any age group and the maximum number of children passing in an age group was 9 children (7.5%) in the oldest group. A closer look at their results in the items testing for the comparative structure (Tables 4.91 to 4.93) reveals that children performed better in the first two items than the third (Item 9.3). The number of children who pointed to the correct picture in Items 9.1 (testing for the comparative *longer*) and 9.2 (testing for the comparative *bigger*) was 90 (75%) and 105 (87.5%) respectively. On the other hand, only half of the children pointed to the correct picture in Item 9.3 (testing for the comparative *shorter*).

Subject modification

Structure-18. Post modified subject within a S-V clause.

Structure-21. Post modified subject within a S-V-C clause.

The above two structures test for the post-modification of the subject. The position of the complement that modifies the subject varies in these two structures. The complement preceded

the verb in Structure 18, *the boy with black clothing is drinking*, while it came after the verb in Structure 21, *the boy chasing the horse is fat*. The results of children in the items testing for these two structures can be seen below.

Structure-18. Post modified subject within a S-V clause:

Table 4.94 Item 18.1

Sentence presented: The boy with black clothing is drinking										
Sentences illustrated by the picture	**Cues**			**Children who selected the picture in every age group**					
	Lexical meaning of the noun *boy*	Lexical meaning of the verb	Lexical meaning of the adjective	**1**	**2**	**3**	**4**	**5**	**6**
A boy with black clothing drinking	+	+	+	15	16	19	20	20	20
A boy with black clothing eating	+	-	+	1	1	1	0	0	0
A boy with white clothing drinking	+	+	-	4	2	0	0	0	0
A girl with black clothing drinking	-	+	+	0	1	0	0	0	0

Table 4.95 Item 18.2

Sentence presented: The man with a black beard is eating									
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the verb	Lexical meaning of the adjective	**1***	**2***	**3**	**4**	**5**	**6**
A man with a black beard eating	+	+	11	13	18	18	19	19
A man with a white beard eating	+	-	0	3	0	0	0	0
A man with a black beard drinking	-	+	5	2	2	1	1	1
A man with a white beard drinking	-	-	1	1	0	1	0	0

Table 4.96 Item 18.3

Sentence presented: The girl with a short hair is writing									
Sentences illustrated by the picture	**Cues**		**Children who selected the picture in every age group**					
	Lexical meaning of the verb	Lexical meaning of the adjective	**1***	**2***	**3**	**4**	**5**	**6**
A girl with a short hair writing	+	+	9	10	15	14	14	20
A girl with a long hair writing	+	-	6	5	1	2	2	0
A girl with a short hair reading	-	+	2	4	4	3	4	0
A girl with a short hair standing	-	+	0	0	0	1	0	0

21. Post modified subject within a S-V-C clause:

Table 4.97 Item 21.1

Sentence presented: The boy chasing the horse is fat										
Sentences illustrated by the picture	**Cues**				**Children who selected the picture in every age group**					
	A fat boy	A fat horse	A horse (not fat)	Agent-action-object	**1**	**2**	**3**	**4**	**5**	**6**
A fat boy chasing a thin horse	+	-	+	+	5	11	8	7	10	3
A fat horse chasing a fat boy	+	+	-	-	2	1	3	2	1	5
A thin boy chasing a thin horse	-	-	+	+	12	5	8	10	7	10
A thin horse chasing a thin boy	-	-	+	-	1	3	1	1	2	2

Table 4.98 Item 21.2

Sentence presented: The cow chasing the cat is brown										
Sentences illustrated by the picture	Cues				Children who selected the picture in every age group					
	A brown cow	A brown cat	A cat (not brown)	Agent-action-object	1*	2*	3	4	5	6
A brown cow chasing a black cat	+	-	+	+	2	7	6	5	9	5
A black cat chasing a brown cow	+	+	-	-	5	5	3	3	1	3
A black cow chasing a brown cat	-	+	-	+	7	5	8	10	7	10
A brown cat chasing a black cow	-	+	-	-	3	2	3	2	3	2

Table 4.99 Item 21.3

Sentence presented: The box under the table is black									
Sentences illustrated by the picture	Cues			Children who selected the picture in every age group					
	A black box	A black table	A table (not black)	1*	2*	3	4	5	6
A black box under a brown table	+	-	+	15	14	20	17	18	20
A white box under a black table	-	+	-	1	4	0	2	2	0
A Black table	-	+	-	0	0	0	1	0	0
A white box under a brown table	-	-	+	1	1	0	0	0	0

The children's performance varied in these two structures. While 70 (58%) passed Structure 18, only 11 (9%) passed Structure 21. As regards performance of age groups, Structure 18 was passed by age group 4;0 to 4;5 onwards. Structure 21 was not passed by any age group and the maximum number of children who passed this structure in an age group was 4 out of the 20 tested in the group from 4;0 to 4;5 years.

4.2.5 The relationship between CDS and the study of language comprehension

After presenting the results of both the CDS study and the language comprehension study, the relationship between the results of the two need to be investigated. The results of the two procedures may be judged to agree with each other if either of two situations occur, namely, children show a high passing rate in a structure that is used frequently by fathers in the CDS study (Table 4.100) or they have a low pass rate in a structure that is not used frequently by fathers in the CDS study Table 4.101. The results of the two procedures may not agree with each other if either of the following occur: first, children show a high pass rate in a structure that is not used frequently by fathers in the CDS study (Table 4.102) and second, children

show a low passing rate in a structure that is used frequently by fathers in the CDS study (Table 4.103). Prepositions will be presented in a separate table (Table 4.104) because they represent a special case.

Table 4.100 Structures which demonstrate an agreement between a good performance in both the CDS study and the language comprehension study.

	children who passed the structure in the comprehension test		The structure's frequency of occurrence in father's speech in the CDS study		Percent of fathers who used the structure
	No.	Percent	No.	Mean per father	
Possessives	118	98%	62	5.2	83.3%
Adj-N	116	97%	232	19	100%
Plural nouns	98	82%	93	7.8	91.7%

Table 4.101 Structures which demonstrate an agreement between a poor performance in both the CDS study and the language comprehension study.

	children who passed the structure in the comprehension test		The structure's frequency of occurrence in father's speech in the CDS study		Percent of fathers who used the structure
	No.	Percent	No.	Mean per father	
Post modified subject within a S-V clause	70	58%	3	0.3	25%
Comparatives	38	32%	32	2.7	75%
S-V sentences where both the verb and the subject are inflected for number	32	27%	4	0.3	33.3%
Complex commands	24	20%	5	0.4	16.7%
Post modified subject within a S-V-C clause	11	9%	1	0.1	8.3%

Table 4.102 Structures which demonstrate a weak agreement between a poor performance in the CDS study and a good one in the language comprehension study.

	children who passed the structure in the comprehension test		The structure's frequency of occurrence in father's speech in the CDS study		Percent of fathers who used the structure
	No.	Percent	No.	Mean per father	
Adj+Adj	111	92.5%	8	0.7	16.7%
Negated adjectives	110	92%	4	0.3	16.7%
Dual nouns	106	88%	1	0.1	8.3%
Verbs inflected for gender in V-O sentences	97	81%	2	0.2	8.3%
Agentless passive	92	77%	7	0.6	41.7%

Table 4.103 Structures which demonstrate a weak agreement between a good performance in the CDS study and a poor one in the language comprehension study.

	children who passed the structure in the comprehension test		The structure's frequency of occurrence in father's speech in the CDS study		Percent of fathers who used the structure
	No.	Percent	No.	Mean per father	
Verbs inflected for gender in V+(S=0) sentences	88	73%	351	29.3	100%
Negated verbs	87	72.5%	146	12.2	100%
Plural verbs	73	61%	261	21.8	100%

Table 4.104 A comparison between the number of children who passed the tested prepositions and their frequency of occurrence in fathers' speech in the CDS study.

	children who passed the preposition in the comprehension test		The preposition's frequency of occurrence in father's speech in the CDS study		Percent of fathers who used the preposition
	No.	Percent	No.	Mean per father	
Preposition *In*	117	97.5%	22	1.8	41.7%
Preposition *On*	109	90.8%	43	3.6	100%
Preposition *Under*	77	64.2%	14	1.2	66.7%
Preposition *Beside*	72	60%	9	0.8	41.7%
Preposition *Behind*	58	48.3%	6	0.5	33.3%
Preposition *In front of*	54	45%	15	1.3	41.7%
Preposition *Between*	9	7.5%	1	0.1	8.3%

4.2.6 Results of the reliability testing

In addition to the test re-test method for computing reliability, the internal consistency of the used test was computed. The results of the test re-test reliability will be presented first followed by the internal consistency results.

4.2.6.1 Results of the test re-test reliability

In the current study the probability factor involved in multiple choice led to the use of the percentage scores of agreement as a descriptive indicator of reliability. An 85% agreement was considered to be the cut-off at which to consider an agreement level reliable or unreliable. It was thought that such a cut-off rate is a safe threshold above which one can claim the test is reliable. However, agreements that are expected to occur as a result of a chance factor must be considered. The fewer the occasions of having agreements by chance, the more reliable the test is. In the case of the pictures sub-test, the likelihood of having an agreement by chance is 0.25

of the time, while in the case of the objects sub-test, the likelihood of having an agreement by chance could not be counted as the task is an object-manipulation task and the child's response was marked either correct or wrong which was not the case in the pictures sub-test where a detailed description of the child's response is recorded. For example, a child may put the spoon in the cup when he is ordered to *put it on it* and fail the item, while in the re-test, he puts the spoon under the cup when he is ordered to *put it on it* and fails that item. By failing the item in the test and re-test, there will be an agreement between the two testing occasions, although the child's responses were different. To conclude, an 85% cut-off will be used taking into account the disadvantages that may result from using such a method.

The test re-test reliability was computed for the results of the 9 children who were re-tested within 2-3 weeks of the initial testing session. The reliability of every child's performance in the objects, pictures sub-tests and their sum was examined first, followed by a thorough analysis of the reliability of children's performance in every structure tested. Since the nine children re-tested were distributed throughout the six age groups, it is of interest to know whether reliability changes with the effect of the child's age as it was found in previous research to be affected by the age of the subjects tested (see Section 2.3.1.1). Reliability was measured at this stage for every child re-tested by using the following procedure:

$$\frac{\text{Number of agreements between test and re-test for every item}}{\text{Number of items tested}} \times 100$$

Reliability results for every child re-tested are presented in the following table.

Table 4.105 Test re-test reliability of the results of every child re-tested.

Subject	Age group	Agreement between test re-test in the		
		Objects sub-test (%)	Pictures sub-test (%)	Total test score (%)
1	5;6 to 5;11	94.7	91.2	92.1
2	5;0 to 5;5	100	91.2	93.4
3	4;6 to 4;11	89.5	91.2	90.8
4	4;6 to 4;11	94.7	94.7	94.7
5	4;0 to 4;5	94.7	89.5	90.8
6	4;0 to 4;5	89.5	82.5	84.2
7	3;6 to 3;11	100	78.9	84.2
8	3;6 to 3;11	84.2	91.2	89.5
9	3;0 to 3;5	89.5	86	86.8
Overall reliability		93	88.5	89.6

As shown in the above table, for 7 out of the 9 children re-tested, the total test scores seem to be reliable on the basis of the 85% cut-off. The other two children's test re-test reliability was (84.2%) which is very close to the 85% cut-off. The overall performance of children's results was shown to be reliable as the agreement between test and re-test was 93% in the objects sub-test, 88.5% in the pictures sub-test and 89.6% in the sum of the two sub-tests. With reference to the effect of the age factor, older children seem to demonstrate a more reliable performance compared to younger ones. The relationship between the children's age and the reliabilities of their total test score was tested statistically by Spearman's rank correlation. Statistical testing resulted in a significant relationship ($r=0.757$ and $p< 0.05$) and consequently the coefficient of determination (r^2) (see Section 4.1.2) was: $r^2=(0.757)^2 =0.57$. This results indicates that 57% of the variability in children's test re-test reliability can be a direct effect of the age factor. Accordingly, this suggests that children's test re-test reliability is expected to increase as they grow older.

The other way of examining reliability is to look at the agreement between children's performance in the test re-test for every structure separately and the following formula was used for computing reliability:

$$\frac{\text{Number of agreements between test and re-test for every structure}}{\text{Number of times the structure was tested}} \text{ x100}$$

Items in the picture sub-test which were excluded in the data analysis have been excluded as well when the reliability was computed. Thus the number of testing occasions will be reduced for some structures. The number of testing occasions refers to the items used to represent every structure multiplied by the number of children re-tested (i.e. 9). Thus for prepositions, for example, the number of testing occasions was 18 because two items were used to test every preposition. Fifteen structures tested by pictures have 27 testing occasions since they were tested by 3 items and the rest of the structures (6 structures) have 18 testing occasions because one of the three items representing them was excluded.

Table 4.106 Test re-test reliability of the structures tested by objects. Shaded structures are the unreliable structures according to an 85% cut-off.

Structure	No. testing occasions	No. of Agreements	Reliability (%)
possessive	9	9	100.00
preposition in	18	17	94.44
preposition on	18	18	100.00
preposition under	18	15	83.33
preposition in front of	18	16	88.89
preposition behind	18	17	94.44
preposition beside	18	18	100.00
preposition between	18	18	100.00
Complex command I	9	8	88.89
Complex command II	9	8	88.89
Complex command III	9	6	66.67
Complex command VI	9	9	100.00

Table 4.107 Test re-test reliability of the structures tested by pictures. Shaded structures are the unreliable structures according to an 85% cut-off.

Structure	No. of testing occasions	No. of Agreements	Reliability (%)
1	27	27	100.00
2	27	25	92.59
3	18	18	100.00
4	18	17	94.44
5	27	23	85.19
6	18	17	94.44
7	18	18	100.00
8	27	23	85.19
9	27	21	77.78
10	27	24	88.89
11	27	27	100.00
12	27	27	100.00
13	18	18	100.00
14	27	25	92.59
15	27	23	85.19
16	27	25	92.59
17	27	20	74.07
18	27	20	74.07
19	27	24	88.89
20	18	15	88.88
21	27	18	66.67

* See Table 4.35 for structures' names.

As Tables 4.106 and 4.107 show, the performance of the 9 children who were re-tested was not reliable on the basis of the 85% cut-off in 2 structures tested by objects and 4 structures tested by pictures, while their performance in the rest of the structures was reliable, showing an agreement above the 85% cut-off. Children's responses were not reliable in the preposition *under* and the complex commands III in the objects sub-test and Structures 9 (comparatives), 17 (S-V-O sentences where the object is inflected for gender), 18 (post modified subject within a S-V clause) and 21 (post modified subject within a S-V-C clause) in the pictures sub-test.

Although the main aim of the test re-test is to measure the reliability of the test, there are other factors that may cause unreliability other than the test itself (Section 2.3.1.1). One such a factor is the examiner herself. An examiner whose performance is not systematic will not produce reliable results, even if the test itself is reliable. Another factor that may cause unreliability is the testing situation which might be suitable for the testee on one occasion but

not on another. Thus getting reliable agreement between test and re-test not only indicates that the test itself is reliable, but also indicates that the examiner was systematic and the testing situation is suitable on both testing occasions.

4.2.6.2 Internal consistency results

As mentioned in Section 2.3.1.1, K-R 20 is the best formula to use for internal consistency computation when the test being assessed has items that have variable difficulty and is dichotomous. The formula used for the computation of the KR-20 is as follows (Kapplan & Saccuzzo, 1997).

$$\text{KR-20}=\left(\frac{N}{N-1}\right)\frac{S-\sum pq}{S}$$

Where N = the number of items on the test.

S = the variance of the total test score.

p = the proportion of subjects getting each item correct (this is found separately for every item).

q = the proportion of subjects getting each item wrong (this is found separately for each individual item).

$\sum pq$ = the sum of the products of p times q for each item on the test.

The previous formula was used to compute the internal consistency of the items used in the objects and pictures sub-tests. First, the internal consistency of every age group's performance in the objects, pictures sub-tests and their sum was computed and results are presented in Table 4.108. After that the internal consistency of the performance of all subjects as one group in the two sub-tests and their sum was computed and results are shown in Table 4.109.

Table 4.108 Results of the internal consistency of the items used in the objects and pictures sub-tests computed for every age group.

Age groups	Internal consistency of the items used in the objects sub-test	Internal consistency of the items used in the pictures sub-test	Internal consistency of the items used in the whole test
3;0 to 3;5	0.644	0.565	0.648
3;6 to 3;11	0.411	0.776	0.659
4;0 to 4;5	0.667	0.508	0.656
4;6 to 4;11	0.651	0.530	0.670
5;0 to 5;5	0.562	0.546	0.700
5;6 to 5;11	0.316	0.531	0.556

Table 4.109 Results of the internal consistency of the items used in the objects and pictures sub-tests computed for all subjects.

Internal consistency of the items used in the objects sub-test	Internal consistency of the items used in the pictures sub-test	Internal consistency of the items used in the whole test
0.68	0.73	0.80

As shown in the above table, when individual age groups were considered, items seem not to contribute consistently to the total test score as the internal consistency of the performance of most groups did not exceed 0.7 which is the point at which Carmines & Zeller (1979) suggested a test can be considered internally consistent. However, when the performance of all subjects was considered, items used in the test seem to be consistent as the internal consistency of the pictures sub-test and the sum of the two sub-tests exceeded 0.7 and the internal consistency of the items used in the objects sub-test was 0.68, which is very close to 0.7.

Chapter Five

Discussion

As mentioned before, the main aim of the research was to get data on the developmental patterns, rate and order of acquisition of some morpho-syntactic structures' comprehension for Saudi children on which to base a criterion-referenced assessment. In order to help establish the criterion, it was decided to study Saudi adults' speech directed to their children (CDS). Results of the CDS study will be discussed first followed by discussion on the language comprehension study.

5.1 Child Directed Speech (CDS)

While preparing the study, the need to look at adult language directed to children emerged. Studying CDS was thought to be important in that it provides a natural sample that illustrates the type and range of structures' complexity a Saudi child is expected to comprehend within the age range of the proposed test. Since the proposed test is a criterion-referenced one, CDS data was important for establishing the criterion for such a test as it was one of the determining factors. In selecting structures for the test, the aim was not to simply adapt those structures that dominate in English-language tests and use them with Arabic-speaking children, but rather to ensure a solid starting point. The CDS was thought to provide most of these structures which can be included in a language test. Such a study was also important in providing the vocabulary items that a Saudi child is expected to comprehend. To achieve the previously mentioned aims, the speech of 12 fathers addressing their 2;4 to 5;6 years-old children was analysed. Fathers were selected to be the conversational partner because they are more accessible to a male investigator than mothers in conservative Saudi society (Section 2.1.2).

Vocabulary items used by fathers in the CDS study were considered when these items were selected for the comprehension test as they formed one of the determinants when a decision was made on what vocabulary items to include in the study. (See Section 3.3.2.1 for the other determinant). Consequently, most of the vocabulary items included in the vocabulary pre-test were words frequently used by fathers in the CDS (*c.f.* Table 4.1 and the vocabulary pre-test in Appendix 10). When comparing Table 4.1 and the lexical items used in the vocabulary pre-test, one can observe that 37 (71%) of the items used in the vocabulary pre-test (52 items in total) were items that were used at least once by fathers in the CDS study. A closer look at the 12 items failed by three children or more in the vocabulary pre-test (Table 4.10) revealed that six of them - *feed*, *cut*, *read*, *chase*, *push* and *a paper* - were not used at all by fathers in the CDS study. (See Appendix 12 for all the vocabulary items searched in the CDS study). This suggests that it was useful to use the vocabulary used by fathers despite the limitations on this data. This also emphasises the relationship between the results of the CDS study and the vocabulary pre-test in that half of the items failed by three or more children were not spoken by any father in the CDS study. It is therefore recommended that tests of syntactic comprehension use vocabulary items that children are expected to comprehend. The language of adults, particularly parents when speaking to their children, is a good source for such vocabulary items. One way of identifying these vocabulary items is by interviewing parents and questioning them regarding particular items.

However, the lexical items used by fathers in the CDS study were affected by the situation in which the recordings were made needs to be considered. Since the situation was a play situation between the father and his child, the majority of words used are expected to be relevant to that play situation. The verb *build* (a block), for example was used 32 times by fathers in the CDS study when they were asking their children to build blocks, although this verb is not expected to appear that frequently if fathers were speaking to their children in another situation. The effect of this situation becomes very clear when look at the most

frequent words spoken by all 12 fathers at least 20 times (only items used later in the comprehension test are mentioned) which were, *a car* (46 times), *a horse* (45 times), *big* (42 times), *a boy* (31 times), *red* (31 times), *put (something) in* (21 times) and *play* (20 times). These seven words are all words that are frequently used in play situations and they are related to objects and toys present in front of the father and the child at the time of the recording. It was expected that the conversation between the child and his father was going to be about things present in that situation, especially if we consider what has been mentioned by James (1990), that children's comprehension of words for people and objects is initially limited to situations in which referents are present. According to this, one cannot assume that words which have been mentioned most frequently by fathers in the current study will be the most frequent words used by the same fathers if the situations were different. The same applies to words which have not been spoken by fathers in the present study. It is expected that other words would be used in other situations. However, since the only information we have available about Saudi CDS is the current CDS data, it is sensible to use this data in making some assumptions about the vocabulary and grammatical complexity expected from Saudi children to comprehend. For example information such as the frequency of occurrence of certain vocabulary items in the language which is available to a researcher studying English CDS could have helped when doing the analysis for Saudi CDS, had it existed.

In the above table, BT words were used by 3 fathers only. The use of BT words could not be related to the age of the child since the father of the child aged 4;9 years used BT words. This suggests that the use of BT words by Saudi fathers does not seem to be related to the age of the child but rather to personal differences among fathers. The use of BT words in Arabic CDS has been reported by Ferguson (1956) and Omar (1973) who gave some examples of BT words used in the Syrian, Palestinian and Egyptian dialects of Arabic. It is noticeable that almost all BT words described in the current study have no inflection. This was noticed before by both Ferguson (1965) in the Syrian and Palestinian dialects and Omar (1973) in the

Egyptian dialect. The only exception to this rule in the current study was the word /ʔæl-ʔærnub/ where a definite article /ʔæl-/ is attached to the word. Further studies of the speech of Arabic-speaking adults with their younger children are required to investigate BT words. It is recommended that such study is conducted with a larger sample and includes mothers as well as fathers. Another factor that could enrich such a study is studying different varieties of the Arabic language.

An issue considered in the CDS study is the dialect variations between fathers as they were originally from three regions in Saudi Arabia. As mentioned in Chapter 2, Saudi dialects seem to vary in their vocabulary and prosodic features rather than syntactic structure. This was shown to be true in the current study as four of the fathers used some vocabulary words that are specific to their regions (Table 4.3). The fact that regional varieties were evident confirms that colloquial style of language is used in Saudi Arabia. This emphasises the importance of considering the variations in vocabulary of different dialects when assessing children's language comprehension, a point that was considered in the current study.

As mentioned in Section 3.2.2.2, before analysing structures present in the CDS study, a set of structures was initially selected and the fathers' corpora were searched to verify their presence. There were three sources for these structures which are: selected structures from 3 language comprehension tests for English-speaking children, structures suggested by the researcher from knowledge of the Arabic language and clinical experience and structures selected after analysis of the CDS Stage I study data. It was indicated in Chapter 4 (Section 4.1.2 and Tables 4.4 and 4.5) that the structures previously selected and suggested by the researcher and those selected after analysing the CDS Stage I data were the most frequently used structures by fathers when addressing their children across the whole corpus. This emphasises the advantage of verifying that the structures employed in the language comprehension test occur frequently in the CDS study. This is also important for establishing

the face validity of such a test. Face validity was defined by Kaplan & Saccuzzo (1997) as "the mere appearance that a measure has validity"

It was found that fathers of older children used more structures (in term of types and frequency of occurrence - see Table 4.6). This can be used as an indication that language structure used with older children is more complex than language structure used with younger ones. This finding supports the finding of studies with children speaking other languages such as English in that the structure of adult speech is modified according to the age and linguistic abilities of the child being spoken to. (For a much more extensive discussion see Phillips' 1973 work in Section 2.2.9 and Moerk's 1974 work in Section 2.3). The relationship between the frequency of occurrence of the structures in the CDS data and their complexity level as shown by the study subjects' test results will be discussed in a later in this thesis (Section 5.2.8).

The other measure used to determine the syntactic complexity of fathers' speech was the number of verbs per utterance (Table 4.7). Although statistical testing revealed that there was a significant positive relationship between the age of the child and the number of verbs per utterance used by his father, it was pointed out in Section 4.1.2 that this significance is of little practical value. It was found that the age factor can account for only 32% of the variability in the number of verbs per utterance produced by the fathers. A closer look at the number of verbs produced by every father revealed that the difference between the number of verbs produced by fathers is greater for younger children. This observation was tested by grouping the children in Table 4.7 into three groups, I, II and III, according to their age. Group I comprises fathers of the four youngest children (mean age 2;10 years) and they used fewer verbs per utterance (mean 0.47 verbs) compared to Group II (mean age 3;10 years and mean verbs per utterance 0.77 verbs) and Group III (mean age 5;1;0 years and mean verbs per utterance 0.74 verbs). However the slight difference in verbs per utterance between

Groups II and III fathers was in favour of fathers of the younger group (Group II). This result indicates that this measure (number of verbs per utterance) can be used in Arabic to estimate the complexity of fathers' speech to their younger children whose age does not exceed 3;0 years. Arabic-speaking fathers in the current study seem to use fewer verbs compared to the English-speaking mothers studied in Hoff-Ginsberg's (1985) study. The mothers in Hoff-Ginsberg's study used a mean of 0.7 verbs per utterance when their children were 2;10 years, while fathers in the present study used a mean of 0.47 verbs when their children were 2;10 years. In addition to the difference between the Arabic and English languages, the current study analysed fathers' speech while Hoff-Ginsberg's study analysed mothers' speech. These two factors might have affected the difference in the results of the two studies. Hoff-Ginsberg did not report the procedure they used to count the number of verbs, so it cannot be compared with the procedure used in the current study.

The last aspect of the CDS investigated in the present study was discourse functions. The coding system used by Hampson & Nelson (1993) was replicated in the present study. Results of the current study are compared to Hampson & Nelson's results in the following table.

Table 5.1 A comparison between Hampson & Nelson's and the current study in relation to discourse functions present in every 100* utterances.

Function	Hampson & Nelson (1993)		The current study	
	Percent	Rank order	Percent	Rank order
Description	21	1	18.9	3
Request for action	20	2	14.2	4
Conversational devices	13	3	8.9	5
Statements	10	4	22.3	2
Request for permission	10	4	0.3	10
Sounds	9	6	0.3	10
Request for information	7	7	31.1	1
Performatives	5	8	0.9	8
Expressive repetitions	2	9	0.5	9
Referential repetitions	1	10	1.3	6
Elicited imitation	0	11	0.1	12
Conventional recasts	0	12	1.1	7

* Although Hampson & Nelson's results are described as a percent, their sum is 98.

Almost one third of the fathers' utterances in the current study were requests for information, while they represented 7% of the mothers' utterances in Hampson & Nelson's study. Statements, request for permission, sounds and performatives are other discourse functions where results varied in the two studies. One factor that might have caused such variability is the older age of the current study subjects (mean age 3;9 years) compared to Hampson & Nelson's study (mean age 1;1 years). Another factor already mentioned is that this study concentrated on fathers' speech patterns, while Hampson & Nelson focused on those of mothers. A factor that might have caused the variability is the conversation situation. While the situation was free play in the current study, the situations in Hampson and Nelson's study were care-taking and free play. There are cultural factors that might have caused such difference between the results of the two studies. For example Saudi fathers might prefer to engage in a question and answer type of communication as shown by the percentage of requests for information (31% of the utterances) instead of just describing things present in the situation. An investigation of the previously mentioned possibilities needs to be considered in future research that concerns Arabic CDS.

5.2 Language comprehension study

The current study of language comprehension was performed in two parts, a pilot and a main study. Only the results of the main study will be discussed because the results of the pilot study were considered unreliable (Section 3.3.2). The examiner who carried out the testing performed reliably as shown by the test re-test results (Section 5.2.9). Having the test performed appropriately by another person indicates that the test administration devised for the study is not complicated. A second advantage of having another person perform the test (particularly a woman) is that she will be accepted by children more than a male examiner since children are only taught by women in their nurseries. A disadvantage of having the test performed by another person is the possibility of administrative mistakes occurring. However, this was minimised by the training received by the examiner and the weekly meetings which helped to resolve the unexpected administrative problems that arose at that time. Performance of the pilot study revealed some other problems which were subsequently eliminated (Section 3.3.2).

5.2.1 Hearing screening

The procedure used to screen hearing was a speech discrimination test which was found to be the most appropriate for the task presented since children will be tested in the rest of the language test for their ability to comprehend spoken sentences. It would have been preferable to have had a pure tone screening audiometry in addition to the speech discrimination test. However, obtaining a portable audiometer and also permission to perform the test on the study subjects was not possible. This is partly because access to the nurseries by the researcher for hearing testing was restricted. In addition, pure tone audiometry testing has been criticised for not providing direct information as to how a person hears and understands speech (Bess & McConnell, 1981) and for not reflecting the testee's capacity to perceive more complex sounds since it tests for the ability to discriminate signals (Cramer & Erber, 1974).

With regard to the stimuli used to test subjects' hearing, they were the six nouns used in the objects sub-test. Having toys or pictures for children to select from is considered by many authors as the most appropriate task for testing children's speech discrimination, for example Northern & Downs (1991), who added that words repetition tasks are more appropriate for adults.

The hearing screening used in the current study had the feature of using restricted vocabulary items which were frequent nouns used by fathers in the CDS study. Another feature was the simple response required from children since the child was required to point to an object.

Stimuli were spoken live to children in the current study and this is one way of presenting them, while the other way is to present pre-recorded words via a tape recorder. However it was not possible to measure stimuli presentation level. Since the examiner was instructed to speak the words slightly louder than her usual voice, it is expected that she presented the words with an intensity that was around 45 dB. Measuring the examiner's intensity level was not possible because of the unavailability of a device that could do the job such as a Sound Pressure Level meter (SPL). There is a strong debate in the literature on whether to use live or recorded materials for speech discriminations tests. This issue was discussed by Katz (1985) and both views were presented. Katz concluded the discussion by stating that a live voice is a better way of assessing young children's speech discrimination abilities. Having the examiner cover her lips with a paper sheet while presenting stimuli for the hearing screening helped to ensure that children would not identify a word by looking at the examiner's lips.

Only one of the six nouns used was monosyllabic which is /kub/ *cup*, while the other five were bisyllabic, although monosyllabic words are the recommended type of words for speech discrimination tests (Section 2.3.4). This is because an investigation of the syllabic structure

was not performed prior to words selection. The words to be used in the hearing screening of the clinical test need to be phonetically balanced monosyllabic words which is the most appropriate type for such tests.

5.2.2 Receptive Vocabulary Pre-test (RVP)

The study subjects were required to perform a vocabulary pre-test in order to ensure that when a child failed a morpho-syntactic structure, his failure was not attributed to failing lexical items in the tested sentences. This has been stressed by many researchers, for example, Carrow (1968) noticed that sometimes the difficulty a child has in understanding an utterance might be because of the semantic content not the syntactic structure.

Lexical items tested were obtained from the target sentences used in testing the morpho-syntactic structures. It was found that the target sentences included 25 nouns, 17 verbs and 10 adjectives and these items constituted the 52 lexical items used in the vocabulary pre-test. Most of these items were frequent words used by Saudi fathers addressing their young children. More specifically, 72% of the nouns, 59% of the verbs and 90% of the adjectives used in the test were used at least once by fathers addressing their children in the CDS study. This suggests that Saudi children will find it easy to comprehend most vocabulary items used in the test; however, a reasonable number of errors were expected since every child was tested for his comprehension of these 52 lexical items. This assumption was shown to be true as none of the children tested failed more than 4 lexical items out of the 52 items tested. Furthermore, 40 out of the 52 items used were passed by all the study subjects.

Before presenting the vocabulary items failed, the possible reasons for failing will be mentioned. Failing to comprehend a vocabulary item can be attributed to three reasons. The first possibility is that the child lacks the knowledge of the specific items tested. The second possibility is that the drawing is not clear enough for the child to recognise the item tested.

The final possibility is that the child might know the item tested and it is drawn clearly, but the item is addressed differently in the child's dialect. This last problem was overcome by a dialect checklist when children were asked to name the eight items which could have variable forms in the Saudi dialects and the name given by the child to that particular item was used throughout the test. Since the dialect checklist was introduced before the test was performed, it was expected that this ruled out one of the possible reasons for failure.

The 12 vocabulary items failed were: 5 nouns and 7 verbs, despite the fact that 25 nouns were used compared to 17 verbs. It is recognised frequently in the literature that nouns are easier to comprehend than verbs. For example Miller *et al.* (1980) found that nouns were comprehended earlier than verbs (Section 2.2.2.3). The 10 adjectives used in the present study were passed by all the study subjects.

The verbs *feed, run* and *cut* were shown to be the most difficult items as they were not comprehended by 16 (13%), 11 (9%) and 8 (7%) children out of the 120 children respectively. The verbs *feed* and *cut* were represented on the same plate of four pictures along with the verbs *brush* and *chase*. Inspection of the pictures representing the verbs *cut* and *feed* showed that they were clearly represented with a woman cutting a piece of cake to represent the verb *cut* and a woman feeding a little girl to represent the verb *feed.* The verb *cut* was also found to be a difficult verb to comprehend in the pilot study where it was not comprehended by 6 out of the 41 children tested. Subsequently, the picture representing the verb *cut* was redrawn which resulted in this verb being failed by only 8 children out of the 120 children tested. This redrawing suggested an improvement in the children's responses. It is probable that children who did not comprehend the verbs *feed* and *cut* did so because they did not understand the vocabulary itself and was not due to a problem in the pictures representing the verbs. This is supported by the individual age groups' performance in the verbs *feed* and *cut* (Table 4.10). It is evident from the table that these two verbs were failed

by more children in the younger age groups compared to children in the older age groups. The verb *feed* was failed by 11 children of the youngest three groups, while it was failed by only 5 children in the oldest three groups. Similarly, the verb *cut* was failed by 6 children of the youngest three groups, while it was failed by only 2 children in the oldest three groups.

With regard to the verb *run*, the other three verbs drawn in the plate were *read*, *tear*, and *push*. Inspection of the pictures revealed that the verb *run* was apparently clearly represented by the drawing. However, the boy who is being pushed by a man looks like as if he is running as well, which may have an effect on the child's perception of the picture. This was supported by the finding that 9 out of the 11 children who made errors in the verb *run* have actually pointed to the picture of the man pushing the boy. Therefore it is recommended that another picture is used in the clinical test to accompany the verb *run*.

The nouns *a woman* and *a girl* were also not reliably comprehended by 7 children. This might be due to the plausibility of the word *girl* in the Arabic spoken in Saudi. The noun *girl* is given to any woman until she is married which means, for example that a 26 years-old woman can be called *a girl*. It is recommended that any future research considers this point and avoids using one of these two words as a distracter if the other one is the target.

Surprisingly enough, children passed all ten adjectives tested. The reason for that might be that both the positive and the negative ends of most adjectives tested were presented in the same plate. This was true for the adjectives, *big:small*; *long:short*; and *fat:thin*. Having polar adjectives makes comprehension easier. (See the polarity principle in Section 4.2.4). This problem could not be avoided when constructing the test because terms are relative and a reference for the adjective tested needs to be present in the same plate. The adjective *long* could not be tested for its comprehension except, for example if we have a long pen and a short one in the same plate.

It can be inferred from the previous discussion that the vocabulary used is appropriate for the present study. Special care needs to be taken in future to select items that children are expected to comprehend, as the present study has shown that most of the items selected from the CDS study were easier to comprehend for children than other vocabulary items not used by fathers in the CDS study.

The vocabulary pre-testing data showed clearly that the effect of age was significant (Section 4.2.1.3) This meant that older children passed more vocabulary items compared to younger ones. It is well known that children acquire more lexical items in terms of comprehension and production as they grow older. Benedict (1979) found that by 1;6 years of age, children reached a cumulative comprehension total of 50 words, and they comprehend an average of 22 new words each month (Section 2.2.2.2).

The effect of gender on the results of the receptive vocabulary pre-test was inconsistent. While girls performed slightly better in the older age groups, boys' performance was slightly better in the younger age groups' results. This indicates that one cannot predict which of the two genders will perform better. The same finding, that gender variable has no significant effect on children's language capabilities, was reached by other researchers (for example Berryman ,1983). (See the following section for more details).

5.2.3 The test of morpho-syntax comprehension

The main part of the research is the procedure that tested for the comprehension of certain morpho-syntactic structures. Two methods were used in the test of morpho-syntax comprehension: an object and a picture sub-test. Twenty three items were used to test 3 structures by objects and 63 items were used to test 21 structures by pictures.

The objects sub-test consisted of morpho-syntactic structures which were tested by the use of 6 miniature toys which were a chair, a table, a cup, a spoon, a knife and a shoe. The reasons for selecting these particular items are that firstly, they were nouns used by fathers when addressing their children in the CDS study (Section 4.1.1) and secondly, because they were suitable for testing prepositions which is the main structure tested by the objects. Objects such as the ones used in the current study are suitable for children who are 1;8 years or older according to Miller & Paul (1995). Cocking & McHale (1981) found that children's performance in an object-manipulation task was better than their performance in a picture-pointing task (Section 2.3). Testing the difference in performance between objects-manipulation and pictures-pointing tasks was beyond the scope of the current study due to the time limitation. However, several established language comprehension tests in English such as RDLS (Reynell, 1985) have used the object-manipulation task successfully. It can also be suggested that it is a common experience for Saudi children from their first year of life to play with toys. Therefore future procedures are encouraged to employ more objects for testing Saudi children's language capabilities, especially since some structures such as possessives are difficult to test with pictures. However, the point that some structures are difficult to test using objects needs to be considered. An example of such structures which are difficult to test by pictures is testing for the comprehension of passive sentences where complicated instructions need to be used if they are going to be tested by objects. (See Section 2.2.4.4). On the other hand, the use of pictures only limits what can be tested. For the previously mentioned reasons, both picture-pointing and object-manipulation tasks were used in the present study.

As regards the perception of pictures, Saudi children were expected to be less exposed to pictures compared to children in western societies since picture books are rarely used by mothers in Saudi society (Section 2.3). Saudi children's limited exposure to pictures occurs through watching cartoons on TV programs, colouring black and white line drawings (for

some children), looking at nursery school books (if children go to nurseries) and looking at their older brothers and sisters' school books which include many pictures. This indicates that the subjects in this study will be more exposed to pictures than other children who do not attend nurseries.

5.2.3.1 Items which were excluded from the pictures sub-test

When analysing the results of the two procedures (i.e. the objects and pictures sub-tests), it was noticed that with 6 out of the 63 items used in the picture sub-test, children were consistent in selecting a certain distracter. For this reason results of these 6 items were excluded from the analysis. It is worth discussing the reasons for the exclusion of these 6 items before discussing the test results.

In the pictures sub-test, distracters can be lexical only or lexical and grammatical. Children appeared to systematically over-select the same distracter in 5 out of the 63 items tested by pictures which were Items: 3.1, 4.1, 7.3, 10.2 and 13.1. These were removed from the test and were not considered when counting test scores. The reasons for removing these items will be discussed before discussing the test results.

Tables that show the removed items are presented in the Results Chapter including the target sentences as well as sentences that were used as distracters (Tables 4.13 to 4.18). In Item 3.1, which is one of three items testing for the comprehension of S-V sentences where the verb is present continuous, the target sentence was *the woman is walking*. This sentence was confused with the distracter sentence *the girl is walking*. The reason for confusing these two sentences is in the perception of the drawings of the woman and the girl. (See Section 5.2.2).

Items 4.1 and 20.3 are similar - the only difference is that in Item 4.1 two words are manipulated (i.e. 2 ICW), while there are three in Item 20.3 (i.e. 3 ICW) so the discussion on

Item 4.1 can be generalised to Item 20.3. Item 4.1 is one of three items that test for the comprehension of SVO sentences where the verb is present continuous. The target sentence in Item 4.1 was *the man is washing the car* which was selected by 50 subjects, while the distracter *the boy is washing the car* was selected by 68 subjects. In Item 20.3, 64 subjects selected the target sentence, while the distracter was selected by the rest of the sample (i.e. 56 children). A possible reason for having the distracter selected more than the target picture was the use of a probable event comprehension strategy. It is not common in Saudi Arabia to see a man washing his car; instead, it is quite common to see young people washing their cars or their fathers' or older brothers' cars. Having a less common event of *a man washing a car* compete with a more common event of *a boy washing a car* led most of the children (71.6%) in Item 4.1 and nearly half of them (47%) in Item 20.3 to ignore the linguistic knowledge conveyed by the sentence spoken to them, *the man is washing the car*, and to select the picture that represented the more probable event, *the boy is washing the car.*

The fourth item that was excluded is Item 7.3 which tested for the comprehension of (adj.+adj.+n.) sentences. Looking at the pictures drawn to represent the 4 sentences in that item, it can be observed that the picture of the man is not very clear. The man's beard and moustache are too short to enable a child to spot that he is a man. The most possible explanation is that most of the children who selected the distracter *tall thin boy* confused the picture of the tall man with the picture of the tall boy especially because the confusing picture of the boy shows a tall boy.

The same explanation applies to Item 13.1 which tests for the comprehension of SVC sentences where the complement is a negated adjective. The target *the boy is not fat* was selected by 62 children, while the distracter *the man is not fat* was confused with the target and was selected by 56 children. It is possible that the children's perception of the pictures of the tall boy and the tall man were affected by the drawing, as was the case in Item 7.3.

The last item that was excluded is Item 10.2 which tests for the comprehension of V-O sentences where the verb is inflected for gender and the subject is hidden. The target sentence *he (a man) is carrying the baby* was selected in this item by 63 children, while one of the distracters *she (a woman) is carrying the baby* was selected by 51 (42.5%) children. Possibly most of these 51 children used a probable event comprehension strategy as a basis for their picture selection instead of using their knowledge of linguistic structure. It is evident here that the children who selected the distracter used their knowledge of the world and selected the most probable event, which is a woman carrying a baby, rather than the less probable event, which is a man carrying a baby. When constructing tests of language comprehension, target picture and pictures used as distracters need to have similar probabilities in order to allow the child to use his linguistic knowledge to respond to questions.

5.2.3.2 Gender variable

Before discussing the effect of the gender and age variables on children's results, it was important to know whether the interaction between the two independent variables, gender and age, affects the dependent variable, test scores. An interaction effect between two variables occurs when the effect of one variable is not the same at all levels of the other variable (Pagano, 1998). The interaction between the two variables was found not to be significant. This result implies that the two variables are not related and thus each of them can be tested separately

It was important before discussing the children's results in detail to decide whether or not a child's gender will have an effect on his test performance as this would affect the way in which the results would be treated. Having a significant effect for the gender variable would mean that results for the girls would be treated separately from those of the boys. If the opposite is true (i.e. gender has no significant effect on children's results), then the boys' and girls' results would be treated as one group.

With respect to the current study, the gender variable was found not to have a significant effect on the children's test results. Statistical testing for the effect of gender on the results of the objects and pictures sub-test was performed and its effect on the children's results was found not to be significant. Several other studies have also found no effect for the gender variable. An example is the study by Berryman (1983) who used the PLS (Zimmerman *et al.*, 1969) to test 672 pre-school children aged 3;8 to 5;4 years. Berryman found that gender differences for both the auditory comprehension and verbal ability sub-tests, as well as for the total scale, were clinically insignificant.

5.2.3.3 Sensitivity of objects, pictures sub-tests and their sum to the age variable

An important feature of a developmental language test is to have the items included sensitive to age, because it is expected that children's performance on the test will improve as they get older and acquire greater competence. With respect to the current study a collective effect for the age variable on the scores of the objects and pictures sub-tests was first investigated. It was found, as mentioned in Section 4.2.2.1, that age had a strong effect on the scores of the objects and pictures sub-tests. Since a collective effect for the age variable was found, each sub-test's sensitivity to the age variable was tested.

The age variable's effect on the results of the objects sub-test was tested first, followed by its effect on the results of the pictures sub-test, and finally the age variable's effect on the sum of the two sub-tests was investigated. It was found that the age variable had a significant effect on all three testing occasions. This indicated that the test as a whole was sensitive to age, which in turn meant that generally the test is capable of detecting differences in the development of language comprehension as children grow older. However, further statistical testing needs to be carried out to find out the extent of the age interval within which the test is capable of detecting such differences.

After ensuring that the test was capable of detecting changes in children's language comprehension development as they grew older, it was necessary to know the extent of such changes that the test is capable of detecting. With regard to the age ranges used in other tests of language comprehension, Miller & Yoder (1984) in their test classified children according to their total test scores into age ranges that varied by 1;0 year. The age range was shorter in the TROG (Bishop, 1989) and it was a 0;3 month age interval. For example a child who passes 7 blocks out of the 20 blocks tested in TROG (Section 2.3.2.6) is given an age equivalent of 4;6 years. Every block passed is credited a 0;3 month extra until the age of 6;0 years.

In the present study it was of interest to know the age range at which differences in Saudi children's comprehension development could be detected. Children were originally classified into six age groups varying in 6 month age ranges. Thus, statistical testing was performed to examine whether the children's scores in one age group differ significantly from their scores in the other age groups. The more significant the comparisons between age groups, the more sensitive the test is to differences in children's ages. The procedure as well as the statistical test used, which was Tukey's HSD, were explained in detail in Section 4.2.2.2.

As shown in Tables 4.24, 4.27 and 4.30, children's performance seems to vary significantly when the difference between one age group and another is at least one year, although some significant variations were observed when the difference between the age groups was 6 months. These results suggest that a 6 months age range is not a sufficient period to enable the morpho-syntactic structure used to detect changes in the development of the language comprehension of the subjects of this study. These results also suggest that the test is sensitive to a 1;0 year age range which implies that a 1 year period is sufficient to enable the morpho-syntactic structure used to detect the changes in the development of the study subjects' language comprehension. However, this needs to be treated with caution since one age

comparison (4;0 to 4;5 and 5;0 to 5;5) was not significant. A further examination of the results of these two groups will be presented next. Children in the current study seem to pass through three stages of development in relation to the structures tested. This is indicated by comparisons in performance between groups when the younger two groups differ from the next older ones which in turn differ from the oldest group.

As mentioned above, the comparisons between age groups 4;0 to 4;5 and 5;0 to 5;5 was not sensitive and this required further investigation. When these two age groups' results were examined, it was found that the younger group (4;0 to 4;5) scored better than the older group (5;0 to 5;5) in the objects sub-test (Figure 4.2), whereas in the pictures sub-test, the older group's performance was slightly better than the younger group (Figure 4.3). A further examination of the boys' and girls' scores revealed that in both the objects and the pictures sub-tests, the younger group's performance was better than that of the older group, whereas the opposite was true for boys where the older group's performance was better than the younger group in both the objects and the pictures sub-tests (Figures 4.2 and 4.3). This meant that a further examination needed to be performed for the girls' results in these two age groups in order to find out the reason for the younger group's performance being better than the older one's.

A thorough investigation of the girls' performance revealed that the group aged 4;0 to 4;5 years performed better than the one aged 5;0 to 5;5 years in both the objects and pictures sub-tests. The difference between the two age groups, which was in favour of the younger children in both sub-tests, was clearer in the objects sub-test where the total score of the younger group girls was 69 in comparison to 53 for the older girls. In the pictures sub-test, the total score of the younger group of girls was 132, while it was 131 for the older group. It could be inferred from the previous discussion that the performance of girls in these two age groups (i.e. 4;0 to 4;5 and 5;0 to 5;5), is contrary to expectations. This made the one year age

range difference between the two age groups non-significant. A justification for this unexpected result was that some of the girls, such as girls no. 56, 59 and 60 (see Appendix 13) in the younger group, show excellent language comprehension capabilities that are ahead of their chronological age. Another reason is that some of the older group girls, such as girls no. 92, 93 and 94 (see Appendix 13), had language comprehension capabilities that were below their chronological age. The other possibility is that younger girls performed better due to a chance factor. Based on these three justifications, performing the test with a larger sample is expected to correct the problem of having the younger group perform better than the older one.

5.2.3.4 The Relationship between the scores of objects and pictures sub-tests

The relationship between the two sub-tests, objects and pictures, was examined. The reason for examining the relation between the two was to know whether a child who showed a good performance on the objects sub-test would also show a good performance on the pictures sub-test. Spearman's rank correlation was used to correlate children's scores on objects with their scores on pictures. First, correlation between the two was done for every age group separately, which meant that age was not considered at this stage. After that the scores of objects were correlated with scores of pictures for all age groups taking age into consideration. Statistical testing for individual age groups resulted in a non-significant correlation between the two, except for the age group from 5;0 to 5;5 years which was highly significant.

The next stage was to test the scores of objects and pictures across all age groups which meant that a third variable, which is age, was going to be included in addition to the objects and pictures variables. By considering age, data were treated as they were ordered in an ascending order beginning from the younger group and ending with the older one. The statistical test used for that purpose was a partial correlation test which can treat 3 variables

at the same time. In the partial correlation test, the scores on the objects sub-test were correlated with those of the pictures sub-test while the age variable was controlled. Statistical testing resulted in a highly significant correlation which suggested that children who performed in one of the sub-tests at a certain level are expected to perform at a similar level in the other sub-test. According to such results, if a child showed a below average performance on the objects sub-test for example his performance on the pictures sub-test is also expected to be below average.

Summary

As discussed above, since there was no significant effect for gender, boys and girls were treated as one group of 120 subjects. With regard to age, it proved to have a significant effect both on the two sub-tests and their sum. The sensitivity of the test to age ranges was examined and statistical testing showed that the test was sensitive to a 1 year age range. Finally, the objects and pictures scores were found to correlate with each other when the age variable was controlled.

5.2.3.5 Sensitivity of individual structures to the age variables

The next step was to examine the sensitivity of every morpho-syntactic structure to the age variable. The aim of such examination was to know whether a certain structure was capable of detecting difference in age within the age range of the test which is between 3;0 and 6;0 years. Fisher's exact test (F) was used to test the structures' sensitivity to age. Half of the structures tested by objects, 6 out of 12, and almost half of the structures tested by pictures, 10 out of 21, were found to be sensitive to age (Tables 4.34 and 4.35).

The structures that did not show sensitivity to age were studied in detail and results of the structures tested by objects will be discussed first and results of the structures tested by pictures will follow.

Six out of the 12 structures tested by objects were shown to be sensitive to age (Table 4.34). Structures which were sensitive to age were the prepositions *under*, *in front of* and *behind* and complex commands I and III. This indicated that the previously mentioned structures were able to detect differences in the children's language comprehension capabilities as they grew older within the age range of the children tested. The other 6 structures did not have this ability to detect differences in the children's language comprehension as they grow older within the age range of the children tested. These 6 structures were possessives, prepositions *in* and *on* and complex commands II and IV.

With regard to the structures tested by pictures, 10 out of the 21 structures tested were found to be sensitive to age as indicated in Table 4.35. There are at least four possible reasons that caused some of the tested structures not to be sensitive to age. One possible reason is that the tested structure was fully acquired by almost all the study subjects which meant that this structure might be sensitive to age if it was used with a younger group of children. After reviewing the results of individual age groups in every structure, the previous justification was found applicable to the following structures, which are presented in following table.

Table 5.2 Structures which were passed by almost all children. See Table 4.38 for children's results in the structures tested by objects, and Table 4.39 for those tested by pictures.

Structure tested by objects	Structure tested by pictures
Possessive	Adj.-N
Preposition *in*	S-V sentences (V is present continuous)
Preposition *on*	Adj.-Adj.-N sentences
	V-O sentences (V is inflected for gender and S is hidden)
	Passive sentences

The structures given in the above table can be used in the clinical language test even though they were acquired by children aged 3;0 years or older. This is because firstly, by having them at the beginning of a language test, an examiner can ensure that subjects, especially younger ones, understand the task required. Secondly, items that are perceived as easy by children will give them encouragement. However the main justification for having simple

structures included in a clinical language test is that it is intended for use with children with language disorders whose linguistic abilities are likely to be inferior to their chronological age.

A second reason why the structures did not show sensitivity to age is that these structures were not yet acquired by most subjects as shown by the children's results. Such structures might be sensitive to age if they were used to test older children. The children's performance was reviewed to identify structures which were not sensitive to age because they were failed by most children. Three structures in the objects sub-test and 2 structures in the pictures sub-test were found to fit this criterion and they are presented in the following table.

Table 5.35 Structures which were failed by most children. See Table 4.38 for children's results in the structures tested by objects, and Table 4.39 for those tested by pictures.

Structure tested by objects	Structure tested by pictures
Preposition *between*	Comparatives
Complex commands II	Post modified subject within a S-V-C clause
Complex commands VI	

A limited number of these structures which were failed by most children needs to be included in the clinical language test since the test is a criterion-referenced test that will be used with a clinical population. This will enable a clinician to use the test, for example, on older children with learning difficulties. It must be noted that such structures need to be put at the end of the test in order not to make the child feel discouraged because he has not answered correctly, which will affect his responses in the rest of the test.

The third possible reason for some of the tested structures not being sensitive to age is that the number of subjects tested is insufficient for the structure to show sensitivity to age. For such structures, performing the test with a larger sample is expected to make the structure sensitive to age. Another possible solution to this problem is to extend the age range of the subjects. This case was found in one structure tested by pictures, which is structure number 5

(reversible active, see Table 4.39 for children's results in this structure). Table 4.35 shows that the p-value for this structure is approaching significance and the table suggests that the results from the older group, aged 5;5 to 5;11 years, were responsible for this structure not being sensitive to age.

The final possible reason why some of the tested structures do not show sensitivity to age is that the process of development of these structures is a gradual one. Thus, an extended age range is needed to detect differences in the acquisition of such structures. This is especially evident in SVO sentences (where V is present continuous) which shows clearly that the number of children passing the structure increases slowly until the oldest age group, where there is an abrupt increase in the number of children passing from 13 to 17 (see Table 4.39 for children's results in this structure). The same applies to structures 6 (verbs inflected for gender) and 8 (Verbs inflected for number) and it is expected that the sensitivity of these structures may be significant if the age range is extended.

5.2.3.6 Structures' order and age of acquisition

One of the main aims of the present study was to find the order of the comprehension acquisition of the tested structures according to age. Age was found to be a significant variable for the objects and pictures sub-tests and of both together. Ranking of the structures according to their order of acquisition was based on the assumption that a structure passed by most children was easier to comprehend than a structure passed by fewer children. Based on this assumption, an order of acquisition for the tested structures was made and presented in Table 4.36 for structures tested by objects and in Table 4.37 for structures tested by pictures. As these two tables show, the structures are placed in a descending order starting from the structure that was passed by most children (at the top of the table) and ending by the structure that was passed by the smallest number of children (at the bottom of the table). This means that the table gives us a rough indication as to which structure develops first, However, it

does not indicate the age at which a structure develops. The procedure which was used in this particular research to determine whether a structure was mastered by a particular age group or not was to set a cut-off criterion of 60% passing. In reference to the set cut-off criterion, children belonging to a particular age group were considered to have mastered a structure if at least 60% of them (12 children in this research since each age group consists of 20 children) passed the three items testing for the structure. As indicated in Section 2.3.1.1, this cut-off criterion has been used previously in the literature to determine children who had mastered a certain structure from those who had not (for example Carrow, 1968 and Miller & Yoder, 1984).

Identifying structures mastered at a particular age from those not mastered will help in clinical practice to determine the order in which structures are tested. When using a criterion (such as the 60% passing cut-off used in the present study), it must be considered that this criterion was set as an indication of the population norm. Consequently, there will be some children at younger age groups who passed the structure being tested; however, it has not been considered that these children have passed because the number passing the structure in their age group did not reach the set criterion which is 60%.

The two tables presented in the Results Chapter (Table 4.38 for structures tested by objects, and Table 4.39 for structures tested by pictures) indicate the age range at which every structure develops when the 60% passing is used as a mastery criterion.

A problem regarding this criterion arose when an age group may show mastery of a particular structure by having at least 60% (12 children) pass the structure; however, an older age group may show failure in that structure by having less than 12 children pass it. This situation is very clear in the results of structures tested by objects and particularly in the complex command III structure and the preposition *in front of*. Thirteen children passed the complex

command III structure in the group ranging in age from 4;0 to 4;5 years; however in the next two older groups ranging in age from 4;6 to 4;11 years and 5;0 to 5;5 years respectively only 7 and 8 children passed the structure which meant that these older age groups were considered as having failed according to the set cut-off passing criterion. The way this problem was treated was to rely on the performance of the younger group that passed the structure and to attribute the older group's poor performance to a sampling error. According to this rule if at least 12 children passed a structure, the age group they belong to and the older age groups will be considered passing that structure even if more than 8 children in an older age group fail the structure. Going back to the complex command III example children whose age is 4;0 to 4;5 years or older will be considered masters of the structure, even though only 7 in the group aged 4;6 to 4;11 years and 8 in the group aged 5;0 to 5;5 passed the structure. This way of relying on the performance of a younger group appeared very clearly in two of the structures tested by objects which are complex command III and the preposition *in front of*. When a younger age group performs better than an older one, this might be attributed to several reasons. These are:

- Some younger children perform well above their age level.
- Some other older children may perform worse than their age level even though they passed the criteria that was set for the study subjects selection.
- It is assumed that such errors decrease as the number of subjects representing every age group increases. Given the time and resource restrictions for the present study, 20 children in each age group was the maximum possible number to be included
- As mentioned in the Methods Chapter, a child passes a structure only if he passes in all three items testing for this structure's comprehension. This meant that some children might have passed two out of the three items testing for the structure; however they failed in that structure when the total scores were computed. This was shown to be true for some structures whereby a single item was remarkably more difficult than the other two items testing for the comprehension of the structure. (See the beginning of this section).

- Other reasons may be due to the circumstances of testing such as poor attention or fatigue which produce fluctuations in children's responses. The examiner was instructed to keep the child attentive during the whole session and to continue testing on another day if the child appeared tired. However, direct observation of the test situation was not possible for the researcher to determine if attention was a problem.

5.2.4 Comprehension patterns of the structures tested by objects

One of the aims of the current research is to investigate the developmental patterns of comprehension of selected morpho-syntactic structures. This section will attempt to accomplish the above stated aim by examining the way Saudi children interpreted the tested morpho-syntactic structures. The results of the structures as well as the items representing these structures will be discussed in this section. This will include a discussion of the results of the children who responded correctly in addition to those who did not. The results of the items representing the structures tested by objects will be discussed first, followed by those tested by pictures.

Assessing a child's language comprehension in an object-manipulation task can be considered a less structured situation compared to a picture-pointing task, particularly if the commands used in the object-manipulation task do not conflict with the child's world knowledge. In object-manipulation tasks the child is not restricted to the choice of the four pictures presented (in the case of tests that use four pictures). This does not allow for an analysis of the child's responses, which is the case with picture-pointing tasks. Consequently the cues used by children to interpret structures tested by objects can hardly be determined by investigating children's responses. The chance factor has little effect on the child's response in an object-manipulation task, while this is different in a picture-pointing one where in a four picture choice, for example, there is a 25% possibility that the child will score a correct response based on chance only. Children's results in the items testing for the comprehension

of the three structure tested by objects will be discussed below. In addition, we will explore the reasons that led children to perform in some items better than others although they test for the same structure.

5.2.4.1 Possessives

The results presented in Table 4.40 imply that the possessive determiner is acquired early in the life of a Saudi child. According to this result, a child aged 3;0 years or older is expected to fully comprehend this structure. One could not generalise from the results of the two children who could not point to three items testing for possessives as they represent a very low percentage (1.7%) of the children tested. The possessive structure is one of the structures which was not sensitive to age in the current study see (Table 4.34) and this was attributed to the fact that this structure is mastered early in the child's life as indicated by the high pass rate. Possessives seem to be acquired even earlier for English-speaking children as Golinkoff & Markessini (1980) found that English-speaking children as young as 1;7 years were able to comprehend possessives tested when a 75% criterion was used. One difference between this current study and the work by Golinkoff & Markessini is that they used two nouns to express the possessive/possession relationship instead of a pronoun and a noun which was used in the current study (see Section 2.2.4.9). Another study that tested the comprehension of possessives is Layton's (1976) which found that 76% of the subjects in the group aged 3;0 years were able to comprehend possessives such as *the boy's daddy* in an acting-out task. When comparing the present study results with those of Layton in relation to comprehension of possessives, we can observe that the subjects in the current study performed better. In addition to the structural difference between the two languages, there are two other factors that might have accounted for the difference in results of these two studies. Firstly, the type of possessives used by Layton are different from the possessive used in the current study, which is possessive determiner. Secondly, Layton used objects to test for the comprehension

of this structure, while in the current study the child was asked to point to his body parts and the examiner's body parts.

5.2.4.2 Prepositions

The prepositions *in* and *on* were easy for the subjects to comprehend and this was shown by the high performance demonstrated by all age groups (see Table 4.41 for children's results in every item testing for the comprehension of possessives). This result indicates that 3;0 year-olds comprehend these two prepositions with great proficiency, with the preposition *in* being apparently easier to comprehend than *on.* The same result was found in studies of other languages. Clark (1973), for example tested 70 English-speaking children for their comprehension of the prepositions *in, on* and *under* and found that the preposition *in* was the easiest as it was comprehended by 94% of the younger group with a mean age of 2;3 years. (See Section 2.2.4.5 for details on the stages of comprehension of these three prepositions). Another study of English-speaking children's comprehension of prepositions was Carrow's (1968) who found that the prepositions *in, on* and *under* were understood by at least 60% of the age groups tested including the youngest age group from 2;6 to 3;0 years.

Children's performance in the preposition *in* violates expectations of the effect of world knowledge on children's comprehension as 3 children failed the most probable item *put the spoon in the cup*, while none of the children failed the less probable item *put the knife in the shoe*. Although the difference in the children's results between the two items is very slight, that they performed better in the less probable item needs further investigation. The opposite occurred with the preposition *on*, as more children responded correctly to the probable item *put the knife on the table* compared to the less probable item *put the spoon on the chair*. Children seem to be affected by their world knowledge as they are more likely to put a knife on a table than a spoon on a chair. The strong effect of world knowledge on Saudi subjects' responses was found in the current study (see Section 5.2.3.1). One may argue that world

knowledge had no effect on children's responses to the preposition *in* because the two items were very easy for the subjects to comprehend.

The age of mastery for the preposition *under* found in the present study is older than the age reported for English-speaking children in both Clark's (1973) and Carrow's (1968) studies. While 98% of the third age group children (mean age 2;9 years) comprehended the preposition *under* correctly in Clark's (1973) study, at least 60% of the children in the youngest age group from 2;6 to 3;0 years were able to comprehend the preposition *under* in Carrow's (1968) study. It must be noticed that Carrow used a picture-pointing task to test for the comprehension of prepositions, while an object-manipulation task was used in both Clark's and the present study.

Children's responses in the two items testing for the preposition *under* were slightly variable. It is interesting to observe that the sentence containing the word *table* was passed by more children compared to the one containing the word *chair* when testing the three prepositions *on*, *under* and *in front of* (see Table 4.41). Looking at the two miniature toys used in the current test to represent the words *table* and *chair*, one can observe that the table, which was round, is slightly bigger than the chair. Another difference between the two objects is that the chair is a fronted object, while the table is a nonfronted one. Fronted objects such as a chair or a television take their reference from the object, thus a sentence such as *in front of the TV* appears to mean *in front of the screen* (Owens, 1996). Nonfronted objects such as the table used in the current study take their location from the speaker's perspective. Owens points out that interpretation of prepositions attached to nonfronted objects requires a certain level of social skill on the part of the listener. Accordingly, it is expected that the interpretation of the preposition *in front of* in the sentence *in front of the chair* is going to be easier than its interpretation in the sentence *in front of the table*. This was not true for the present study subjects' results as their performance in sentences containing the nonfronted object *table* was

better than their performance in sentences containing the fronted object *chair*. The only possible explanation is the one mentioned above that the slight difference in the sizes of the two objects might have led to the better performance in sentences containing the word *table* whenever a table and a chair were used to test for the same preposition (i.e. in the prepositions *on*, *under* and *in front of*).

A strong effect of children's world knowledge can be noticed in the responses to the preposition *beside*. As Table 4.41 indicates, most children (92.5%) put the knife beside the spoon, which is a probable event seen by children almost everyday. However fewer children (63%) put the shoe beside the table which is a less probable event. Another reason that might have caused (or possibly raised) the difference in the result between the two items is the fact that *the spoon* is a fronted object, while *the table* is a nonfronted one (see the discussion above). One may observe that children showed a similar performance in the two items testing for the preposition *behind* which can be attributed to the fact that both objects used as a reference (i.e. the shoe and the cup) are fronted and the two sentences have similar probability.

Results of the current study vary slightly from results of studies with children speaking other languages such as English- and Spanish-speaking children in relation to the prepositions *behind*, *beside* and *in front of*. The following table compares the performance of the current study subjects to that of children speaking Spanish and English in their comprehension of the prepositions *under*, *beside*, *behind* and *in front of*.

Table 5.4 Prepositions *under*, *beside*, *behind* and *in front of* ordered according to their age of acquisition in comprehension as was found in the present study and three other studies of English- and Spanish-speaking children.

Study	The present study	Conner & Chapman	Cox	Kuczaj & Maratsos
Year		1985	1979	1975
Language	Arabic	Spanish	English	English
Prepositions	*Under & Beside*	*Under*	*Behind*	*In front of & Behind*
	Behind	*In front of* and *Behind*	*In front of*	*Beside*
	In front of	*Beside*		

As mentioned above, *between* was the most difficult preposition to comprehend in the present study. Results showed that *between* was so difficult that only 9 children out of the 120 children tested were able to pass the two items representing this preposition. Carrow's (1968) results in relation to *between* indicated that this preposition was mastered by at least 60% of the children aged 3;6 years, while in the current study even older children (from 5;6 to 5;11 years) did not show mastery of *between.* Carrow did not mention the number of items used to test every preposition because two items were used in the present study and the child had to pass both items in order to have passed the preposition tested. The two commands used to test for the comprehension of the preposition *between* in the current study were *put the knife between the cup and the table* and *put the spoon between the table and the chair.* These are similar to commands used to test for the other six prepositions except for having an extra noun to represent the relation *between.* The difficulty in carrying out this command can be explained by either the difficulty of the task or the linguistic structure. It is recommended that this preposition is tested using another task. If a poor performance continues even when the other task is used, the possibility that the difficulty is inherent in the preposition itself is stronger, and accordingly it can be said that this preposition develops later in Saudi children's language - unlike English-speaking children. Children performed similarly in the two items testing the preposition *between* which suggests that the two items have similar difficulty.

To conclude, data showed that all prepositions tested, except *between,* showed a similar pattern and age of development in comprehension to that found in children speaking other languages, particularly English. Prepositions were found to develop in the following order: *in, on, under, beside, behind, in front of* and finally *between.* The difficulty found in the comprehension of *between* was attributed to either the task used or to a specific feature of this preposition in the Arabic language. Children's world knowledge was found to affect their performance when responding to some of the prepositions studied.

5.2.4.3 Complex commands

Children showed a variable performance in the four commands tested as shown in Table 4.42. The reason for such variability can be explored by analysing the structure of every sentence used to test the comprehension of complex commands in the current study. An analysis of these sentences revealed that some sentences are more complex than others, as indicated in the following table.

Table 5.5 An analysis of the sentences testing for the comprehension of complex commands.

Command	Sentence used for testing	Analysis result					
		Nouns	Verbs	Prep.	Pron.	Conj.	Det.
I	Put the spoon behind the shoe and the knife in the cup	Spoon Shoe Knife Cup	Put	Behind In		And	4-the
II	Give me the spoon and put the cup on the chair	Spoon Cup Chair	Give Put	On	Me	And	3-the
III	Put the cup on the table and the knife under the chair	Cup Table Knife Chair	Put	On Under		And	4-the
IV	Put the spoon between the cup and the shoe and give me the knife	Spoon Cup Shoe Knife	Put Give	Betwee n	Me	2-and	4-the

It must be noted that the same analysis result would be achieved if the Arabic version of the sentences were analysed. The only difference is that the pronoun *me* is an inflected suffix attached to the verb and the determiner *the* is an inflected prefix attached to the noun, which differentiated them from *me* and *the* in English. As Table 5.5 shows, commands-I and -III appear to have an identical structure in that they both contain four nouns, one verb, two prepositions, one conjunction, four determiners and no pronouns. However, they differ in the types of prepositions used, which were *in* and *behind* in command-I, while they were *on* and *under* in command-III. Prepositions of the later command (i.e. command-III) appeared easier to comprehend according to the results of the preposition structure, since the preposition *behind*, which was used in command-I, was found to be significantly more difficult to

comprehend compared to *on* and *under*, as shown in the preposition section of this chapter. Test results support this expectation as command-III was comprehended by 48 children, while command-I by only 29 children. With regard to the comprehension across age groups, the youngest age group that was able to show mastery of command-III was the one from 4;0 to 4;5 years, whereas the case was different for command-I when it was passed only by the older group aged 5;6 to 5;11 years.

The other two commands, which are commands II and IV, appear to have a similar structure since they both have two verbs, one preposition and one pronoun. However, command-IV appears to have more nouns, conjunctions and determiners which indicate that it is expected to be comprehended by fewer children compared to command-I. Another reason for expecting command-IV to be more difficult than command-II is that the preposition used in the former is *between* which children found the most difficult preposition to comprehend, while in the later it was *on* which is one of the easiest. As expected, command-IV was understood by 3 children compared to command II which was comprehended by 17 children. However, none of the age groups was successful in having the number of subjects passed exceed the 60% criterion, which suggested that these two commands were more difficult than commands-I and -III to comprehend.

Several studies have discussed the comprehension of simple commands that contain one request only. (See Section 2.2.4.8 for more details). However, few studies have been concerned with the comprehension of complex commands. One of these is Carrow's (1968) study which found that at least 60% of the children at the 4;6 age group were able to carry out complex commands such as *put the car under the table and bring me the book.* It must be noted that the previous sentence used by Carrow has a different structure compared to the sentences used in the present study to test the comprehension of complex commands. Carrow's results seem to agree with the results of command-III in the present study, which

was comprehended by at least 60% of the 4;0 to 4;5 age group subjects. The difference in structure between the sentences used in the present study and Carrow's study needs to be considered.

5.2.5 Comprehension patterns of the structures tested by pictures and require lexical knowledge only

5.2.5.1 Structures that require the knowledge of two lexical cues

The shared feature between the three structures presented at the beginning of Section 4.2.4.1 (Structures 1, 3 and 4 whose results are presented in Tables 4.43 to 4.49) is that a listener needs to comprehend two lexical cues in order to achieve comprehension of the presented sentence. The types of lexical cues in these structures vary according to sentences presented. In Structure 1 the two lexical cues are a noun and an adjective, while they are a noun and a verb in Structures 3 and 4. Children's superior performance in Structure 1 indicates that study subjects as young as 3;0 years are able to use their lexical knowledge successfully to interpret sentences that contain two lexical cues. This result seems to agree with the results obtained by Carrow's (1968) study with English-speaking children who showed comprehension of sentences containing a noun and an adjective as young as 2;6 years.

Structures 3 and 4 are similar in that they have two lexical cues that are valid (i.e. available and reliable according to the CM). In Structure 4 an extra noun is added even though this noun did not vary in the distracters. The addition of this noun might have added some memory load to the processing of Structure 4 sentences. According to CM this might have increased cue cost (see Section 2.2.1.5) causing cue validity to be decreased. It can be noticed that the distracter selected by almost all children who pointed to a wrong picture in Items 4.2 and 4.3 was the one that includes the noun but not the verb cues. Children who selected this might have been using a comprehension strategy by which they were attending to the noun or

they might have been attending to the last word said by the examiner since the noun was the last word in the sentences representing Structure 4.

5.2.5.2 Structures that require the knowledge of three lexical cues

When comparing children's results in these three structures (Structures 7, 16 and 20 whose results are presented in Tables 4.50 to 4.56), it must be noted that although they all contain three lexical cues, sentences representing them are not similar in their syntactic structure. While Structure 7 as well as Items 16.2 and 16.3 contain two adjectives and a noun, Item 16.1 contains two verbs and a noun. Structure 18, on the other hand, contains a verb, a noun and an adjective and Structure 20 contains two nouns and a verb.

As the CM anticipates, sentences where two items are varied were easier for the subjects to comprehend than sentences where three items are varied, given that the items have a similar nature (i.e. they all require lexical knowledge for their comprehension). According to the CM, a cue cost will be added in the case of three lexical items, increasing the difficulty of that item's comprehension. This was shown by the current study subjects' performance in the first group of structures which require the knowledge of two lexical cues, and the second group of structures which require the knowledge of three lexical cues.

The slight difference between the results of Structures 7 and 16 can be attributed to the fact that sentences representing Items 16.2 and 16.3 have more morphemes compared to sentences representing Structure 7. The noun in Items 16.2 and 16.3 is prefixed by the definite article /ʔæl-/ and the two adjectives are separated by the conjunction /wæ-/, while sentences representing Structure 7 have no added morphemes to the two adjectives and the noun. This sentence-length factor in Items 16.2 and 16.3 could have increased the cue cost and decreased the validity of the lexical cues. The difference in children's results between Structure 7 and the two items in Structure 16 is more evident in the two younger groups (i.e.

3;0-3;5 and 3;6-3;11) which supports Bates & MacWhinney (1989) contention that cue cost might well be expected to weigh more heavily for small children.

As the results of Structure 7 and Items 16.2 and 16.3 indicate, double adjectives are acquired at an early age (before 3;0 years of age). This is an earlier age compared to that reported for English-speaking children who were found by Carrow (1968) not to acquire sentences containing a noun and two adjectives until they were 4;6 years old. Children in Carrow's were asked to point to one of two pictures in response to sentences such as *a large blue ball.* The current study is similar to Carrow's in that it used a picture-pointing task and double adjective sentences without a conjunction between the two adjectives. The main difference between the current study and Carrow's study is that she used two pictures only, a target and a distracter, while four pictures were used in the current study, a target and three distracters. Having more distracters is a point in favour of the current study because it is less probable that a subject will get the correct answer by chance since he will be faced with 4 pictures. A child faced with 2 choices to select from has a 50% chance of answering correctly by chance, whereas the chance will be reduced to 25% if he is faced with four choices. Regardless of having one distracter only, Carrow's subjects did not show mastery of double adjectives until a later age compared to subjects of the current study even though the passing criterion, which was 60%, was the same in the two studies.

Another study of English-speaking children's comprehension of double adjectives is by Ehri (1976), who tested 40 children between 4;0 and 8;0 years. (See Section 2.2.4.3). She found that the only group that mastered this structure in comprehension was the older one aged 6;0 to 8;0 years who were correct on 94% of the sentences tested, while children in the group aged 4;0 to 5;0 years were correct on 39% of the sentences only. The testing procedure used in Ehri's study was to ask children to select objects by giving two features (e.g. *select any objects that are long and soft*). Thus a child in Ehri's study was able to show comprehension

of double adjectives if he uses two lexical cues only which were the lexical meaning of the adjectives. In comparison the current study subjects should integrate three cues in order to show comprehension of the double adjective sentences tested.

As mentioned above, children showed a poor performance in Item 16.1 compared to the other two items (i.e. Items 16.2 and 16.3). Two possible reasons might have caused the variability in children's results. First, the difference in cues used - two verbs and a noun in Item 16.1 but two adjectives and a noun in Items 16.2 and 16.3. It might be more difficult for children, especially younger ones, to integrate the meaning of two verbs and a noun compared to two adjectives and a noun. It must be noted that in the Arabic version of Item 16.1 the two verbs are not suffixed as it appears in the English translation of the item. The second possible reason is a perceivability factor (adding to the cost of the cue) by which some children could not distinguish between the pictures of the boy and the man which resulted in their selection of the picture of *a man standing and eating* instead of the target picture of *a boy standing and eating*. Cue validity in this case is expected to decrease as a result of this perceivability problem. Children's results in this item support both reasons as most of the children who did not point to the target picture in fact selected the picture of *a man standing and eating*. The way this result is interpreted according to the CM is that the three cues competed together and the lexical meaning of the two verbs *stand* and *eat* won the competition which resulted in children's reliance on the two verbs as cues and ignoring the lexical meaning of the noun *boy* cue. This result can also be explained according to the second reason as children who could not distinguish between the pictures of the boy and the man treated the picture of *the man standing and eating* as the target picture.

The comprehension of Structure 20 requires the integration of the lexical meaning of three cues: two nouns and a verb. This might be the main reason for children's poor performance in this structure. It was noticed above that children in Items 20.1 and 20.2 were consistent in

selecting a certain distracter. Thus what was said about Item 16.1 regarding the perceivability problem can be generalised to Items 20.1 and 20.2. It could be the case that children find it more difficult to comprehend a sentence based on two nouns and a verb (as in Items 20.1 and 20.2) or two verbs and a noun (as in Item 16.1) compared to two adjectives and a noun (as in Structure 7 and Items 16.2 and 16.3). Children who did not point to the target picture in Item 20.1 might have been using a comprehension strategy by which they were attending to the last word of the sentence presented to them (i.e. *apple*). This explanation is not applicable to Item 20.2 as none of the children pointed to the picture representing the distracter *a man carrying a ladder* although it includes the last word in the target sentence (i.e. *ladder*).

5.2.5.3 Summary of the discussion on structures that require lexical knowledge only

The above discussed structures are ones that require lexical knowledge only for their comprehension in the test presented. The lexical meaning of the words was used as the only cue to comprehension in these structures. In the first group of structures, study subjects had to allow the convergence of two lexical cues in order to show comprehension of the tested sentences. Almost all children tested were able to use the two lexical cues, however a slight deterioration was observed in children's performance when the cue cost was increased by adding an extra noun to the sentence (although not varied in the pictures).

In the second group of structures three lexical cues need to converge to lead to comprehension of the tested structures. As expected, children found it more difficult to integrate three lexical cues compared to two. Also the type of these lexical cues was found to affect comprehension. Children were able to comprehend sentences containing two adjectives and a noun better than structures containing two verbs and a noun or two nouns and a verb. Similarly, sentences containing two verbs and a noun were more difficult for the subjects to

comprehend than those containing two nouns and a verb. Cue cost representing perceivability was found to affect children's responses.

5.2.6 Comprehension patterns of the structures tested by pictures and requiring the use of both lexical and syntactic knowledge

5.2.6.1 Negation

Negation cues were not the only cues used to test for the comprehension of structures 12, 13 and 19 as some lexical ones were incorporated. This means that children were required to show not only their comprehension of the negation in these structures but also their ability to integrate different cues including the negation cue. The number as well as the types of cues used are expected to affect comprehension of the structures. Comprehension of sentences testing negated verbs requires the understanding of the negation *not* in addition to the lexical meanings of the negated verb and the accompanying noun. Similarly, comprehension of sentences testing negated adjectives requires the understanding of the negation *not* in addition to the lexical meanings of the negated adjective and the accompanying noun. Thus, all these three cues need to interact to show comprehension of the type of negation assessed in these structures. The case is slightly different in Structure 19 as the lexical meaning of two adjectives need to be incorporated into the comprehension process of the sentence in addition to the negation *not* and the lexical meaning of the accompanying noun.

Most children were able to use all three cues when responding to sentences testing negated adjectives (see Tables 4.60 and 4.61). Eight out of the nine children who failed to use all three cues interactively did so because they could not incorporate the negation cue into the comprehension process, as these eight children responded relying on their lexical knowledge only. This implies that lexical cues did not represent a problem for study subjects when responding to negated adjective structures. This was not exactly the case with negated verbs as some of the lexical cues had an effect on the way children comprehended this structure.

Children who failed items testing for the comprehension of negated verbs seemed as if they were attending to the negated verb and ignoring the subject of the sentence, which was true for 29 children in the three items. Children in the younger three groups demonstrated this phenomenon of attending to the negated verb cue and ignoring the noun, and this was true for all three items testing the negated verb structure yet is more evident in Items 12.1 and 12.3 (see Tables 4.57 and 4.59). As shown in the tables, a total of 11 children failed to use the negation cue but not as many as those who attended to the negated verb and ignored the subject of the sentence (i.e. ignored the lexical meaning of the noun). This phenomenon is not observed in the negated adjective structure but it is apparent in responses of children to Structure 19 (X but not Y). As can be observed in Tables 4.62 to 4.64, children's responses to Structure 19 are similar to their responses to the negated verb structure in that they seem to be attending to the negated words (either a verb or an adjective in Structure 19) and ignoring the noun which is the subject of the sentence. Two reasons might have caused their worse performance in Structure 19 compared to Structures 12 and 13. First, the sentence length factor, as sentences in Structure 19 are longer than those in Structures 12 and 13 which could have interfered with the comprehension process. Second, the use of the conjunction *but* in Structure 19 increases the sentence length which in turn is expected to increase the memory load. Since three cues are required to comprehend Item 19.1 and there are two cues in Items 19.2 and 19.3, it is expected that children will find it more difficult to comprehend Item 19.1. This expectation was not supported by the results as there was not much difference between children's results in the three items. Based on this, one can assume that most of the children's errors in these structures were caused by their focus on the negated word and varying the subject of the sentence (as was the case in Item 19.1) did not have a major effect on their responses.

It is of interest to know whether there is a difference in children's responses to Item 19.2 where X and Y were adjectives and Items 19.1 and 19.2 where X and Y were verbs. There is

a very slight difference in favour of Item 19.2 as 107 children pointed to the correct picture in that item, compared to 105 in Item 19.1 and 103 in Item 19.3. One can infer, from children's results in structures testing negation as well as from their results in structures that require lexical knowledge only (discussed above), that children in the current study perform better in sentences that include(s) a(n) adjective(s) compared to those including (a) noun(s) or (a) verb(s) when all the other cues are held constant. Thus if two sentences have the same structure and the only difference between them is that one contains an adjective, while the other contains a verb instead, Saudi children in this study showed a better ability to deal with the sentence containing the adjective. Further testing is needed with other structures to test this hypothesis.

Studies of English-speaking children's comprehension of negation have been performed mainly with negated verbs and few of them have been concerned with negated adjectives. One of the few studies that tested the comprehension of negated adjectives is Layton's (1976) which used an acting-out task. He found that 68% of the youngest group's subjects with a mean age of 2;6 years were able to act out this structure correctly. This seemed to agree with the findings in the present study for the comprehension of negated adjectives, that this structure develops before 3;0 years in Arabic-speaking children. These results do not seem to be affected by the differences in the tasks used, which was a picture-pointing in the present study and an object-manipulation in Layton's study.

The ground-breaking study of Fraser *et al.* (1963 - see Section 2.2.4.6 for more details) found that 71% of their subjects (3;1 to 3;7 years) were able to respond to negated sentences such as *the girl is not cooking*. An earlier age was reported by Carrow (1968) who found that at least 60% of the youngest group 2;6 to 3;0 years were able to identify negated sentences such as *the boy is not carrying*. When these results are compared to those of the present study, the age reported for the comprehension of negated verbs for English-speaking children is earlier

than that found for Saudi children. While the age reported in the previous 2 studies for English-speaking children was around 3;0 years, Saudi children were found to comprehend negated verbs with a 60% passing criterion above the age of 4;0 years. The performance of Fraser *et al.*'s and Carrow's subjects might have been enhanced by their use of 2 pictures as opposed to 4 pictures in the current study.

5.2.6.2 Gender inflection

This group includes Structures 6, 10 and 17 whose results are presented in Tables 4.65 to 4.72. As far as the cues to comprehension are concerned, both Structures 6 and 10 require the comprehension of both a gender inflection on the verb and the lexical meaning of that verb. In addition to these two cues, Structure 10 requires the comprehension of the lexical meaning of a noun cue. Thus Structure 10 is expected to be more difficult to comprehend compared to Structure 6. The sentence subject in both structures is hidden which is a pro-drop feature of Arabic where the subject of particular sentences is not explicitly marked by a subject noun phrase. This feature increases the difficulty of processing the agreement between the different parts of the sentence, as noted by Sokolov (1989). Analysing the performance of children in every item assessing Structures 6 and 10 reveals that the gender inflection on the verb represented a difficulty to around 9% of the children in both structures. This indicates that there was no major effect for the added difficulty of the lexical meaning of the noun cue in Structure 10. Most children showed an ability to use the grammatical and the lexical cues interactively to approach the comprehension of Structures 6 and 10. One can observe that the number of children who failed the items testing for these two structures decreases as they grow older. This suggests that children become more competent in identifying the gender of the subject being talked about as they grow older. The overall children's performance indicates that these two structures are developed in comprehension before the age of 3;0 years, especially since they were passed by all age groups. As presented in Section 4.1.2.1, three fathers used the

wrong gender inflection in five of their utterances. This was explained as a simplification or as a perception from fathers that such inflections are not essential for meaning.

As mentioned above, sentences representing Structure 17 have a more complex structure compared to Structures 6 and 10. A sentence that represents this structure is /ʔæɾ-ɾæg̣al jɪ-dɪf-æh/ *the man is pushing him* with the gender being an inflected suffix working as the object of the sentence and attached to the verb. Thus one can imagine the difficulty in this sentence as the child will need to attend to both the subject and the inflected object in the sentence. Having an inflected pronoun replacing a noun in object position is expected to increase the difficulty of the sentence. The difficulty in sentences representing this structure is focused in the second word of the sentence which contains the gender determiner (/jæ-/ for a male or /tæ-/ for a female), the verb and the object inflected for gender. The difficulty of the sentence is not expected to decrease if the object pronoun was *it* because in Arabic all nouns including inanimate things are inflected for gender. Children's poor performance in this structure implies that this is one of the structures that is mastered late in their language development. It also implies that having the gender inflection as a sentence object increases the difficulty of the sentence compared to having it as an inflection on the verb. Although none of the age groups were able to pass it, this structure was shown to be sensitive to age (Table 4.35). This suggests that regardless of being a difficult structure to comprehend, it was able to detect differences in performance as children grow older. This can be used as an indicator that this structure is expected to be sensitive to age if used with an older group of children.

Children's difficulty in Structure 17 appears to have originated mainly from not attending to the gender inflection. Individual items results shown in Tables 4.70 to 4.72 confirm this observation as most of the children who failed to point to the correct picture were affected by the gender inflection on the sentence object. There does not seem to be a great difference

between older and younger children in that respect. There are few children (9% in Item 17.1, 8% in Item 17.2 and only 1% in Item 17.3) who seem to have attended to the last word in the sentence (i.e. the verb and the object inflection attached to the verb) and ignored the lexical meaning of the noun which is the subject of the sentence. It can be argued that children did not attend to the last word in Item 17.3 as they have done in Items 17.2 and 17.3 because the distracter was *a man feeding a very young girl.* Children did not point to this distracter although it includes the last word (i.e. feeding) because it is not so probable in the Saudi culture to see a man feeding his baby. A thorough look at the items testing for Structure 17 reveals that younger children used 'attend to the last' strategy more than older ones. Attending to the last word in the sentence was not observed in Structure 10 although it is similar to Structure 17 in that it requires the use of three cues, a grammatical and two lexical cues. This suggests that the use of 'attend to the last' strategy was caused by the grammatical difficulty of Structure 17 as explained above and not the number of cues needed to comprehend the structure. It was shown above that the use of this strategy decreases with age.

5.2.6.3 Active and passive verbs

The agentless passive is supposed to be simpler to comprehend than the other forms of the passive as mentioned by Hayhurst (1967) because the actor is omitted. According to this it is assumed that passive is an easy form to comprehend by Arabic-speaking children. This expectation was shown to be true since 77% of the children passed this structure. Two cues only: the lexical meaning of the noun and the verb in its passive form were contained in the items testing for the comprehension of the passive structure, which was Structure 11 (results are presented in Tables 4.76 to 4.78). A child can also respond correctly to sentences representing this structure by attending to the lexical meaning of the noun and the verb. However, this is less likely to happen because in Arabic verbs are modified to the passive form by adding the prefix /ʔɪn-/ to the verb stem. This decreases the perceivability of the meaning of the verb cue which increases the item's cue cost. Having 70% of the children in

the youngest age group pass this structure indicates that passive sentences develop before the age of 3;0 years. The few children who pointed to a distracter were actually relying on the verb in its passive form cue and ignoring the noun cue (i.e. the subject of the sentence). This is clearer when looking at results of Item 11.1 where some of the younger children in particular ignored the lexical meaning of the sentence subject (see Table 4.76). Children performed better in Items 11.2 and 11.3 compared to Item 11.1, an observation which needs further investigation. One can notice that nearly a quarter of the children (22%) selected the distracter *a broken cup* in Item 11.1, while distracters that use the same cues in the other two items (*a torn dress* in Item 11.2 and *a crashed motorcycle* in Item 11.3) were selected by few children. A closer look at these three distracters reveals that in the first item a broken plate and a broken cup have an equal probability of occurrence in a child's daily life, whereas it is more probable for a child to see a torn book than a torn dress (Item 11.2) and similarly it is more probable to see a crashed car than a crashed motorcycle (especially in the Saudi culture as motorcycles are not often used). This is the suggested reason for some children's confusion in Item 11.1 and at the same time for their superior performance in Items 11.2 and 11.3. It is recommended in future studies to select events that have equal probability when a comparison is made such as the one used in Item 11.1.

Having the agentless passive structure passed by most children agrees with the results of Omar (1973) who included an item testing for the comprehension of the passive in her simple comprehension test. Children for that item were shown 2 pictures and were required to point to the picture of *the boy who is being hit.* All children except child 1 (age 2;8 years) were able to point correctly, indicating that this structure is acquired in comprehension before 3;0 years of age. The massive literature available in the comprehension of passive sentences in studies of other languages such as English is more heavily concerned with the reversible and non-reversible forms of the passive, which are not present in Arabic.

Reversible active will be discussed in this section since the non-reversible form was discussed earlier when the results of Structure 4 were discussed. The process involved in understanding a reversible sentence was described by James (1990). To understand a reversible sentence correctly, the child must understand the syntactic relations in the sentence. (See Section 2.2.4.4 for more details). According to this, a child who is presented with the sentence *the man is chasing the horse* will need to know that *the man* is the subject of the sentence while *the horse* is the object of the sentence. Reversible active sentences used in this study were manipulated so that the child needed to use three cues interactively to show comprehension of reversible active. Two of these cues were lexical (a noun and a verb in Item 5.1 and two nouns in Items 5.2 and 5.3; see Tables 4.73 to 4.75), while the third was an agent-action-object cue. By using an agent-action-object strategy, children will assign the first noun as the agent of the action, while the second noun is the object of the action. Slobin & Bever (1982) explored the presence of this strategy in a cross-linguistic study of four languages; English, Italian, Serbo-Croatian and Turkish (see Section 2.2.1.3 for more details). Children in their study were aged 2;0 to 4;4 years and they were required to act out simple transitive sentences. Their main finding was that unlike children speaking the other three languages, Turkish-speaking children did not use an agent-action-object as they did not show an agent first preference. This was attributed by Slobin & Bever to the fact that Turkish is an inflectional language that has a free word order. Regarding the current study subjects, most of them used the two lexical cues in addition to the agent-action-object cue interactively and they pointed to the correct picture. Less than a quarter of the subjects (15% in Item 5.1, 18% in Item 5.2 and 24% in Item 5.3) seem to have used the two lexical cues appropriately. However, they have not assigned the agent to the first noun which reveals that they were not using an agent-action-object strategy. As far as the age of children is concerned, it seems that agent-action-object cue was not used by younger children more than older ones, as older children were more able to use the three cues correctly. This result seems to correspond with the structure of Arabic language as an inflectional language which has few restrictions on

word order. This result supports the claim raised by proponents of the CM that children speaking a particular language will use the cues that are specific to the structure of their language. English-speaking adults, for example, in Bates *et al.*'s (1982) study assigned the role of the actor to *the eraser* in the sentence *the eraser kicked the horse* because word order is a strong cue in English. Thus, word order is not a strong cue in Arabic since a total of 19% of the current study subjects did not assign the role of the agent to the first noun although sentences used do not conflict with children's world knowledge as was the case in Bates *et al.*'s study. Saying that sentences do not conflict with children's world knowledge means that the two events of *a man chasing a horse* and *a horse chasing a man* have an equal probability of occurrence.

With regard to the age at which Saudi children master the form of reversible active used in the current study, this structure was not mastered by at least 60% of the children until the group aged 4;6 to 4;11 years. Having only 9 children of the preceding group 4;0 to 4;5 years pass this structure indicates that the age at which this structure is mastered is between 4;6 and 4;11 years. This age of mastery is later than the age reported in other languages, such as the studies of Fraser *et al.* (1963), who found that children were able to interpret reversible active sentences when they were around 3;6 years-old, and Carrow (1968), who reported an earlier age of 3;0 years for the mastery of the reversible active sentences. This can be attributed to the use of an agent-action-object strategy by English-speaking children as the present study has shown that not all Saudi children use this strategy when dealing with reversible active sentences. Another factor that may account for the difference between the present study and the other two studies is the number of pictures used for testing. In Fraser *et al.* and Carrow's studies 2 pictures were used, while 4 pictures were used in the present study to test every item. In an acting-out study, Hakuta (1977) studied the comprehension of reversible active sentences in Japanese-speaking children from 2;3 to 6;2 years and found that this structure was not understood until children were 3;9 years-old.

5.2.6.4 Number inflection

Four structures test for the number inflection in the present study, which are Structures 2, 8, 14 and 15 whose results are presented in Tables 4.79 to 4.90. Children's results in Structures 2 and 8 suggest that verbs and nouns inflected for number are not mastered until the age range from 4;0 to 4;5 years. Performance of the group from 3;6 to 3;11 years supports this finding when only 8 children (40%) passed Structure 8 and 6 children (30%) passed Structure 2 which indicates that children at that particular age, from 3;6 to 3;11 years, have not yet mastered these two structures. Looking at individual items testing for Structure 2, one might deduce from results of Items 2.1 and 2.2. that the distinction between plural and dual is unclear for this group of children. Younger children (especially in the two younger groups) demonstrate this lack of distinction more than older ones. This suggests that very young children treat dual and plural nouns as one group and they develop the distinction between the two gradually until they start elaborating it around the age of 4;0 years. The sentence testing for the comprehension of a singular noun (Item 2.3) did not have a number inflection. Thus children will need to attend to the absence of a number inflection on the noun to realise that it is a singular noun. Children found this item more difficult than the other two and almost all children who did not point to the correct picture in Item 2.3 (24% of the children) pointed to the one representing the plural noun (*the cats*). It is possible that children were pointing to one of the cats in the distracter picture (the one that has four cats), but this will not be considered the correct answer by the examiner. This administration problem was highlighted by Waryas & Ruder (1974) who reported that when testing the plural *boys* against the singular *boy* a child may point to one of the boys indicating that he is the singular boy. Although this problem appeared more in younger children's responses, it can also be observed in those of older children. A problem of this kind could not be solved in a picture-pointing task and one can avoid it by using an object-manipulation task.

As regards studies of languages other than Arabic, Carrow's (1968) study included a structure testing for singular and plural nouns and she found that they are mastered between the age of 4;0 and 5;0 years. Carrow's stimulus was a picture-pointing task in which a child was presented, for example, with a picture of a ball and another picture of a group of balls and then he was asked to point to the ball or the balls. Layton (1976) reported an earlier age for the comprehension of singular and plural nouns by English-speaking children, where he found that 65% of his youngest group aged 2;6 years comprehended this structure. The procedure used in Layton's study was to put a group of cars, for instance, before the child and to ask the child to give *the cars/car* to the examiner. (See Section 2.2.4.1 for more details). The only difference between these two studies is the task used, which was a picture-pointing are in Carrow's study, while it was an object-manipulation in Layton's study. However, the task alone is not sufficient to account for the difference between the two ages reported in these two studies. Results of the current study showed that 65% of 4;0 to 4;5 year-olds comprehended the nouns inflected for number structure, which is similar to the results of Carrow, who found that this structure is comprehended by 4;0 to 5;0 year-olds.

The same patterns of responses observed in singular nouns appeared in singular verbs, especially with reference to the problem of pointing to one person in the picture representing the plural verb assuming that it represents the singular verb. For example, in Item 8.3 about 22% of the children pointed to one of the boys in the picture of three boys walking when asked to point to the sentence *he (a boy) walks* (see Table 4.84). This problem decreases as children grow older and only one child had this problem in the older group aged 5;6-5;11. Regarding the item testing for plural inflection on the verb (Item 8.1), children showed a high performance as 91% of them pointed to the correct picture and responses of the rest did not have a clear pattern (see Table 4.84). One proposed factor that may have enhanced children's performance in Item 8.1 is the fact that verbs are not inflected for dual number in S.A. This represented a problem for the children when responding to the item testing for plural nouns

as some children pointed to the picture that signifies the dual number of the noun. (See results of Item 8.1 in Table 4.79).

Verbs inflected for number were tested by Layton (1976) by asking children to act out sentences such as *the sheep jump/the sheep jumps*. Layton found that this structure was one of the most difficult for his subjects to comprehend and only 50% of the oldest group's subjects (aged 4;6 years) were able to act out sentences representing this structure correctly. Another study that reported difficulty in comprehending this structure in English-speaking children is Carrow's (1968). She found that this contrast is not comprehended by at least 60% of the children until the age of 5;0 years when the plural was given as a stimulus (e.g. *the cats play*). However, 3;0 year-olds comprehended the contrast when the singular was given as the stimulus (e.g. *the cat plays*). This structure (Structure 8) was not an easy one for Arabic-speaking children in the current study to comprehend. Children did not reach the 60% criterion in this structure until they were 4;0 to 4;5 years-old. The performance continued around the 60% pass rate until the oldest age group where 17 children (85%) passed the verbs inflected for number structure.

As shown above, Structure 14 was failed by most children and the fact that the oldest age group just reached the 60% criterion shows how difficult this structure is for Arabic-speaking children to comprehend. Children's problems with Structure 14 tend to be in the first item representing this structure (Item 14.1) where there is a plural inflection on both the noun and the verb. An added difficulty in this structure is the use of *men* and *boys* in the same structure and it was noticed before that children have particular difficulty in distinguishing between the two. This represented a serious problem to the study subjects as the number of children who pointed to *the boys are eating* was equal to the number of children who pointed to the target picture, *the men are eating* (43 children). Again, the problem of mixing the plural and dual nouns emerges in this item as 16% of the children pointed to the picture of two men eating,

which indicates that this group of children has not yet mastered the distinction between plural and dual nouns. One reason that may have made children's performance better in Item 14.2 compared to Item 14.1 is the use of two lexical cues and a grammatical one. Almost all children who selected a distracter in Item 14.2 (the boy is drinking) pointed to the picture of three boys drinking. This is the same pattern of responses observed above when singular nouns were discussed, as children might have been pointing to one of the boys who is drinking thinking that it is the correct picture. Future work with children need to consider this problem and use other tasks for the assessment of singular nouns and verbs. When the dual structure was tried in Item 14.3, a better performance than the other two structures was observed, but some of the younger children still show a tendency to mix dual with plural nouns.

With regard to studies of other languages, Carrow (1968) tested for the comprehension of N-V number agreement structure which is similar to Structure 14 in the present study. In this structure, children were presented with two pictures, a picture of one sheep jumping and another picture of 2 sheep jumping. Children were then required to point to *the sheep are jumping*. Carrow found that this contrast was not understood until the age of 6;6 years when the plural was given as a stimulus (i.e. *the sheep are jumping*); however, 4;0 year-olds understood the contrast when the singular was given as the stimulus (i.e. *the sheep is jumping*). Arabic-speaking children in the current study have faced a similar difficulty with this structure (Structure 14) when it was not passed except by the oldest group aged 5;6 to 5;11 years. The noun used in Carrow's study *the sheep* can be either plural or singular without changing its structure, while the nouns tested in the current study are inflected for number. This means that both the subject and the verb which are inflected for number added an extra clue for the study subjects. However, their performance did not improve in spite of having this extra clue, which suggests that this too is a difficult structure for Saudi children to comprehend.

Results for children in Structure 15 were similar to those in Structure 14 as most children failed the structure. The hidden subject in structure 15 might have added a slight difficulty since it required the child to know the subject being talked about which adds a cue cost factor to the comprehension process. Distracters in Item 15.3 were manipulated so that a child will need to use his knowledge of the lexical meanings of both the verb and the noun in addition to the plural inflection on the noun cue. It is expected that children will not perform so well in Item 15.3 if a dual inflection on the noun cue is used as a distracter because it is going to be set in competition with the plural inflection on the noun cue. This was the case in some of the above items testing for number inflection as some children, particularly younger ones, could not distinguish dual from plural nouns. Further investigation is needed to explain the worse performance by children shown in the other two items (15.1 and 15.2). Two observations can characterise the choices selected by the other children in Item 15.1. The first concerns 28% of the children as they attended to the last word in the sentence and selected the picture of two cars. It is possible that such children found difficulty in integrating the three cues (the two lexical cues and the dual inflection on the noun cue) and responded relying only on the noun cue, which was the last word in the sentence. The second observation is applicable to around 23% of the children as they selected the distracter that denotes a plural inflection. Those are the children described above as not mastering the distinction between plural and dual nouns. Both of the two observations are more apparent in younger children than in older ones.

In five of their utterances, three fathers used the wrong number when speaking to their children in the CDS study. This was done mainly with nouns, by giving a noun the regular plural form while it should be pluralised irregularly, and with pronouns, by using the singular pronoun (e.g. *it*) while a plural pronoun (e.g. *they*) should have been used. Such use of the incorrect number was attributed to the fathers trying to simplify their language. Thus, for

example, a father who used the regular form of the plural noun thought that it might be easier for his child to comprehend than the irregular form.

5.2.6.5 Comparatives

The poor performance of children in Structure 9 (Tables 4.91 to 4.93) might be attributed in part to the use of ICW in testing for the comprehension of this structure. This can be shown by viewing the three distracters that were used in conjunction with the sentence mentioned earlier. These three distracters were: *the knife is shorter than the pen, the knife is as short as the pen* and *the flower is longer than the pen.* Two parts of the target sentence were varied in the three distracters which meant that two ICW were used when testing for the comprehension of this structure. This ensured that children who passed this structure have passed it for comprehending the tested structure, which is comparatives, and not because of extra-syntactic factors.

Children's performance in individual items seems to support the polarity principle described by Clark (1971, see Section 4.2.2.3) which states that the positive pole of an adjective is easier to comprehend than the negative one. It is evident that *longer* (which represents the positive pole of the adjective) was passed by more children in the current study compared to *shorter* (which represents the negative pole of the adjective). Further evidence that supports this finding is the distracter selected by the other children who did not point to the correct picture. In the case of *longer* and *bigger*, the distracter selected by 19% of the children in Item 9.1 and 8% of the children in Item 9.2 was the one that describes equality (i.e. the two objects have equal length or are equal in size). Few children selected the distracter that represents the negative pole of the two adjectives tested in Items 9.1 and 9.2. A different situation can be observed in Item 9.3 (testing for *shorter*) as 23% of the children selected the distracter that represents the positive pole of the adjective, which again supports the polarity principle. This effect of the negative pole of the adjective decreases with age as shown in the

results of the first two items; however all age groups were affected to a similar extent by selecting the positive pole of the adjective when the comparative *shorter* was tested. Further testing of the polarity principle needs to be performed in future using more adjectives.

As regards English-speaking children, Carrow (1968) tested her subjects for their comprehension of the comparative *taller* and she found that this structure was not passed by at least 60% of the children until they were 5;0 years old. In an object-manipulation task, Layton & Stick (1979) tested the comprehension of this structure in 100 English-speaking children from 1;8 to 4;6 years and found that this structure was understood by 68% of the 2;6 years-old and 84% of the 3;6 years-old. The procedure used by Layton & Stick was to present four objects in front of the child which were a small car, a medium truck, a medium large car and a large truck, and to ask the child to point to *the truck that is smaller than this* car (pointing to the medium truck). The relatively late age for the development of comparatives reported in the previous studies, when a picture-pointing task was used, and the early age reported in Layton & Stick's object-manipulation task suggests that comparatives are better comprehended when an object-manipulation task is used. It is suggested that an assessment of the comprehension of comparatives is performed in the clinical test using an objects manipulation task since it has been proven to be the most appropriate for testing this structure.

5.2.6.6 Subject modification

Subject modification was tested by two structures which are Structures 18 and 21 (Tables 4.94 to 4.99). Children's performance in Structure 18 suggests that this structure is not developed until children are 4;0 years old. Structure 21 was in fact the most difficult structure for the study subjects to comprehend. Getting this poor result suggested that this structure is appropriate for use with children whose age is 6;0 years or older.

A thorough analysis of the items testing for the comprehension of Structure 18 reveals that a child will need to integrate the meaning of three cues in order to show comprehension of Item 18.1. In comparison, the integration of the meaning of two cues is required in the other two items (i.e. Items 18.2 and 18.3). This should have made the children's job easier in these two items. However this was not the case as they performed better in the first item (using three lexical cues) compared to the other two items. Having the item requiring three cues to be comprehended passed by more children than the other two items requiring two cues (although they have the same type of cues), suggests that there are other factors that affect the comprehension process in addition to the cues in this structure. One of these factors is the type of the adjective used, as it seems to have affected children's responses in Item 18.3 where 16 children (13%) selected the sentence that signifies the opposite pole of the adjective (i.e. *long* instead of *short*). The possible reason is that children who made this selection were choosing the positive pole of the adjective instead of the negative one. Some other children confused the lexical meaning of the verb *eat* with *drink* in Item 18.2 and the verb *write* with the verb *read* in Item 18.3. The modification of the sentence subject increased the difficulty of sentences testing for Structure 18 as this modification separates the sentence subject from its verb. This cue cost factor might have decreased the validity of the lexical meaning of the verb cue as some children may attend to the first part of the sentence, try to keep it in memory and ignore the last part of it.

With reference to the items representing Structure 21, they require the use of three cues. Items 21.1 and 21.2 require the use of two lexical cues in addition to an agent-action-object cue, while Item 12.3 requires the use of three lexical cues. Children's results reflected this difference in items' structure as more children responded correctly to Item 21.3 compared to Items 21.1 and 21.2. Children's responses, especially in Items 21.1 and 21.2, seem to be affected by the number of the cues factor and the fact that the subject of the sentence was modified in the last word. Thus a child will need to attend to both the beginning and the end

of the sentence to comprehend the subject modification. Agent-action-object cue seems to have an effect on children's responses as the number of children who selected the distracter that violates this cue is relatively low (24 children in Item 21.1 and 35 in Item 21.2). Nevertheless the presence of some children who do not use this cue supports the finding reported above that although Arabic-speaking children use this cue, they do not use it to the same extent as English-speaking children do.

5.2.6.7 Summary of the discussion on structures that require the use of both lexical and syntactic knowledge

Children in the above mentioned structures needed to integrate knowledge of the morpho-syntactic structure studied in addition to their knowledge of the meaning of (a) lexical item(s). Lexical knowledge was incorporated into the comprehension process when studying these morpho-syntactic structures because in a picture-pointing task there needs to be a target picture and distracters. The target picture will need to be drawn so that the child points to it only if he demonstrates knowledge of the structure tested, whereas the distracters need to be manipulated so that they identify the possible wrong choices a child could make. Lexical items are used in manipulating the distracters to make sure that the child's selection of the target picture demonstrates his comprehension of the studied structure. Results of most of the structures showed that children did not encounter a problem in interpreting the lexical meaning of the cues used but their main difficulty was with the morpho-syntactic structure being studied.

Children in the current study were found to use two comprehension strategies. The first of these is to attend to the last word in the target sentence and to respond relying only on the meaning of that word. This was observed when comprehending several structures in the current study such as Structures 15 and 17 (see Tables 4.88 to 4.90 and 4.70 to 4.72). Younger children seem to be affected by this strategy more than older ones. Another

observation based on the children's results is that they seem to attend to the last word when the sentence has a complex structure (compare for example the results of Item 15.1 in Table 4.88 to results of Items 15.2 and 15.3 in Tables 4.89 and 4.90). It can be concluded from these two observations that 'attend to the last' strategy is used by younger children when faced by a difficult structure and the use of this strategy is gradually abandoned as they grow older.

Saudi children were found to rely on their world knowledge in responding to some of the structures studied. This becomes more evident in two situations. The first occurs when one of the distracters is more probable (i.e. occurs more frequently in daily life) than the target sentence. The second situation occurs when the target sentence is the one that is more probable compared to the distracters (see for example results of Items 11.2 and 11.3) and in this case children will point to the target sentence even though they may have just a partial knowledge of the structure tested. Children's use of their world knowledge was reported before in this study when results of structures tested by objects were discussed (Section 4.2.3.2).

An interesting finding in the current study was that children perform better in a sentence that contains more adjectives compared to one with more verbs or nouns if the two sentences have the same structure. Another finding in relation to adjectives is that the positive pole of an adjective was found to be easier for the subject to comprehend compared to the negative pole, which supports the polarity principle hypothesised by Clark (1971, see Section 4.2.2.3).

In structures where the subject was hidden, it is expected that this feature adds a slight difficulty, since it requires the child to know the subject being talked about which adds a cue cost factor to the comprehension process. This in turn increases the difficulty of processing the agreement between the different parts of the sentence (Sokolov, 1989). Although the subject is hidden, its gender and number are identified by inflections on the verb. This gives the listener a rough idea about the subject. With reference to gender inflection, children seem

to acquire the ability to differentiate the gender of the subject being talked about early in their life and become more competent as they grow older. Differentiating the gender of the sentence object was more difficult for the children to perform and their errors in this structure resulted mainly from attending to the other gender.

More interesting observations were found when number inflections were studied. The first is that some children seem not to differentiate dual from plural nouns and they acquire this ability gradually as they get older. No preference was found for either the plural or the dual as some children pointed to the dual noun when the plural was in question, and some of them pointed to the plural noun when the dual was in question. This mixing up of the plural and dual appears more clearly in the responses of the two younger groups (from 3;0 to 4;0 years). The other observation related to the number inflection is the child pointing to the picture that illustrates the plural when he is asked about the singular. The reason behind this phenomenon is that children actually were pointing to one of the items in the picture that illustrates the plural. As mentioned above such patterns of responses are better controlled when an object-manipulation task is employed.

A finding that is noted and is thought to be specific to inflectional languages is that word order did not have a strong effect on children's responses to reversible active sentences. Thus contrary to the responses of English-speaking children, for example, there was a tendency in nearly one fifth of the children in the current study not to assign the subject to the first noun and the object to the second, although sentences used do not conflict with children's world knowledge. This feature agrees with the expectations of the CM that children speaking a particular language will use the cues that are specific to the structure of their language.

A finding that is observed in nearly all the structures studied is that the performance of children improves with age. As mentioned above, the use of comprehension strategies such

as the use of world knowledge was noticed in younger children than older ones. When a lexical and a syntactic cue are used in the same structure, younger children appear to have difficulty with both cues, while older children seem to have a particular difficulty in dealing with the syntactic cues.

The last mentioned point, that children's performance improves with age, may be considered as an indication that the content of the test is valid. As mentioned before, Section 2.3.1.1, the content of a test is valid if it represents the domain it is designed to assess. Thus, an assessment tool of children's language comprehension needs to take into account the fact that children's performance is expected to improve with age. It also needs to consider that some structures will be passed by most children, while other structures will not. This can be observed in the results of the present study, indicating that the content of the assessment tool used is valid.

5.2.7 The findings of the current study interpreted in terms of the Competition Model

The three phases described by Bates & MacWhinney (1989) (see Section 2.2.3) through which children pass in acquiring language comprehension of their native language were observed in the current study.

With reference to the first phase, using the available cues, it was observed that children, especially younger ones, relied on a non-linguistic cue and ignored the linguistic one when responding to some structures. In some structures, children chose the most probable event even if it is not the target picture. This was particularly observed in younger children's responses to the agentless passive (5.2.6.3) and to some of the structures testing for gender inflection (5.2.6.2). In other structures children attended to the last word in the target sentence and pointed to the picture that included this word even though it was not the target

picture. Some younger children responded on the basis of this cue to Structure 15 (number inflection) (Section 5.2.6.4)and Structure 17 (gender inflection) (Section 5.2.6.2) which suggests that the salience of the last word of the sentence was their available cue.

The second phase was evident when the current study subjects responded on the basis of the valid cues which are both available and reliable. Thus, children at this stage were not using cue availability as their only procedure for responding as was the case in the previous phase. For example, in responding to structures that require the comprehension of three lexical cues such as Structure 16 (Section 5.2.5.2), a child who is responding solely on the basis of the available cue will respond relying on the meaning of one lexical meaning only which will lead to incorrect answer. On the other hand, the child who responds on the basis of the valid cue(s) will integrate the lexical meaning of all three cues and will point to the correct picture. Another example that illustrates this phase is children's responses to Structure 12 (negation) (Section 5.2.6.1). In this structure the children have shown that they were using the valid cues because comprehension of two lexical cues together with the negation structure is required. Thus the correct response will be shown only if the child not only used the available cue but also the reliable ones.

The case when two or more cues compete together was identified by proponents of the CM as the third phase. The child in this phase will show a correct response if the valid cue as opposed to the invalid wins the competition. In the current study the competition between cues was evident in the comprehension of some structures, such as the agentless passive (Section 5.2.6.3). In this structure there appeared to be competition between the child's linguistic knowledge represented by his knowledge of the preposition tested as opposed to his extra-linguistic knowledge represented by his world knowledge (event probability). In the agentless passive structure children performed better when the distracter was less probable compared to the target sentence (Items 11.2 and 11.3), while a worse performance

can be noticed in Item 11.1 where the distracter and the target sentence have equal probability. This suggests that in Item 11.1 there was competition between the child's linguistic knowledge of the passive structure and his world knowledge. Children who show a correct response in this item are those whose linguistic knowledge won out while those who show incorrect responses are those whose world knowledge won the competition. Thus in developmental terms the CM provided a valid framework to interpret the data from the current study.

Another tenet of the CM is that every language will be sensitive to forms specific to its own structure (Section 2.2.1.5). This claim, of the CM, was supported by the way subjects in the current study responded to reversible active sentences. It was found that around 20% of the subjects did not assign the role of the agent to the first noun in reversible active sentences (Section 5.2.6.3). English speakers, on the other hand, are expected to assign the role of the agent to the first noun, even if by doing so the sentence will conflict with the speaker's world knowledge, as was found by Bates *et al.* (1982) (see Section 2.2.2.3). This finding supports Bates & MacWhinney's (1987, 1989) claim that the order of importance of cues to actor assignment is different for different languages and such an order will be determined by the structure of the language itself.

Proponents of the CM define 'cue cost' as an information processing constraint that affects language processing (see Section 2.2.1.5). Factors such as memory load and sentence length are expected to increase a certain cue's cost which in turn will decrease that cue validity. The two types of cue cost identified by proponents of the CM were observed in the present study. Assignability can be noticed when children's performance deteriorates as a result of the memory load factor which is the case in children's responses to Structure 18 which assesses subject modification (Section 5.2.6.6). In this structure the sentence subject was separated from its verb by a modifying phrase, such as the sentence *the boy with black*

clothing is drinking, where the subject and the verb are separated by the phrase *with black clothing*. It is possible that this might have created an assignability problem for some children as they may attend to the first part of the sentence, try to keep it in memory and ignore the last part, which means that an extra memory load is required for this structure.

Sentence length was also found to affect the assignability of a cue. This can be observed in children's responses to the structures testing for the comprehension of negation (Section 5.2.6.1). In these structures, sentence length among some other factors might have caused children's responses to Structures 12 and 13 to be better than their responses to Structure 19, which uses longer sentences compared to the other two structures for testing the comprehension of negation. Further testing of this hypothesis, that the length of a sentence affects the assignability of a cue, needs to be conducted. One possible way of testing this hypothesis is by studying children's responses to two sentences that have the same structure but where one includes more words compared to the other one.

In sum, results of the current study seem to support three major tenets of the CM. First, the model predicts three stages for language acquisition which were found in the data of the present study. Second, the model predicts differences between languages rather than similarities and this was proven to be true according to the results of the current study. Finally, the model proposes that limitations on a child's ability to understand sentences can be caused by certain factors other than the structure of the language itself, and this was shown to be true on some occasions although further testing was recommended.

5.2.8 The relationship between CDS and the study of language comprehension

Some of the structures that were employed in the language comprehension study were investigated in the speech of fathers in the CDS study. A comparison is going to be made between the number of children passing a structure and the number of times a structure is used by the fathers. One may anticipate that a structure that is passed by the majority of children in the comprehension study is going to be a frequent structure used by fathers in the CDS study. Similarly, a structure that is failed by the majority of children is not going to be a frequent structure used by fathers in the CDS study. Below is a discussion of the relation patterns between the CDS and the language comprehension studies. However, one must be cautious when making such comparisons because of the following reasons:

- In an ideal comparison study an assessment of the language comprehension abilities of the addressed children in the CDS study need to be performed. This is because in a social/interaction point of view, structures that are heard more frequently by a child are expected to be easier for that child to comprehend.
- Although mothers are expected to use more CDS features compared to fathers (Snow, 1995), the speech of fathers was studied in the current study because they are much more accessible than mothers in the Saudi culture.
- The main aim of the CDS study was not to compare its result with the results of the language comprehension study.
- Although the number of utterances analysed per father was 160 utterances, a larger number of utterances will provide an optimum case of comparison.
- The play situation used to collect the CDS data might have caused some fathers not to use some structures such as complex commands so frequently for reasons other than the complexity (i.e. the play situation is one where adults are less likely to command because the relationship is more equal and less authorisation than others).

The first group of structures presented in Table 4.100 show structures that were used frequently by fathers and at the same time were passed by most children in the language comprehension study. The second group of structures (Table 4.101) includes structures that were not used frequently by fathers and were failed by the majority of children in the language comprehension study. Thus, these two groups of structures show an agreement between the two studies. This result supports the social/interactionist's claim that structures rarely used by adults are expected to be difficult for the children to comprehend. One can observe that some of the structures presented in Tables 4.100 and 4.101 show a perfect agreement, such as Adj-N and complex commands, while other structures such as comparatives show a less perfect agreement between the two.

The other structures included in Tables 4.102 and 4.103 are ones which do not present an agreement between the results of the CDS and the language comprehension studies. Again, structures such as negated adjectives represent a clear case of no agreement as this structure was passed by 92% of the children in the language comprehension study, while it was only used 4 times by two fathers (16.7%). Yet other structures, such as the post-modified subject within a S-V clause structure, represent a very poor agreement. In this particular structure the number of children passing was 70, (or 58% of the children studied), while this structure was used only three times by fathers in the CDS study. The structures presented in Tables 4.102 and 4.103 demonstrate a poor agreement between the two studies, supporting the claim that the relation between CDS and children's language comprehension is a weak one. The points mentioned above regarding the current study need to be considered as generalising from the results of the current comparison is not possible.

The relationship between the CDS and the language comprehension studies with reference to prepositions is presented in Table 4.104. Frequency of occurrence of these prepositions in fathers' speech seems to have some agreement with their level of complexity determined by

the test of language comprehension. It can be inferred from the comparison results that prepositions which were the most frequent in fathers' speech were the easiest to comprehend in the comprehension test, and these prepositions are *in*, *on* and *under*. Prepositions *between* and *behind* seem to be the most difficult in both studies, while *beside* lay in the middle. The only exception to this rule is the preposition *in front of* which occurred in the speech of fathers' 15 times, while it is the second most difficult preposition to comprehend for subjects in the comprehension test.

5.2.9 Reliability

5.2.9.1 Test re-test reliability

Test re-test method was one of the procedures used in the current study to test reliability. Nine children of different age groups were re-tested within 2-3 weeks. (See Table 3.12 for details of the children re-tested). As indicated in Section 4.2.6.1, an 85% cut-off was used to judge reliability since a statistical test was very difficult to perform. The agreement between test and re-test for every child of the nine re-tested in the objects, pictures and the sum of the two sub-tests was computed. The number of children who performed below the 85% agreement level when re-tested was one child (11%) in the objects sub-test, and two children (22%) in the pictures sub-test out of the nine children re-tested. This can be considered a good reliability, particularly if we consider that the three children who did not perform reliably had agreements between test and re-test that were close to the 85% agreement level (see Table 4.105). The better agreement demonstrated by the children in the objects sub-test compared to the pictures sub-test can be attributed to the scoring system used in the two sub-tests. In the pictures sub-test when re-tested, the child needs to point to the same picture (either the target or a distracter) that he pointed to in the initial testing to be marked as having an agreement between test and re-test. But in the objects sub-test, a child was marked as showing an agreement between test and re-test if he passed or failed the item in the two trials (i.e. test and re-test). Thus, when asked to *put the cup on the table*, the child may put the cup

on the table in the initial testing trial and put it beside the table when re-tested. Therefore this child will be marked as showing an agreement in this item he failed in both trials although his responses were not the same. A future scoring for the objects sub-test needs to consider this point by recording the child's response even if he fails to carry out the command.

Older children demonstrated a more reliable performance compared to younger ones and the effect of the age factor was found to be significant even though the number of children re-tested was relatively small and suggests that the stability of children's performance in the current study increases as they grow older. This supports Anastasi & Urbina's (1997) claim that younger children may show a low reliability compared to older ones because their responses are influenced by guessing.

After discussing the reliability of the nine children's response in the two sub-tests and their sum as a whole, the reliability of children's responses in every structure will now be discussed. Children's responses in most of the structures were reliable (83% of the structures tested by objects and 81% of the structures tested by pictures). Children did not show a reliable performance in two structures tested by objects and four structures tested by pictures. These are the preposition *under* and the complex commands III in the objects sub-test, and Structures 9, 17, 18 and 21 in the picture sub-test. Four out of these 6 structures were difficult for the study subjects to comprehend. These structures were complex commands III in the objects sub-test and structures 9, 18 and 21 in the pictures sub-test. Getting a poor agreement between test and re-test in these structures might be attributed to the fact that children were inconsistent in their answers and lack the syntactic knowledge of these structures (Tables 4.41 and 4.42). The agreement achieved in the current study can be considered strong, which indicates that the test itself is reliable. Accordingly, this strong agreement between test and re-test suggests that the examiner was systematic in performing the test.

5.2.9.2 Internal consistency

The aim of internal consistency, as pointed out by Shewan & Pepper (1984), is to indicate to what extent the items in a test contribute consistently to the total score. Although the test used to compute the internal consistency in the current study (KR-20) accounts for the variable difficulty of test structures, having some structures passed by most children and other ones failed by most children represents a strong variability in the difficulty of structures. This might be one reason for not getting a consistent performance when every age group's performance was considered (see Table 4.109). The other possible reason is the number of subjects included in every group (20 children) which is relatively low. The finding that the performance of children was consistent when treated as a whole (i.e. 120 children) supports the last argument that the more children included when testing for the internal consistency of the test, the more internally consistent the test is.

5.3 Difficulties encountered in the study

5.3.1 Difficulties encountered in the CDS study

The most noticeable difficulty faced in this research in relation to the CDS study was that Saudi women are not accessible to men who are strangers (i.e. a man who is not a father, grandfather, son, brother, uncle or nephew). This means that few women are accessible to a Saudi researcher which is a general problem encountered in any research where women are directly involved. One way to get over this problem is to have the woman recorded by another woman or she herself can make the recording while she is talking with her child (if a speech sample of a mother and child conversation is needed as in this research). However, a further problem arises which is that most women do not want their voices to be recorded. This is the reason that led to using fathers instead of mothers as conversational partners in the current study.

Another cultural problem confronted was that some fathers refused to be video recorded. That is why conversations were audio recorded instead of being video recorded. Another difficulty in relation to the CDS study was that the current study appears to be the first consistent study of CDS in Arabic from a grammatical structure point of view. For this reason it was necessary to make some decisions regarding vocabulary items, discourse functions and morpho-syntactic structures that needed to be investigated in fathers' speech.

5.3.2 Difficulties encountered in the language comprehension study

Difficulties with the test emerged when the test was ready for application on the Saudi children because the most appropriate place to find children is nurseries which are not accessible to men in Saudi. For this reason a woman was required to perform the test and the pilot study which was performed by three University students was unsuccessful (Section 3.3.2). It was not until a woman was employed to do the job that the test was applied in a satisfactory manner. Finding the appropriate examiner who accepted being trained by a man

was a demanding task which took a few weeks to achieve. It seems that the children tested in the current study were possibly an advantaged group since they were attending nurseries. Badawood's study mentioned in Section 2.1.4 has shown that children drawn from nursery schools may be relatively advantaged in linguistic and educational terms, compared to children who do not attend nurseries before their elementary education.

Getting permission to perform the test in nurseries was not easy to get and it was not obtained until a committee arranged by the GPGE reviewed the test materials. This is because children were going to be tested and they wanted to ensure that all materials included were appropriate from a religious and cultural point of view. The questionnaire that was used in conjunction with the test was reviewed by the same committee to again ensure that all questions asked were appropriate and did not violate the culture or the religion.

Chapter Six

Epilogue

Engen & Engen (1983) listed three points that need to be determined before constructing a test of language development. These are: the aim of the test or the kind of information wanted from the test; the purpose for which it will be used and the form in which the results should be presented to provide useful information for diagnostic purposes. Another point relative to language comprehension tests is to determine whether to include or exclude extra-linguistic factors, or in other words to test the contextualised or the decontextualised level of comprehension. In accordance with the previously stated points, the aim is to construct a clinical test of Arabic language comprehension of morpho-syntax for use by Saudi speech-language therapists to assess Saudi children's Arabic language. When performing a sentence comprehension test, the long term goal is to "achieve a profile of the child's receptive ability through the presentation of a representative sample of the sentence structures of the language" (Engen & Engen, 1983, p.1). The aimed test is supposed to give a representative sample of the Saudi children's comprehension abilities of morpho-syntax. The domain of this test is a set of morpho-syntactic structures thought to be representative of the range of structure of Arabic spoken in Saudi Arabia as shown by results of the comprehension study implemented in this research. Certain modifications will need to be made to the comprehension study in order to make it suitable as a clinical test of language comprehension to be used with Saudi children suffering from language disorders. In addition to these modifications, a manual for the clinical test is going to be written and information to be included regarding the manual is presented in the following section.

6.1 Modifications that will be performed to the study of language comprehension

The comprehension test that was used in the current study consisted of the following: a dialect words checklist, a hearing screening, a receptive vocabulary pre-test and a test of morpho-syntax comprehension. The aims and the procedures used in each of these parts was given in Chapter 3 and a discussion of the results as well as limitations of the procedures was presented in Chapter 5. In this section modifications that will be made in the comprehension study to yield a language comprehension test will be presented.

6.1.1 Vocabulary pre-test

As presented in the Methods Chapter, most items were selected from the CDS study (72% of the nouns, 59% of the verbs and 90% of the adjectives), while the rest of the items were not used by fathers in the CDS study. It was found that out of the 52 items used in the vocabulary pre-test, 12 items only were failed by at least 3 subjects as indicated in Table 4.10. Most items failed were not words used frequently by fathers in the CDS study. Table 4.10 shows that some items were failed by three children only, while the maximum number of children who failed an item was 16 (13%) children on the verb *feed.* Although this is considered a fairly low level of failure, an effort should be made when constructing the clinical test to reduce the number of items failed. This will ensure that vocabulary items used in a tested sentence do not interfere with the comprehension of the sentence structure. This can be done by substituting difficult items such as the verbs *feed, run* and *cut* by easier verbs to comprehend. It is suggested that these should be selected from the CDS study data. Another way of correcting this problem is to avoid using plausible items such as the nouns *a woman* and *a girl* (Section 5.2.2). This can be done by having these two nouns tested separately (i.e. not in the same plate).

6.1.2 Morpho-syntax comprehension test

6.1.2.1 Selection of subjects

The subjects of the current study were children attending nurseries in the city of Riyadh in Saudi Arabia. A broader range of subjects needs to be incorporated into the study including subjects not attending nurseries who represent the majority of children in Saudi Arabia (Section 2.1.4) and subjects from other Saudi cities. Another point which needs to be considered is that children with language disorders need to be included in the study since the test is targeted at them to ensure that the test produces usable data (i.e. items that are easy enough to show what children with language disorders can do).

6.1.2.2 Difficulty of items

Some of the items used were too easy or too difficult for the study subjects to respond to. With regard to items that were found to be too easy for the study subjects, we can expect that including younger children (aged from 2;0 to 3;0 years) in a subsequent study will solve this problem since they will not find these items easy to comprehend. Since younger children, especially those aged from 2;0 to 2;5 years, are not expected to respond to pictures appropriately, it is recommended that they are tested using objects only. This will be helpful as well when testing children with language disorders since they usually perform at a level lower than their chronological age and so their language competence can best be evaluated by using easy items.

A limited number of these structures which have not yet been acquired by most children need to be included in the clinical language test since the test is a criterion-referenced one that will be used with a clinical population. This will enable a clinician to use the test, for example, with older children with learning difficulties who are expected to show a good performance in these difficult structures. It must be noted that such structures need to be put at the end of

the test in order not to make the child feel discouraged because he has not answered correctly, which will affect his responses in the rest of the test.

The items which were difficult for the study subjects to comprehend are presented in Table 6.1 for structures tested by objects and in Table 6.2 for structures tested by pictures. Such items can be included in the clinical test, although a clinician needs to use his clinical judgement to decide on children who can be tested with these structures. Using these structures with selected children will reduce the length of the test making it more suitable for children in a clinical population.

Table 6.1 Difficult structures tested by objects.

Structure	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	Total
Complex commands II	0	1	4	3	3	6	17
Preposition *between*	0	1	2	3	0	3	9
Complex commands VI	0	0	2	0	0	1	3

Table 6.2 Difficult structures tested by pictures.

Structure	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	Total
Comparatives	4	3	6	8	8	9	38
S-V-O sentences (3 ICW)	3	4	3	1	7	10	28
S-V-O sentences (O is inflected for gender)	2	5	2	1	7	8	25
Post modified subject within a S-V-C clause	0	1	4	2	3	1	11

It is recommended that the task used for testing comparatives is changed to an object-manipulation one as this was found to produce more reliable results. (See the following section).

6.1.2.3 Structures which need to be tested by objects instead of pictures.

It is recommended that two structures should be tested by objects instead of pictures. These structures are reversible active sentences and sentences containing comparatives. Testing comparatives by objects is expected to produce more accurate results. (See the comparative part in Section 4.2.4 for the reasons). Verbs used in testing for the comprehension of active

sentences such as *push*, *chase* and *feed* are difficult to represent by pictures. For this reason it is suggested that objects are used in testing for the comprehension of active sentences.

6.1.2.4 Structures which need to be expanded

As mentioned in the Discussion Chapter, 2 of the structures which test for number inflection include an item testing for the comprehension of the dual number. It is recommended that a separate structure is used to test for the singular/dual contrast instead of testing the dual and singular/plural contrast in the same structure. This is true for the following: nouns inflected for number (structure 2) and V-O sentences where the verb and the object are inflected for number (Structure 15). By having the contrast singular/plural and the contrast singular/dual tested separately, one can make a judgement about plural and dual individually instead of making judgements about number inflection as a whole. As regards the other structure (i.e. Structure 8) which tests for number, dual inflection is not used with it in the Arabic spoken in Saudi Arabia.

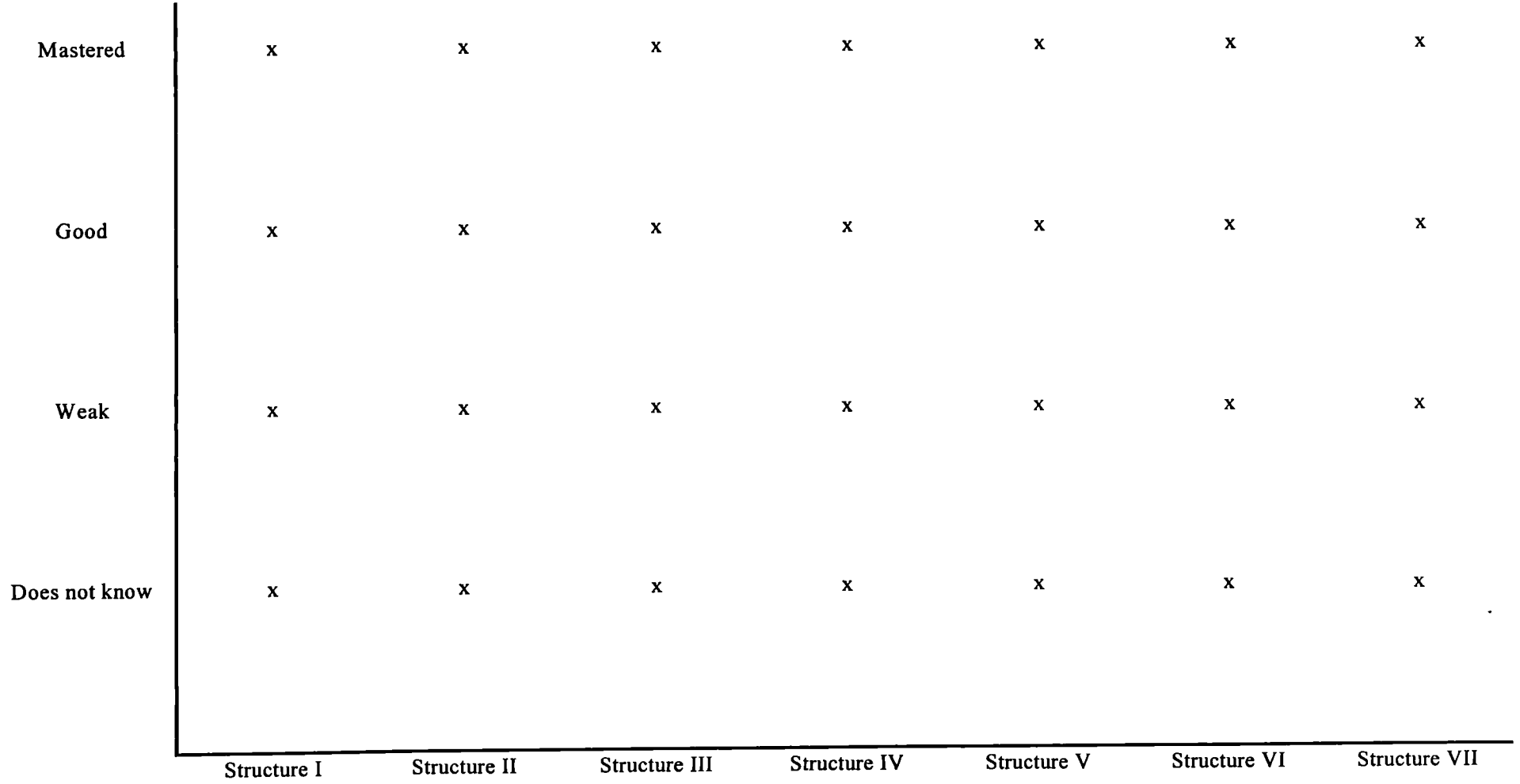
6.1.2.5 Scoring of the test

In the language comprehension study, a subject was failed in a structure if he failed at least one item testing for that structure. This method reduces the probabilities that a child who passes a structure does so as a result of a chance factor or as a result of having a partial knowledge of the structure being tested. However, this method does not give credit to children who pass one or even 2 of the 3 items testing for the comprehension of a structure. Consequently, a scoring system that gives credit to every correct response given by the child is required. A proposed scoring system is to have 4 levels which are: 1) the child has mastered the tested structure if he passed all items testing for that structure; 2) the child is about to master the tested structure if he passed 2/3 of the items testing for that structure; 3) the child has not yet mastered but is getting acquainted with the tested structure if he failed most items testing for that structure; 4) the child does not know the tested structure if he

failed all items testing for that structure. Although such a scoring system is complicated, it is useful in clinical settings in that it allows a clinician to know exactly what a child can and cannot comprehend as well as the child's performance level in every structure (i.e. weak, strong or did not master a certain structure). Another important advantage of this scoring system is that it allows a clinician to monitor and evaluate therapy. Monitoring therapy through this method will allow a speech-language therapist to compare the child's performance after attending a number of sessions before therapy starts. Having the child's performance compared to a set of objectives is one of the distinguishing features of criterion-referenced tests.

Another point to be considered in the clinical test is to develop a profile that illustrates the performance of every child tested. This is helpful clinically in that it makes follow up of children's progress simple and more efficient. Profiling method was used successfully in language tests such as the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk *et al.*, 1968) where every subjects' raw score in every sub-test is compared to the performance of his peers and he is given an age and scaled scores according to age norms. After completing the test every child will have his own profile which shows his own performance in every sub-test relative to the norm. A proposed profile for keeping record of children performance is illustrated in Figure 6.1 where structures will be ordered according to their difficulty and performance criteria are explained in the previous paragraph.

Figure 6.1 The proposed chart for profiling children's results in the clinical test of language comprehension.



6.2 Reliability and Validity of the test

As regards reliability of tests in general and language tests in particular, a detailed explanation was presented in Section 2.3.1.1. Since the clinical test will be examining the comprehension of certain morpho-syntactic structures, this means that content validity could not be measured by examining the content of the items tested. This was expressed clearly by Engen & Engen (p. 27) who stated that "there is no disagreement among linguists as to what constitutes a dative sentence, for instance, or what is the difference between a syntactically simpler or complex sentence". Instead, the type of validity used by Engen & Engen in their RITLS was the definitional validity which according to them means that test items are a valid measure of the abilities they were designed to test, which is in our case the comprehension of certain morpho-syntactic structures. Another point that supports using item analysis instead of correlating different test scores is that there is no other test at present that tests for the same criterion which is Arabic morpho-syntax. Thus item analysis will be used to examine validity of the test.

6.2.1 Item analysis

The aim of item analysis is to evaluate individual test items objectively. Engen & Engen cited two possibilities for item analysis. The first is an evaluation of item difficulty and the second involves the computation of a discrimination index to determine the extent to which each item measures the same thing as the total test measures (Magnusson, 1976 cited in Engen & Engen). Item difficulty is computed by finding the percentage of subjects who passed each item. Nunnally (1972) suggests for a test of this type with 4 alternatives that items in the range of 35% to 85% be considered of average difficulty and reliable in the sense that they differentiate between subjects who perform well and those who perform poorly.

Nunnally (1972) suggested that discrimination index can be computed by determining what percentage of the top 27% of the subjects and the bottom 27% of the subjects in each group got each item wrong. (Engen & Engen, 1983, p. 25).

6.3 Normative data

It is generally accepted that in criterion-referenced tests a child's performance is compared to well defined objectives, while in norm-referenced tests the child's performance is compared to normal developmental data (Miller & Paul, 1995). A criterion-referenced test can be used as a norm-referenced test, according to Popham & Husek, 1975, by constructing a criterion-referenced one and collecting a normative data after that on both normal and children with language disorders. Having the test work both as a criterion-referenced test and a norm-referenced test enables us to determine both if a problem exists and to plan an intervention program. Since the test will be constructed basically as a criterion-referenced test, collecting normative data is expected to increase its effectiveness as a clinical tool.

When collecting normative data there are two important points mentioned by Kline (1986) which need to be considered. The first point is that the sample must accurately reflect the target population at which the test is aimed. The second point is that the sample needs to be large enough to reduce the standard errors of the normative data to negligible proportions. In relation to the clinical language comprehension test to be constructed, the criteria used in the comprehension test were sufficient to make sure that children who will be selected represent average children. It is intended to pilot the test on a group of children with language disorders because they are the target for whom the test will be constructed. Getting further normative data will enable us to determine exactly the age range at which every structure develops. Data from the comprehension test served that purpose for some but not for all structures. When analysing children's data, the total score a child's achieves in the test will not be considered; instead, what is going to be considered is his performance in every structure. Thus, the performance of children representing every age group will be summed together for every single structure instead of considering the total scores of children in the whole test.

With regard to the sample size, it is thought that having 60 children instead of 20 in every 0;6 months age range is adequate to represent the sample. Two age groups will be added to the groups tested in the comprehension test and they are 2;0 to 2;5 and 2;6 to 2;11 years which will make the total sample 480 children. Children will be interviewed and tested at nurseries or at their homes if they are not attending nurseries. Medical records of local health centres will be reviewed and families will be contacted from there. As regards children with language disorders, they will be interviewed and tested at speech-language therapy clinics in Saudi Arabia. This is to ensure that the materials and content used in the clinical test is appropriate to children with language disorders.

6.4 Test manual

A good test manual needs to be written and written with care in order to be used efficiently by the examiner using the test. The following are criteria which need to be met by a language test manual.

1. Explain the purpose of the test clearly.
2. Indicate limitations of the test (i.e. abilities that are assessed by the test and abilities which are not), for example the test is aimed at assessing syntax comprehension but not lexical comprehension.
3. Give statistical information about the test.
4. Inform about reliability and validity.
5. Present a background of the theory. This will include: a brief account of the development of language comprehension in normal and children with language disorders; the difference between comprehension and production; comprehension strategies and the importance of using appropriate materials (linguistically and culturally) to assess children's language in general and Saudi children in particular.
6. Give clear and informative administration procedures.
7. Tell the examiner how to deal with administration problems.

8. Help in interpretation of results. Relate test results to therapy. This is important since criterion-referenced tests lay out means to record performance and to indicate therapy goals.

6.5 Training on using the test

Since the clinical test is going to be the first assessment procedure for language comprehension of Saudi children, intensive training will need to be performed for speech-language therapists who are going to use the test. This will include short courses as well as workshops. During such courses, theoretical and practical information will be presented. The use of the test will be illustrated on a child with a language disorder to demonstrate administration, scoring and profiling procedures. This will also be useful in demonstrating the procedure for obtaining therapy goals from the test results.

Chapter Seven

Conclusion

The need for such a study of Arabic-speaking children's language was highlighted in the Introduction Chapter. It was stressed there that even basic studies of child language in Arabic are very rare. The current study is important in that it is one of the few systematic studies that has tried to explore Arabic children's language. The test that was used in the study took into consideration the process of normal language comprehension acquisition, the structure of the Arabic language and the cultural appropriateness of the materials used.

Since the main aim of the research was to get data on the developmental patterns, rate and order of acquisition of some morpho-syntactic structures' comprehension for Saudi children aged 3;0 to 6;0 years, a language comprehension test was constructed and performed on 120 Saudi children. The language comprehension test that was used in the current study will be used as the main source for constructing the clinical test for language comprehension for use by all Saudi speech-language therapists. This clinical test will be the first Arabic language comprehension test that is designed for use in the Saudi culture. The CDS study is one of the few studies that investigated Arabic CDS and the first that considers Saudi adults' speech to their children.

7.1 Summary of the results

Results reported in the current study include the results of both the CDS study and the language comprehension study. Results of the language comprehension study were discussed first on the basis of children's general performance on the objects, pictures sub-tests and their sum. Comprehension patterns demonstrated by the study subjects was then discussed on the basis of the theoretical framework of the current study which was the CM.

The CDS data was analysed in terms of its vocabulary structure, dialect variation, morpho-syntactic structure and discourse features. Vocabulary items used by fathers would form a source to select from when constructing assessment procedures for Saudi children's language since it is the vocabulary children are expected to comprehend. One of the features noticed in the speech of three fathers is the use of BT words. The use of BT words in Arabic along with some examples were presented in detail by Ferguson (1956). As dialect variations existed in the speech of the fathers, the test had to take this into account since children need to be examined on the vocabulary they understand.

With reference to the searched structures in the speech of Saudi fathers, it was found that fathers of the older children used a greater variety of structures compared to fathers of the younger ones. This supports the finding of other researchers of the CDS in different languages, that the complexity of structure of the speech of adults to children increases as children grow older. The other measure used to determine the complexity of fathers' speech was the number of verbs per utterance. It was found that this measure can be used in Arabic to estimate the complexity of fathers' speech to their younger children whose age does not exceed 3;0 years.

Discourse functions present in Saudi fathers' speech were investigated. Results were compared to those of Hampson & Nelson (1993) and it was found that the most frequent function used by the fathers in the current study was the *request for information* which represented 31.1% of fathers' utterances, while the most frequent function used by Hampson & Nelson's English-speaking mothers was *descriptions*, which represented 21% of their subjects' utterances. The frequency of occurrence of 7 discourse functions out of the 12 studied was found to be similar in English and Arabic, while the frequency of the other 5 functions varied from English to Arabic. This variability was attributed to the following factors: the difference in the children's ages between the two studies (mean age was 3;9 years

in the current study compared to 1;1 years in Hampson & Nelson's study); the gender of the conversational partners (fathers in the present study, while they were mothers in Hampson & Nelson's study) and to the difference in culture.

As regards the test, it examined the comprehension of specific morpho-syntactic structures using an object-manipulation and picture-pointing tasks. Certain pre-testing procedures were conducted: a dialect checklist, a hearing screening and a vocabulary pre-test. The purpose of the dialect checklist was to ensure that the child is tested using the vocabulary used in his dialect. In hearing screening, the goal was to ensure that the child's hearing is adequate for the perception of spoken words since his language comprehension is the process being assessed. Finally, a vocabulary pre-test aimed at confirming that the child's failure in morpho-syntactic structure is not due to a vocabulary miscomprehension.

With regard to the test of morpho-syntax, the first variable tested was gender which was found not to affect the children's results. By this, boys were not found to perform significantly better than girls or vice versa. This led to treating boys' and girls' scores as one group.

The second variable tested was age. As regards the age in which every structure develops, a 60% passing criterion was used and the results are given in Table 4.38 for structures tested by objects and Table 4.39 for structures tested by pictures. A comparison was made between acquisition age for some structures as found in the present study and the age reported in three studies of English-speaking children. Comparison results are presented in Table 7.1 and they show that some structures were comprehended by Saudi children at an age similar to that reported for English-speaking children. Some other structures were acquired in comprehension by Saudi children at an age earlier than that reported for English-speaking children. Yet other structures were acquired in comprehension by Saudi children at an age

later than that reported for English-speaking children. The order at which the tested structures were acquired in comprehension is presented in Table 4.36 for structures tested by objects and in Table 4.37 for structures tested for pictures.

Table 7.1 The age at which Saudi children acquire some of the tested structure compared to that of English-speaking children.

Structure	Results of the present study	The age reported in a study of English-speaking children	
Possessive	3;0	3;0	Layton (1976)
Preposition *in*	3;0	2;6 to 3;0	Carrow (1968)
Preposition *on*	3;0	2;6 to 3;0	Carrow (1968)
Preposition *under*	4;0 to 4;5	2;6 to 3;0	Carrow (1968)
Preposition *beside*	4;0 to 4;5	3;3 to 4;1	Kuczaj & Maratsos (1978)
Preposition *behind*	4;0 to 4;5	3;3 to 4;1	Kuczaj & Maratsos (1978)
Preposition *in front of*	4;6 to 4;11	4;0	Carrow (1968)
Preposition *between*	after 6;0 years	3;6	Carrow (1968)
Complex commands	4;0 to 6;0	4;6	Carrow (1968)
Adj.-N	3;0	2;6	Carrow (1968)
Adj.-Adj.-N sentences	3;0	4;6	Carrow (1968)
S-V-C sentences (where C is a negated adjective)	3;0 to 3;5	2;6	Layton (1976)
S-V sentences (where V is a negated present continuous)	4;0 to 4;5	2;6	Layton (1976)
Verbs inflected for number	4;0 to 4;5	4;0 to 6;6	Carrow (1968)
Nouns inflected for number	4;0 to 4;5	4;0 to 5;0	Carrow (1968)
Reversible active	4;6 to 4;11	3;0	Carrow (1968)
Comparatives	after 6;0 years	5;0	Carrow (1968)

It was found that the test as a whole was sensitive to age which means that it is able to detect age differences. A one year age range was the range at which differences in Saudi children's comprehension development in the current study can be detected. This means that the test is able to classify children tested into groups varying by one year.

In term of structures' sensitivity to age, it was found that about half of the structures were sensitive to age. The other structures did not show a significant sensitivity to age and for some structures this was attributed to structures being too easy or too difficult. Another structure was expected to show significant sensitivity if more subjects were included.

With regard to the relationship between children's scores in objects and pictures sub-tests, a direct relationship could not be tested because each of them examined the comprehension of different structures. However, the kind of comparison that was made was one that answered the following question: Do children who show a good performance in the objects sub-test show a good performance in the pictures sub-test as well? In response to this question it was found that objects and pictures scores were not significantly correlated with each other when every age group was examined separately (i.e. age was not considered). However, objects and pictures scores correlated with each other with high significance when the age variable was included. This suggests that a child who performs well in an objects sub-test, for example is expected to perform well in a pictures sub-test too.

Language comprehension is thought by proponents of the CM to occur from integrating cues from several sources such as the linguistic stimulus and the world knowledge. Cues used by the study subjects to comprehend the tested morph-syntactic structures were determined by analysing their correct as well as incorrect responses to every item used in the picture sub-test. This allowed some insight into the comprehension processes used by children in the current study to understand the tested structures. Accounting for cross-linguistic data was found in the current study to be a feature in favour of the CM as it explained many of the observations found in the current study as indicated below.

One main observation was children's use of different comprehension strategies such as their world knowledge which was observed in children's comprehension of more than one structure. Attend to the last strategy was also noticed especially in the responses of younger children. With reference to the objects used, children showed a better ability in acting out commands with fronted objects such as a chair than nonfronted ones such as a table.

Children in the present study found it more difficult to understand sentences that require the integration of three lexical cues compared to those requiring only two lexical cues. Sentences requiring the comprehension of two adjectives and a noun were comprehended better than those requiring two verbs and a noun which were slightly more difficult to comprehend than those requiring the comprehension of two nouns and a verb.

Structures that require the comprehension of gender inflection were comprehended by most children especially in the older groups. The position of the gender inflection in the sentence (i.e. subject or object position) was found to affect children's responses as they found it more difficult to process this inflection when it was in the object position. Dual and plural number were not distinguished by some of the children in the younger groups which suggested that the distinction between these two number inflection is elaborated later in the life of Saudi children.

An interesting finding observed in the current study is that word order did not have a strong effect on children's responses to reversible active sentences as it is for English-speaking children. Around one fifth of the subjects did not assign the subject to the first noun and the object to the second noun. This was taking as evidence in favour of the CM which anticipates that children speaking a particular language will use cues that are specific to the structure of their language.

The performance of children was noticed to improve with age. Younger children used comprehension strategies mentioned above more than older ones. When the comprehension of a sentence requires the use of both syntactic and semantic cues, younger children appeared to have difficulty with both cues, while older ones appeared to have a particular difficulty in dealing with the syntactic cues.

Seven out of the nine children re-tested, showed an agreement of at least 85% between test and re-test when their performance was considered in every sub-test. However, all children show an agreement of at least 85% when the sum of the two sub-tests was considered. The test in its two sub-sections has shown a good agreement of test re-test when 83% of the structures tested by objects and 81% of the structures tested by pictures had an agreement between test and re-test of at least 85%. This suggested that the test itself is reliable and that the examiner was systematic. Older children showed a more reliable performance in the test re-test compared to younger ones. The test was not internally consistent on the basis of 0.7 criterion when every age group's performance was considered. However the test was consistent when all children's performance was considered.

If a direct relationship exists between results of the language comprehension test and the CDS study, one would expect a frequent structure used by fathers to be easy to comprehend for test subjects and similarly a structure that is not common in fathers' speech is expected to be difficult to comprehend for the study subjects. Fifteen structures out of the 23 that are present in both studies expressed this direct relationship. The rest of the structures did not show evidence for a direct relationship either because a structure was easy for test subjects to comprehend but was not so frequent in fathers' speech, or a structure was frequent in fathers' speech but was difficult for the test subjects to comprehend. A discussion of the relationship between the results of the CDS and the language comprehension studies was presented in Section 5.2.8.

7.2 Recommendations

7.2.1 Recommendations for the clinical test of language comprehension

It is recommended for the clinical test of language comprehension to:

1. Include more children in the study and to expand the age range to include children aged 2;0 to 3;0 years, making the age range of the test from 2;0 to 6;0 years. It is also recommended to include children who are not attending nurseries and children living in cities other than Riyadh.
2. Include vocabulary items that were passed by at least 95% of the children tested in the current study of language comprehension.
3. Use monosyllabic words for hearing screening instead of the bisyllabic words used in the comprehension test.
4. With regard to the morpho-syntactic structures, it is recommended to test some structures by the use of objects instead of pictures as indicated in Section 6.1.2.3 and expand some other items as indicated in Section 6.1.2.4.
5. Avoid using a picture of a girl and a woman in the same plate. This also applies to the pictures of a boy and a man.
6. Apply a new scoring method and use a profiling chart for every subject tested (Section 6.1.2.5).
7. Obtain reliability and validity data (Section 6.2) and perform items analysis (Section 6.2.1).
8. Obtain further normative data (Section 6.3).
9. Design a test manual (Section 6.4).

7.2.2 General recommendations for a language test to be performed in Saudi

1. It is recommended that any research to be performed in a conservative culture such as the Saudi one should observe that women are unlikely to participate in any study if they will be video- or tape-recorded. In addition, they will not be willing to participate in a research project if they will be interviewed by men. Video-recording in particular is not accepted by some men as well. For this reason research that uses video-recording techniques needs to be selective.
2. When designing a CDS study, it is recommended that a subject is chosen for conversation, an activity is performed or a game is played by the target group.
3. When testing language comprehension, the task required from the child (e.g. pointing) needs to be very simple in order not to interfere with the structure being tested.
4. When constructing a syntax comprehension test, types of errors made by children need to be considered.
5. The scoring form used in the language comprehension assessment needs to be simple to use and includes as many details as possible which in turn will assist in data analysis.
6. In relation to clinical practice, the most suitable language test is the one that identifies strengths and weaknesses in the child's language and provides targets for therapy.

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