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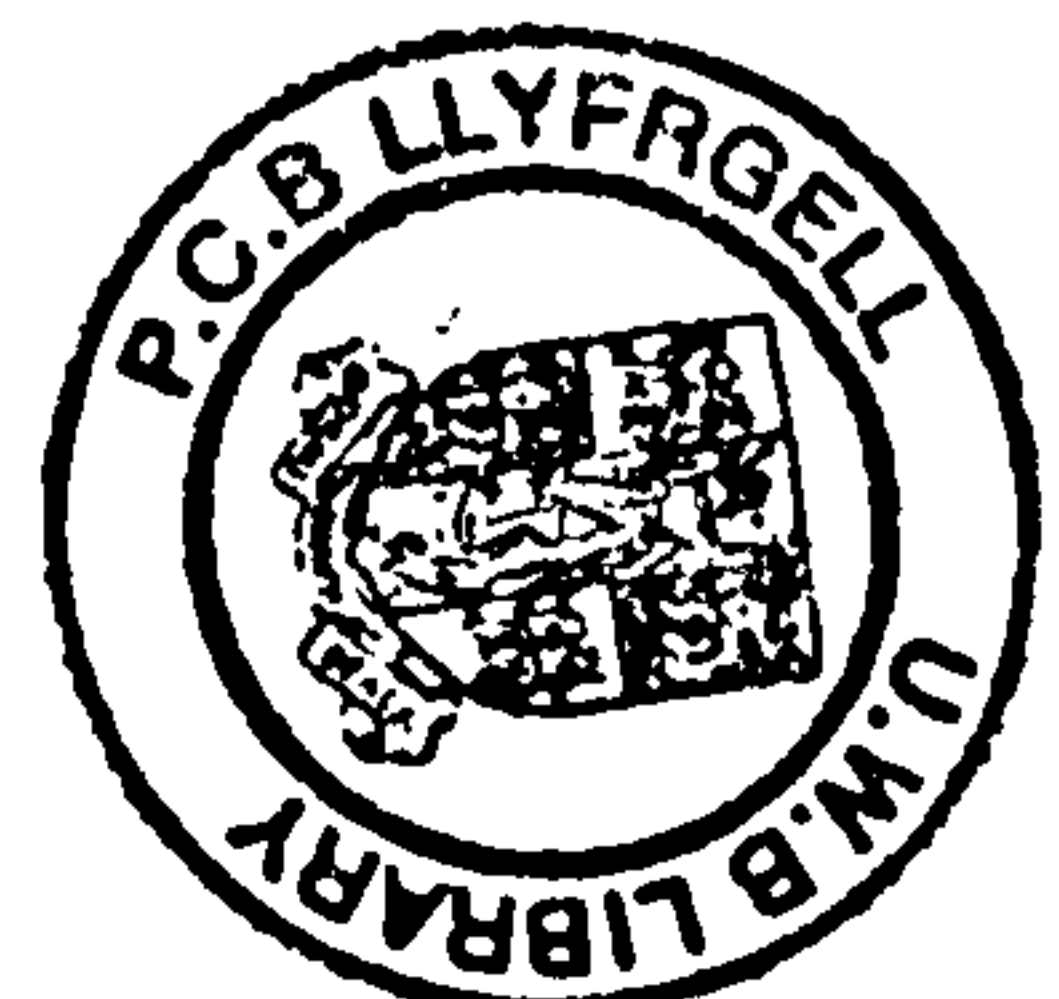
UNIVERSITY of WALES

**The ACQUISITION OF THE ARABIC GENDER AND NUMBER
SYSTEMS**

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A Thesis submitted to the School of Psychology, University of Wales,
Bangor, in partial fulfilment of the requirements of the Degree of Doctor of
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CONTENTS

SUMMARY	1
INTRODUCTION TO THE THESIS.....	3
KEY TO TRANSCRIPTION OF ARABIC USED IN THIS RESEARCH.....	5
CHAPTER 1: THE ACQUISITION OF DIFFERENT GRAMMATICAL SYSTEMS.....	6
1.0 INTRODUCTION.....	6
1.1 GENDER ACQUISITION	7
1.2 NUMBER ACQUISITION.....	10
1.3 VERB ACQUISITION.....	14
1.4 LINGUISTIC CHARACTERISTICS RELEVANT TO UNDERSTANDING GENDER, NUMBER, AND VERB ACQUISITION.....	17
1.4.1 LANGUAGE INPUT AND CHILD DIRECT SPEECH (CDS).....	18
1.4.2 INPUT FREQUENCY	20
1.4.3 LINGUISTIC COMPLEXITY AND IRREGULAR ACQUISITION	22
1.4.4 TRANSPARENCY	23
1.4.5 LANGUAGE PRODUCTIVITY	24
CHAPTER 2: ARABIC NOUN GENDER AND NUMBER SYSTEMS.....	28
2.0 INTRODUCTION.....	28
2.1 THE ARABIC LANGUAGE	28
2.2 NOUN GENDER PATTERNS	30

2.2.1 FIRST PATTERN: NOUNS MARKED AS FEMININE BY A SUFFIX.....	31
2.2.2 SECOND PATTERN: COLLECTIVE NOUNS	31
2.2.3 THIRD PATTERN: INANIMATE FEMININE NOUNS WITH NO OVERT GENDER MARKING	32
2.3 NUMBER SYSTEM	32
2.3.1 SINGULAR FORMS.....	33
2.3.2 DUAL FORMS.....	34
2.3.3 PLURAL FORMS	34
2.3.4 QUANTIFIED NOUNS	36
2.4 ADJECTIVES	37
2.4.1 ADJECTIVES IN AGREEMENT WITH NOUN GENDER.....	37
2.4.2 ADJECTIVES IN AGREEMENT WITH GENDERS AND NUMBERS (DUAL AND PLURAL)	38
2.5 VERBS.....	40
2.5.1 VERBS IN AGREEMENT WITH NOUN GENDER.....	40
2.5.2 VERBS IN AGREEMENT WITH GENDER AND NUMBER (DUAL AND PLURAL).....	41
2.6 THE ARABIC VERNACULAR.....	43
2.6.1 THE SAUDI ARABIC VERNACULAR.....	44
2.7 SUMMARY	45
CHAPTER 3: REVIEW OF RELATED RESEARCH.....	50
3.0 INTRODUCTION.....	50
3.1 ACQUISITION OF ARABIC.....	50
3.2 SUMMARY	64

CHAPTER 4: PRESENT STUDIES	67
4.0 INTRODUCTION.....	67
4.1 AIM OF THE STUDIES	67
4.2 EXPECTED OUTCOMES OF THE STUDIES	67
4.3 GOALS OF THE STUDIES.....	68
4.4 QUESTIONS OF THE STUDIES.....	69
4.5 HYPOTHESES.....	70
CHAPTER 5: COMPREHENSION.....	73
5.0 INTRODUCTION.....	73
5.1 METHODS	73
5.1.1 PARTICIPANTS.....	73
5.1.2 STIMULI.....	74
5.1.2.1 PICTURE STIMULI.....	74
5.1.2.2 LINGUISTIC STIMULI.....	76
5.1.3 PROCEDURE.....	82
5.2 RESULTS.....	84
5.2.1 HUMAN AND ANIMAL NOUNS	84
5.2.2 ADJECTIVES.....	95
5.2.3 VERBS.....	103
5.2.4 COLLECTIVE NOUNS.....	116
5.2.5 INANIMATE FEMININE NOUNS WITH NO OVERT GENDER REFERENT.....	126
5.3 CONCLUSION.....	130
CHAPTER 6: PRODUCTION	133

6.0	INTRODUCTION.....	133
6.1	METHODS	133
6.1.1	PARTICIPANTS.....	133
6.1.2	STIMULI.....	133
6.1.3	PICTURE STIMULI:.....	134
6.1.4	LINGUISTIC STIMULI.....	135
6.1.5	PROCEDURE.....	144
6.2	RESULTS.....	145
6.2.1	PRODUCTION REAL WORDS	145
6.2.1.1	HUMAN AND ANIMAL NOUNS	145
6.2.1.2	ADJECTIVES.....	159
6.2.1.3	VERBS.....	171
6.2.1.4	COLLECTIVE NOUNS.....	185
6.2.1.5	QUANTIFIED NOUNS.....	195
6.2.1.6	INANIMATE FEMININE NOUNS WITH NO OVERT GENDER REFERENT.....	206
6.2.2	PRODUCTION (NOVEL WORDS).....	211
6.3	GENERAL CONCLUSION	220
CHAPTER 7: ERROR ANALYSES, PRODUCTION.....		223
7.0	INTRODUCTION.....	223
7.1	ERRORS MADE WHILE PRODUCING NOUNS	223
7.1.1	PLURALS.....	224
7.1.2	DUAL.....	229
7.2	ERRORS WHILE PRODUCING QUANTIFIED NOUNS.....	234

7.3 ERRORS WHILE PRODUCING VERBS	239
7.4 NOVEL WORDS ERRORS.....	246
7.5 GENERAL DISCUSSION.....	253
CHAPTER 8: LONGITUDINAL STUDY	256
8.0 INTRODUCTION.....	256
8.1 METHOD.....	256
8.1.1 PARTICIPANTS.....	256
8.1.2 PROCEDURE.....	257
8.2 RESULTS.....	258
8.2.1 PRODUCTION OF VERBS.....	258
8.2.2 ADULTS' LANGUAGE INPUT (VERBS TYPES AND TOKENS).....	275
8.2.3 INCORRECT GRAMMATICAL FORMS	286
8.2.3.1 INCORRECT USE OF WORD TYPES.....	287
8.2.3.2 INCORRECT SYNTACTICAL USE OF SUBJECT AGREEMENT.....	287
8.3 DISCUSSION.....	292
CHAPTER 9: GENERAL DISCUSSION.....	295
9.0 INTRODUCTION.....	295
9.1 COMPREHENSION	297
9.2 PRODUCTION.....	301
9.3 LONGITUDINAL STUDY.....	308
9.4 DISCUSSION.....	311
9.5 CONCLUSION.....	313

REFERENCES.....	322
APPENDIX 1: COMPREHENSION.....	335
APPENDIX 1.1 COMPREHENSION STIMULI.....	335
APPENDIX 1.1.1: STIMULI FOR THE HUMAN AND ANIMAL NOUNS CATEGORY.....	335
APPENDIX 1.1.2: STIMULI FOR THE ADJECTIVE CATEGORY.....	338
APPENDIX 1.1.3: STIMULI FOR THE VERB CATEGORY.....	342
APPENDIX 1.1.4: STIMULI FOR THE COLLECTIVE NOUNS CATEGORY.....	346
APPENDIX 1.1.5: STIMULI FOR THE INANIMATE FEMININE NOUNS WITH NO OVERT GENDER REFERENT CATEGORY.....	350
APPENDIX 1.2: COMPREHENSION RESULTS:.....	352
APPENDIX 1.2.1: COMPREHENSION, HUMAN AND ANIMAL NOUNS. (MEANS AND STD. ERRORS).....	352
APPENDIX 1.2.2: COMPREHENSION, ADJECTIVES. (MEANS AND STD. ERRORS).....	355
APPENDIX 1.2.3: COMPREHENSION, VERBS. (MEANS AND STD. ERRORS).....	357
APPENDIX 1.2.4: COMPREHENSION, COLLECTIVE NOUNS. (MEANS AND STD. ERRORS).	361
APPENDIX 1.2.5: COMPREHENSION, INANIMATE FEMININE NOUNS WITH NO OVERT GENDER REFERENT. (MEANS AND STD. ERRORS).....	364
APPENDIX 2: PRODUCTION.....	365
APPENDIX 2.1 PRODUCTION STIMULI.....	365
APPENDIX 2.1.1: STIMULI FOR THE HUMAN AND ANIMAL NOUNS CATEGORY.....	365
APPENDIX 2.1.2: STIMULI FOR THE ADJECTIVE CATEGORY.....	368
APPENDIX 2.1.3: STIMULI FOR THE VERB CATEGORY.....	372

APPENDIX 2.1.4: STIMULI FOR THE COLLECTIVE NOUNS CATEGORY.	376
APPENDIX 2.1.5: STIMULI FOR THE QUANTIFIED NOUNS CATEGORY.....	379
APPENDIX 2.1.6: STIMULI FOR THE INANIMATE FEMININE NOUNS WITH NO OVERT GENDER REFERENT CATEGORY.	381
APPENDIX 2.1.7: THE STORY USED FOR THE (NOUNS AND VERBS) NOVEL NOUNS CATEGORY.	382
APPENDIX 2.2: PRODUCTION RESULTS:	384
APPENDIX 2.2.1: PRODUCTION, HUMAN AND ANIMAL NOUNS. (MEANS AND STD. ERRORS).....	384
APPENDIX 2.2.2: PRODUCTION, ADJECTIVE. (MEANS AND STD. ERRORS).....	388
APPENDIX 2.2.3: PRODUCTION, VERB. (MEANS AND STD. ERRORS).	391
APPENDIX 2.2.4: PRODUCTION, COLLECTIVE NOUNS. (MEANS AND STD. ERRORS).....	394
APPENDIX 2.2.5: PRODUCTION, QUANTIFIED NOUNS. (MEANS AND STD. ERRORS).....	396
APPENDIX 2.2.6: PRODUCTION, INANIMATE FEMININE NOUNS WITH NO OVERT GENDER REFERENT. (MEANS AND STD. ERRORS).	398
NUMBER.....	398
APPENDIX 2.2.7: PRODUCTION, NOVEL WORDS. (MEANS AND STD. ERRORS).....	399

Summary

The study of language acquisition across languages shows that there are different orders and rates of acquisition depending on each language's individual grammatical features and characteristics. This study investigates the acquisition of Arabic gender and number agreement of adjectives and verbs with corresponding nouns in the performance of ninety-eight Saudi children between the ages of six and twelve years, and also of seven adults, in a cross-sectional study. Their comprehension and production is investigated through using a picture selection test and an elicited production test. Three other children between the ages of 1;4¹ and 4;5 have been tape recorded to investigate their language productivity and language input in a longitudinal study.

Our main results indicate that grammatical forms become productive at a very young age-16.22², while mastering of the forms occurs at a later age between eight and twelve years, with some forms being mastered even after the age of twelve. Our findings, on the whole, show that the gender system is mastered between the ages of eight and ten, while errors in the use of the plural system are retained even after the age of twelve. The number system findings also show that singular forms are mastered earlier than dual forms, while dual forms are mastered earlier than plural forms.

¹ 1;4 (year; month. day), thus, 1;4 indicates: one year and four months of age.

² 16.22 indicates: 16 months and 22 days.

In addition, the study reveals that transparency, form frequency, and language input and CDS are some of the main factors contributing to the early mastery of grammatical forms, while abstractness and irregularity in grammatical forms, opaque agreement, and infrequency of language input and CDS result in later acquisition and mastery of grammatical forms.

In general, our results show that the rate of mastery of the Arabic gender system is consistent with the rate of acquisition of the Welsh gender system. Acquisition of the Arabic number system appears consistent with the late acquisition of the German number system, while the late mastery of the Arabic verb system is consistent with Modern Greek acquisition.

Finally, it has become clear that there is a need for further studies on the acquisition of different Arabic dialects and on the main factors behind the late acquisition of Arabic. However, this study has answered many important questions. It has also highlighted areas to investigate, and hopefully these areas will be addressed in future research.

Introduction to the Thesis

The main purpose of this research is to study the rate and order of acquisition (comprehension and production) of Arabic gender and number systems in the performance of children between the ages of six to twelve and adults. We will also investigate the acquisition of subject-number, verb and adjective agreement by conducting both a cross-sectional and a longitudinal study.

To achieve this purpose, this thesis is structured into chapters as follows. Chapter 1 presents the acquisition of different grammatical systems. The systems which are acquired early are presented first, followed by the systems acquired later. Characteristics that affect language acquisition will also be discussed.

Chapter 2 includes descriptions of the Arabic noun gender system and number system, an explanation of adjective and verb agreement with gender and number, and a description of some relevant characteristics of the Saudi Arabic vernacular.

Chapter 3 outlines prior research which has been done to investigate the acquisition of Arabic gender and number systems in four different dialects and in various age groups.

In Chapter 4 our studies are introduced with respect to aims, expected outcomes, goals and questions of the studies, and the research hypotheses.

Chapter 5 describes our comprehension section, methods, and results.

Chapter 6 describes our production section, divided into real and novel words, and presents their methods and results.

Chapter 7 explores errors made by our participants during the production task. Their errors are grouped into categories and examined.

Chapter 8 describes our longitudinal study. In this chapter, children's language productivity, language input and CDS and errors are reviewed.

Chapter 9, the concluding chapter of the thesis, discusses the results of this research (cross-sectional and longitudinal) in regard to classical and vernacular Arabic. The results are also compared with the results of other studies.

Key to transcription of Arabic used in this research

أ	ʔ	Glottal stop	ط	ʈ	Voiceless retroflex stop.
ا	a:	Long vowel	ظ	ð	Fricative
ب	b	Voiced bilabial stop.	ع	ʕ	Voiced pharyngeal fricative
ت	t	Voiceless alveolar.	غ	ɣ	Voiced velar fricative
ث	θ	Voiceless interdental central fricative	ف	f	Voiceless labiodental central fricative
ج	ʒ	Voiced palatoalveolar central laminal fricative.	ق	q	Voiceless uvular stop.
ح	h	Voiceless pharyngeal central fricative.	ك	k	Voiceless velar stop.
خ	x	Voiceless velar fricative.	ل	l	Voiced alveolar lateral approximant.
د	d	Voiced dental	م	m	Voiced bilabial nasal.
ذ	ð	Inter-dental central fricative.	ن	n	Voiced nasal
ر	r	Voiced apicoalveolar trill.	هـ	h	Voiceless glottal central fricative.
ز	z	Dental central fricative.	و	w	Voiced rounded labiovelar approximant.
س	s	Voiceless alveolar central fricative.	ي	j	Voiced palatal central approximant.
ش	ʃ	Voiceless palatoalveolar central laminal fricative.	ـَ	a	Short vowel
ص	s	Fricative	ـِ	i	Short vowel
ض	ɖ	Voiced retroflex	ـُ	u	Short vowel

Chapter 1

The Acquisition of Different Grammatical Systems

1.0 Introduction

When we acquire our mother tongue, we learn its vocabulary and various grammatical forms, such as gender, tense, person, and number, that are encoded in the language (Simoes & Stoel-Gammon, 1979). These grammatical constructs vary among languages, so that every language has its own grammatical features and characteristics. Cross-linguistic studies report that different language systems pose different types of acquisition problems and influence the course of a child's language development (Slobin, 1985, a). However, children acquiring a particular language seem, in general, to acquire forms in more or less the same order (Gleason, 1993).

This chapter will focus primarily on the acquisition of gender and number systems in distinct language systems. Many factors, such as language input, complexity of forms, and the regularity of the system, influence the acquisition of linguistic systems. The review below is organised into sections examining the acquisition of gender, number, and verbs, followed by some factors that affect language acquisition, such as language input, input frequency, linguistic complexity, transparency, and productivity.

1.1 Gender acquisition

Types of noun categories differ from one language to another. Some languages are considered grammatical gender languages and others are natural gender languages. Cross-linguistic research comparing the development and mastering of noun gender across languages has indicated differences among languages. Some of these studies indicate that learning the gender system in a grammatical gender language occurs earlier than in natural gender languages. Gender is easier to acquire in language systems containing gender marks which are clearly attached to the noun than in language systems that use different words to distinguish between males, females and objects. For example, Corbett (1991) reports that the acquisition of gender, e.g. *he*, *she*, and *her*, is late in English in comparison with German. English-speaking children make frequent errors in gender usage at the age of four, whereas German children make few errors in using the appropriate gender forms at the age of two. Mills (1985) suggests two reasons for such results. First, in German gender is marked in many parts of speech, which gives German children more opportunities to learn it. Second, there is a clear phonetic contrast between the German masculine forms *er* and *der* on the one hand and the German feminine forms *sie* and *die* on the other. In English, *he*, *she*, and *her* are less clearly differentiated.

There are other factors that may contribute to the early acquisition of a specific noun gender system. According to Smoczyńska (1985), most Polish children acquire gender distinctions by the age of two. Yet Russian children acquire gender at a later stage despite the fact that the two languages apparently have similar systems in which the feminine singular noun ends in /-a/, the masculine ends in /-o/, and the neuter ends in /-o/

or /-e/. Smoczynska suggests two reasons for the later acquisition of Russian. First, in Russian unstressed /-o/ and /-a/ are pronounced identically, which leads the children to make mistakes and delays their language encoding. Second, Russian has a diminutive masculine form which ends with /-a/ rather than with /-o/, yet its declension is typical of feminine nouns (for example in /kolja/, a boy's or a man's name). In contrast, Polish children have clearer input regarding declension and agreement, with more clear-cut correspondence between form and gender.

Another language that is acquired at an early stage in comparison to other languages with similar characteristics is Turkish. Aksu-koc & Slobin (1985) report that Turkish children acquire numerous grammatical morphemes at a very early age, as early as fifteen months. They also find that two-year-old children rely on inflections rather than word order for the identification of grammatical relations; many of these are suffixed to the noun. Japanese and Korean share this characteristic with Turkish, yet children acquire grammatical inflections later. Aksu-koc & Slobin (1985) point out that such findings could be due to the fact that Turkish grammatical morphemes are mainly obligatory in Turkish, whereas in contrast, many of these morphemes are optional in Japanese and Korean.

The Spanish gender system is also one of the early-acquired gender systems, according to Pérez-Pereira (1991). Spanish children learn the gender system at around three years of age, and master Spanish gender agreement by the age of four to five. Pérez-Pereira points out that masculine endings are more recognizable than feminine endings because the masculine form is unmarked and therefore easier to acquire.

A more recent study by Gathercole (2002) points out, based on the work of Hernández Pina (1984), that when grammatical genders are transparent, children do not have difficulty in accurately acquiring gender distinction at an early age. For example, in the case of the Spanish language, monolingual Spanish-speaking children usually work out the agreement rules between articles and nouns (the masculine article is /el/, and the feminine article is /la/) by thirty-one months of age and are able to choose an appropriate article on the basis of the endings of the noun by three to four years of age.

Previous literature also suggests that learning the gender system in grammatical gender languages can occur early. In fact, the phonological properties determining inflectional patterns are mastered between the ages of two and seven (Levy, 1983). Some influences on early acquisition are transparency and consistency of the system, as well as obligatoriness of morphemes. Cross-linguistic comparisons of children's gender system acquisition show that when these properties are not present, acquisition of gender can be a protracted process. For instance, Welsh gender acquisition is considered late in comparison with other languages. Gathercole, Thomas, & Laporte (2001) examine the acquisition of Welsh grammatical gender between the ages of 4;0 and 11;1. Their results suggest that up until the age of 9;0 children do not acquire the gender system expressed through "mutation". In general, masculine nouns do not undergo phonological changes because of their gender; feminine nouns do but only in certain contexts. The Welsh system is considered opaque because of complex form-function mappings concerning mutation. Children usually use the correct basic forms of nouns when the nouns are masculine. Yet feminine forms are not always used in the inappropriate forms. Overall,

the acquisition and development of complex and opaque gender systems are generally delayed in comparison to less complex systems (Gathercole, *et al.*, 2001).

Such evidence, indicating that the structure of the language plays a role in how easily children learn gender systems, is echoed in studies examining the acquisition of number systems.

1.2 Number acquisition

Number systems across languages differ in their divisions and formations. For example, English and Spanish number systems are divided into two categories--singular and plural, whereas the Arabic number system is divided into three--singular, dual, and plural. Studies that have investigated the acquisition of number across different languages report some differences in acquiring the system; some categories are acquired early, others late. The following studies indicate early number acquisition followed by later acquisition.

The acquisition of the English number system has been studied and described extensively. De Villiers & De Villiers (1986) report that children learning English as their first language start producing plural forms during the two-word stage. Robinson & Mervis (1998) report that plurals pass through a pre-plural stage when the plural morpheme is not used in obligatory contexts, usually before 1;6. Between 1;6 and 1;8, the plural morpheme appears to be used less than 90% of the time; by 1;8 to 1;11, correct plural forms are used over 90% of the time in obligatory contexts. Thus, by 2;0 children usually reach mastery of pluralizing in English. Leonard & Swanson (1999) report

similar results. Nevertheless, Ferenz & Prasada (2002) report that children as young as 1;9 can determine which form (singular or plural) to use in a sentence. Cohn (2001:202 – 203) notes, that children and adults apply the plural regular form to words that it does not apply to. For example, for “mice” many children will say “mouses” by adding the /s/ to the noun.

The primary means of encoding English plurals is the suffix /-s/. In other languages, alternative means of encoding number are often used. In French, articles are considered the primary source of information about number. A small number of nouns have a plural form that is pronounced differently from the singular, and these tend to end in /-al/ or /-ail/. Number appears to be acquired and mastered at an early age, with very few errors. One of the reasons for such early acquisition is probably that “noun forms themselves do not change in pronunciation with a change in number”, but instead are marked in the article (Clark, 1985). Thus, children acquiring French as a first language usually acquire the appropriate article at a young age.

Another language with early number system acquisition, Hungarian is an agglutinative language, with complex morphology and many suffixes. The plural suffix is /-ok/, and it emerges at around 1;10 (MacWhinney, 1985).

The modern Georgian plural is formed regularly, by adding a suffix /-eb-/. It is also acquired early; the first use of the plural suffix by one of the children investigated by Imedadze and Tuite (1992) occurs around the age of 1;9. By the age of 1;11 children overextend using the plural suffix on words that in adult utterances come in the singular form; they also pluralize mass nouns that do not take the plural form in adult language.

Finnish is also an agglutinative language with a rich suffixal inflection system; however, it is not always regular at every point. The regular plural is formed by adding */-t/* to the stem of the word, but other, less straightforward forms also occur in the language. Production of the plural suffix */-t/* emerges by the age of two (Toivainen, 1997: 90). While the first oblique plural form emerges around the age of three, such later acquisition could be due to the difficulty and complexity of the form (Dasinger, 1997: 75).

The Modern Greek (MG) number system is also divided into singular and plural, and again number is acquired early. Children learning Greek as a first language achieve consistent marking of number between 1;9 and 2;6. Number marking in MG is tied to gender and case. Distinctions between them appear when producing neuter and feminine nouns because these are more frequent in the language than masculine nouns (Stephany, 1997).

Looking at Hungarian, Finnish, and Georgian we can see that what we can call regular plural forms (i.e. forms that are shaped by adding an affix to the stem of words) emerge at approximately the same time in different number systems. Other number systems are reported to be learned late, with mistakes occurring at older ages. German number system is an example of such languages.

Park (1978) investigates the acquisition of plural in two German-speaking children and reports that the plural forms appear in obligatory contexts by the age of 2;7 to 3;5, and at this stage children usually apply the plural form instead of the singular in singular obligatory contexts. The late acquisition of the plural system in German could be because singulars and plurals often share the same surface endings. It appears difficult for

children to draw a distinction between the plural mark /-e/ of, e.g. *Hunde* “dogs” and *Hände* “hands”, from the ending of singulars such as *blume* “flower” and *hase* “rabbit”. At the beginning of acquiring the German plural system, children use the singular form where the plural is required, yet after the appearance of plurals in the children’s utterances, the plural is often used in place of the singular. For example, a child might say /*da kinder*/ (‘her children’) while pointing to a single doll, instead of /*da kind*/ (‘her child’).

Mills (1985) has also researched the German plural system, and found that during the one-word stage children produce nouns in singular forms, except for a few nouns that are normally used in the plural form. During the two-words stage nouns are still used in the unmarked singular form, along with a few plurals, yet forms appear to be rote-learned, not rule-produced. At the age of 4;0, children continue making mistakes by overgeneralizing the regular plural suffix /-en/. Even with unmarked pluralized nouns, for example, children will add the plural mark to them, indicating a tendency to mark all forms clearly. Mistakes are also reported in seven-year-olds’ utterances. Such results indicate that the earliest rules acquired are usually those applied to the greatest number of forms. In general, children learning the German plural system continue making mistakes even after the age of 11;0. Such late mastery of the system is likely to be because of “the complexity of the system and the lack of regularity, which makes the system appear late and to continue to be problematic for a considerable time” (Mills, 1985).

1.3 Verb Acquisition

Some studies that investigated the acquisition of language during the 1970s and early 1980s focused on the acquisition of verbs; yet, the researchers did not study verb acquisition as frequently as they studied the acquisition of nouns (Merriman & Tomasello, 1995). As with the acquisition of nouns, the acquisition of verbs depends on many factors that may prompt early or late acquisition. Cross-linguistic studies investigating the acquisition of verb systems have revealed different development time and patterns in children's mastering of the system across languages. For example, Braunwalad (1995) reports in her research that a child acquiring English as a first language starts producing verbs with correct word order by 1;7:4 of age; in general, the period between 1;7 to 2;0 of age demonstrates rapid verb acquisition. However, the knowledge of morphology is minimal. The English present tense inflection */-ing/* is reported to be used productively around the age of 3;1 to 3;8, several months earlier than the past tense inflection */-ed/* (Akhtar & Tomasello 1997). Nevertheless, Jeschull (2003) states that both the past and present tense inflections, as well as irregular forms, emerge at the same time, around stage one before the age of 2;0.

Gathercole, Sebastián & Soto (1999) examine the acquisition of the Spanish verb system, and indicate that at a young age children produce a wide range of verb structures in their speech, but most of these structures are not productive. Around the age of 1;11 verb productivity begins to emerge. A child learning Spanish as a first language shows productivity in infinitive, imperative, and third person singular present tense at the age of 1;11. The first person singular present becomes productive at around the age of 2;1. By

the age of 2;4, the second person singular becomes productive. The results also show a high percentage of errors, such as the use of the third person in place of the second, overregularizing, and other errors, between the ages of 1;6 and 2;6.

Looking at another language, Bantu, with early verb acquisition and a rich system of verbal inflectional morphology and a complex tense/aspect marking system, Demuth (2003) investigates the acquisition of Bantu and reports that by the age of 2;1 the present tense is produced frequently, and by the age of 2;5 the past continuous and recent past appear. Finally, the past tense emerges at around the age of 2;9. Overall, the Bantu verbal inflectional system is productive in children's language before the age of 3;0.

In a cross-linguistic study comparing French and Austrian German, researchers Bassano, Laaha Maillochon, & Dressler (2004) report that in both languages the imperative present is the first tense to be produced, and the singular forms appear in all tenses before the plural forms. However, the past tense emerges earlier in French than in Austrian German, possibly due to the complexity of Austrian German's past tense form. In general, the results indicate that French children have higher verb-token production than Austrian children in the second half of their third year.

We turn our attention now to other languages that have been shown to have later acquisition, such as Finnish and Greek. Finnish verb suffixes mark voice, mood, temporal relations, person and number, and nominalization. Toivainen (1997) reports that the third person singular forms and imperatives emerge by the age of 1;4, while the past tense form appears by the age of 1;8. Past tense negative suffixes are employed by around 2;0. By the age of 2;4, more verb suffix combination emerges; for example, the first person is

used in the past tense, while the passive form is produced in the plural form. Overall, the results indicate that the acquisition and mastery of Finnish verb suffixes continued beyond the age of 4;0.

Modern Greek is also acquired late, possibly due to the fact that its verb morphology is considered complex. Stephany (1997) investigates the acquisition of Modern Greek and reports that by 1;10 imperative mood occurs in the child's language, and by 2;4 imperfect past forms emerge. However, present and past perfect appear rarely until 3;2, while passive forms occur more frequently in the language of 3;0 year-olds. Stephany also indicates that singular verb forms are detected more frequently in children's language than are plural verb forms. On the whole, in Modern Greek the full adult language verb system is usually acquired by the age of 12;0 at the earliest.

Looking at the results of verb and noun acquisition across languages we can see that, in general, nouns are mastered before verbs. Such an idea is widely accepted; children are assumed to use object names in their early speech well before action words. However, Gopnik & Choi (1995) disagree with such claims. They have compared English and Korean children's language acquisition, and report that Korean-speaking children use verbs more frequently than English speaking children. They also compare Korean-speaking mothers' speech with English-speaking mothers' speech and the results show that Korean mothers produce more verbs than nouns, and also that they usually direct their children to engage in activities rather than to label objects. In general, Korean children acquire some verbs earlier than English-speaking children, while naming objects

appears later. Korean children also use verbs productively as young as 1;3 of age, and some of them acquire more verb types than nouns.

In another study investigating the acquisition of Korean, Kim (1997) indicates that both imperative and past-tense forms are acquired by children learning Korean as a first language by the age of 1;9 to 1;11. They also usually inflect the verb correctly with low errors; and errors are usually limited to very early stages. Kim's results also point out that Korean children neither overgeneralize nor omit inflections; their use of inflection is basically the same as the adult's from the earliest developmental stage. These results indicate that children are sensitive to concrete distributional characteristics of inflection in the input, rather than to an abstract characteristic of an inflectional paradigm such as the morphological uniformity condition (Kim, 1997).

The cross-linguistic results above show a strong correlation between the parent's frequent use of words and the age at which their children acquire words (Smiley & Huttenlocher, 1995).

1.4 Linguistic Characteristics Relevant to Understanding

Gender, Number, and Verb Acquisition

The acquisition of any language system is influenced by many factors. Looking at these different factors might help us understand the overall process of first language acquisition.

1.4.1 Language input and Child direct speech (CDS)

One of Chomsky's arguments was that the spoken language children hear is not always grammatically formed (because of slips of the tongue, pauses, the inconsistent use of number and tense, and so on). Therefore, such spoken language cannot provide an accurate guide to acquiring a given language. Such claims as this have prompted child language researchers to study adult speech and its effect on children (Harris, 1992). Consequently, many have challenged Chomsky's claims regarding the linguistic environment in which the child learns a language. Many have emphasized the characteristics of mothers' speech to their children (Furrow & Nelson, 1979) and pointed to the importance of this input and CDS on one's first language acquisition (Givón, 1985).

The first studies regarding mothers' speech to their young children were published in the early 1970s. Most of the results were consistent: the characteristics of the language used with children, in essence, were simplicity, brevity and redundancy (Harris, 1992). This indicates that when mothers address their children they usually modify their speech, which may help children comprehend and produce these language characteristics later on (Ervin-Tripp, 1971; Hu, 1994). According to Ervin-Tripp (1971) children are exposed to a great deal of speech that is not addressed directly to them, and they probably do not pay attention to uninteresting or overly complicated language. The most important part of the language input they are exposed to is the speech addressed to them. In addition to the characteristics of the mother's language, researchers have studied conversational

interaction between parents and children because these conversations are likely to be one of the foundations in the study of child language development. It is through such interactions that children are guided toward the acquisition of grammatical forms in their mother tongue (MacWhinney, 1994). Many cross-cultural studies have focused on the importance of language input and CDS in determining exactly what the child learns. Choi (1997), for example, investigates Korean and American caregivers' language input and CDS. Choi finds that Korean children are exposed to action verbs in language input and CDS more than Americans are, while Americans are exposed to nouns in their CDS more than verbs. As a result, Korean children talk more about actions than American children do.

Sandhofer, Smith & Luo (2000) similarly evaluate nouns and verbs in English and Mandarin-speaking parents' language input to their children between the ages of 0;11 and 2;11. Children learning English hear more nouns than verbs, while children learning Mandarin hear more verbs. The English-speaking children in this study produce more nouns, while children learning Mandarin produce more verbs.

Kolth, Janssen, Kraaimaat & Brutton (1998) investigate monolingual Dutch-speaking mothers and their interactions with their three-year-old children. They find that children whose mothers speak a lot with them and answer their questions with extensive explanations usually have high language levels. This finding also highlights the effect of language input and CDS on the richness of the child's language.

Wittek and Tomasello (2002) compare German children's use of tensed inflected forms. They point out that the German perfekt (present perfect) occurs more frequently in the language input and CDS than infinitives do. In their data, the perfekt is produced

productively earlier than infinitive constructions, even though both constructions are regularly formed. This study highlights the importance of language input and frequency of CDS for early acquisition and mastery of a linguistic form. In general, what children are exposed to or hear can affect how and what they learn; therefore language input and CDS usually plays an important role in language acquisition.

1.4.2 Input Frequency

Some suggest that input frequency is one of the determining factors in the acquisition of some linguistic forms (Moerk, 1992; Schlesinger, 1994). High frequency input helps the transfer of acquired linguistic forms from short-term to long-term memory as well as helping to provide a basis for recognition of concepts and rules. This might explain a child's ability to acquire and produce complex forms early when these forms are frequent in the input (Moerk, 1992).

Gathercole (1986) indicates that frequency of input is a major contributor to differences found in the acquisition of the present perfect between Scottish and American children. Scottish adults use the present perfect more frequently than American adults; and Scottish children learn the present perfect earlier than Americans. Gathercole argues, however, that input frequency interacts with other factors such as cognitive and syntactic simplicity and functional load, in determining what is learned early.

In addition, Moerk (1992: 98) indicates that "low input frequency results in slow improvement"; therefore, when mothers employ a form frequently in their language input, that form is usually acquired earlier by their children than other forms that are less

frequent in the input. For example, when the regular past tense is detected frequently in the input, the child examined in Moerk's study produces the regular past tense frequently and overregularizes few irregular forms. However, when the input is reduced, the child's production of regular past tense also lessens.

In their research on the acquisition of English plurals, Leonard & Swanson (1999) report that one of the factors that helps children acquire English plural noun inflection /-s/ prior to the third singular verb inflection /-s/ is input frequency. The noun plural inflection occurs more frequently in the input than the verb inflection (148 plural tokens vs. 9 verb inflections).

Ragnarsdottir, Simonsen & Plunkett (1999) state that while acquiring morphological Icelandic and Norwegian inflections, children acquire the morphemes repeated more frequently in the input earlier than other less-repeated morphological inflections.

Overall, frequency input seems to play a role in determining the early forms acquired (Gathercole, *et. al.*, 1999). On the one hand, through high-frequency input, children are able to categorise words and forms accurately; on the other hand, infrequent words are usually difficult to categorise (Mintz, 2003).

Looking at the evidence presented concerning input frequency, we can see how clear its importance is on early language acquisition. However, another frequency factor which may also have an effect on acquisition is form frequency in the language. This is where low frequency forms usually generate more errors than high frequency ones. For example, in Spanish, children mostly replace irregular suffixed forms with regular suffixed forms. This result, according to Clahsen, Aveledo & Roco (2002), can be linked

to the fact that there are relatively few (approximately 30) verbs that take irregular suffixes. Therefore, children do not have many opportunities to foster associative generalizations. They have more opportunity with regular suffixed forms.

On the one hand, grammar acquisition order probably reflects the frequency of specific grammatical forms in the input; on the other hand, it could suggest that such order may reflect the linguistic complexity of the form acquired (Messer, 1994).

1.4.3 Linguistic Complexity and Irregular-Acquisition

Two assumptions are made about linguistic complexity. The first assumption is that complex sentences (forms) involve more effort to comprehend and produce than less complex sentences. The second assumption is that children learning a first language usually acquire less complex sentences before more complex forms and sentences (Smith and Kleeck, 1986). However, forms that are frequent in language input and have complex forms are not necessarily acquired later than frequent simple forms (Gathercole, *et al.*, 1999). Irregular forms could be considered one of the complicated forms in a language (Dabrowska, 2001) and they are not usually learned later than regular forms. In fact, they might be used appropriately earlier on, as some studies have indicated.

Many studies have examined the acquisition of regular and irregular forms in different grammatical categories in different language systems, and most agree on the later mastery of irregular forms. Accordingly, Slobin (1971, a) examines the acquisition of English regular and irregular past tenses and reports that English-speaking children use the irregular past tense correctly at an early stage. For example, they are able to say *fell*,

broke, and *went* correctly. However, when they learn regular past tense forms by adding /-ed/ to the verb, as in *walked* and *helped*, children tend to replace the correct irregular form to the incorrect regular form by inflecting it with the past tense suffix /-ed/, making them likely to say "broke~~d~~" instead of *broke*, and "goe~~d~~" instead of *went*. State (1971) indicates that irregular past tense forms occur more frequently in the input than regular forms do, which may be one of the reasons behind the early production of irregular forms.

Kuczaj (1977) also investigates the acquisition of English past tenses and the results show that children master the regular form by the age of 3;0. In contrast, irregular past tense forms are mastered later than the regular. Portuguese also has irregular forms in its linguistic system. Simoes & Stoel-Gammon (1979) report that Brazilian children in general memorize the irregular forms and go through different stages in order to master them: stage one repeating irregular forms; stages two to four indicate irregular forms which are regularized by applying different regular marks; and stage five is the final memorization of irregular forms.

In general, complex irregular forms are difficult to acquire and are therefore mastered later than regular forms. Nevertheless, regular forms may be mastered earlier than irregulars because they could be considered transparent.

1.4.4 Transparency

The children's errors highlight the effect of transparency in that children usually show stronger performance while producing transparent forms. For example, Dabrowska

(2001) points out that children learning the Polish genitive plural show a strong performance in the transparent forms (forms ending with an overt ending /-ów/) in comparison to stem alteration. Demuth (2003) also indicates that learning complex morphological paradigms is easy when they are transparent. Transparency and complexity of form could possibly be linked to each other; thus, a form that is usually transparent is, more often than not, considered ‘uncomplicated’.

One final characteristic to be considered when aiming to discuss the acquisition of morphology is whether a form is productive to the child.

1.4.5 Language Productivity

“Language development is reflected in the appearance of productive forms” (Furrow & Nelson, 1979). Productivity is “the extent to which a particular word-formation device can be used to form new words” (Clark, 1985: 759). Many have argued that children begin producing words with many rote learned or formulated “island constructions” during the preschool years. Children between the ages of three and five years move beyond island constructions, showing evidence of more abstract linguistic constructions (Tomasello & Brooks, 1999). Linguistic productivity truly flourishes when children begin to extract different patterns across words (nouns, verbs, and so forth). In general, when a grammatical form is productive in the child’s utterance, s/he will probably be able to apply the same rule to other different words and utterances.

Many researchers have suggested multiple ways of assessing productivity at early stages. In a study by Gathercole, Sebastián & Soto (1999; 2000) to determine the early command and productivity of Spanish verb forms, two monolingual Spanish children

between 1;6 and 2;6 years of age are examined. The researchers find that by 1;6 to 1;8, verbs occur only in a single form, indicating that the first use of verb forms is restricted. By 1;10 to 1;11, some of the verbs occur in different forms; for instance, one verb may be used in the third person singular present tense and another verb form may be used only in the imperative form. The results also indicate that the development of forms within the verb paradigm does not appear to occur suddenly, even within a given inflectional morpheme. For example, the development of the productive command of the first person singular within one tense does not guarantee the productive use of the same verb within another tense. In general, the results of Gathercole, *et al.* (1999) suggest that command of a full productive system does not occur at a very young age, and it only takes place after accumulation of some contrastive forms of a given type.

On the whole, acquiring grammatical systems is affected by many factors. The rate and order of acquiring a gender system in a language is likely to differ among languages depending on the characteristics of the system itself: whether the system is transparent or opaque, frequently used, and so forth. Each and every grammatical aspect of a language differs within the same language. For example, a grammatical gender system could be formed regularly, while the number system of the same language is formed irregularly. The acquisition of many languages has been examined and reported, but to date few studies have been conducted on Arabic in general and the Saudi dialect in particular. The following chapter will first describe the Arabic gender, number, verb, and adjective systems, and then present the results of some existing studies that have been carried out regarding the acquisition of Arabic.

Overall, acquiring and mastering the gender and number grammatical systems (or any linguistic form) differs across languages. For example, English gender is acquired later than the German gender system, because the German gender is marked in many parts of speech (Mills, 1985. and Corbett, 1991). Polish is mastered earlier than Russian; one of the reasons behind this result is the fact that Polish have a clear-cut correspondence between form and gender in comparison to Russian (Smoczynska, 1985). Turkish grammatical morphemes are acquired earlier than the Japanese and Korean, because many of the Turkish morphemes are obligatory in the language, yet optional in Japanese and Korean (Aksu-koc & Slobin, 1985). Spanish gender system is also acquired and mastered at an early age, between the ages of two and five Pérez-Pereira (1991).

The early acquisition detected across languages is due to many reasons such as transparency and consistency of the system, as well as obligatoriness of morphemes. However, when a gender system is opaque and complex it is usually acquired late, where errors occur beyond the age of six, as detected in the acquisition of Welsh (Gathercole, *et al.*, 2001; and Thomas, 2001).

Studies of the acquisition of number systems across languages show that number in English, French, Hungarian, Georgian and Greek is acquired around the age of two and six months, while the German number system is mastered around the age of eleven, which is due to the complexity of the system and its lack of regularity (Mills, 1985).

On the whole, acquiring grammatical systems is affected by many factors. The rate and order of acquiring a gender system in a language is likely to differ among languages depending on the characteristics of the system itself: whether the system is transparent or

opaque, or frequently used. Even within a single language, one system can be learned early while another can be learned late. For example, a grammatical gender system could be formed regularly, while the number system of the same language is formed irregularly. The acquisition of many languages has been examined and reported, but to date few studies have been conducted on Arabic in general and the Saudi dialect in particular. The following chapter will first describe the Arabic gender, number, verb, and adjective systems, and then present the results of some existing studies that have been carried out regarding the acquisition of Arabic.

Chapter 2

Arabic noun gender and number systems

2.0 Introduction

In this chapter, the Arabic gender and number systems (forms investigated in this research) in the classical and the Saudi vernacular are presented.

2.1 The Arabic Language

During the pre-Islamic era (before the fifth and sixth centuries AD), the Arabic language is spoken primarily in the Arabian Peninsula. Arabs comprised of different tribes. Each tribe had its own culture and colloquial language; although they spoke dialects of the same language, they did not pronounce it in the same way (Hijazey, 1978).

Some of these tribes settled and lived in cities. They were called *hādharī* ('city people') حضر. The other tribes moved from one part of the Arabian peninsula to the other, searching for water and food in the large deserts of the Arabian land. These travelling tribes were called *badī* ('Bedouins') بدو. These different tribes came together to trade amongst each other on big market days. During these days, poets recited their poetry before critics and judges, and it was during this time that a joint language began. It had features of every Arabic colloquial variety, and it came to be considered the best form of

Arabic. They called it */alfushah/* ('the clear language'). */alfushah/* was closest to the colloquial language of the */qurayf/* tribe, who lived in the city of *Makkah*, and it was used by the Arab tribes when they were communicating in literature or in political gatherings. However, when they were talking in their daily lives they would use their tribes' colloquial dialects (Shaheen, 1990). This linguistic situation is called Diglossia.

Diglossia was defined for the first time by Ferguson (1959) as a linguistic situation in which two divergent varieties of the same language co-occur within the same community and serve different communicative functions. Matthews (1997) further defined it as a case in which a community uses two distinct forms of the same language, in which one is acquired before formal education and is appropriate to one range of contexts, and the other is acquired by education and is appropriate to another range of contexts. In languages with two varieties existing side-by-side, one is considered a "high" variety and the other a "low" variety. The high variety is not restricted to any geographical area or social class because it is taught to everyone who goes through the educational system. The high variety is used in official contexts and in a formal style, and the low variety is used in domestic contexts and with an informal style (Wilce, no date).

In olden days poets and speakers used */alfushah/* whether they were from */qurayf/*, *tamim*, *huḍayf*, or other Tribes living in the Arabian Peninsula. */alfushah/* started, developed, and prospered long before Islam. When the Arabs talked using */alfushah/*, it was difficult to tell which tribe the speakers were from because it did not have any of the native colloquial language's special characteristics (Al-Janaby, 1981). The same situation still exists in the Arabic speaking world where modern Arabic diglossia shows that */alfushah/* tends to be used only in formal situations, such as lecturing in a classroom, at

work, on the radio, and on television, and it is mostly used by teachers and radio or television broadcasters. In general, */al fushah/* is viewed as suitable for official and educational functions, and not suitable for domestic and daily life use (Sawaie, 1988).

During early school years, the majority of children are faced with a major new task: learning the written form of their language. For most Arab children, in addition to learning the written form they are also faced with a different form of spoken language */al fushah/*. However, many Arab children are exposed to */al fushah/* during their early years while watching television, since most children's programs and animated films in many Arab countries are presented in */al fushah/* rather than in vernacular dialects.

In the following section, the structure of Arabic gender and number systems are presented in the confines of the Diglossia situation. Verb and adjective agreement with gender and number will also be presented.

2.2 Noun Gender Patterns

All Arabic nouns are either masculine or feminine. Masculine nouns are unmarked for gender, while most feminine nouns are marked for gender by overt gender markers. Arabic feminine nouns follow four patterns: nouns marked as feminine by a suffix; collective nouns; inanimate feminine nouns with no overt gender marking; and pairs of unrelated words, one referring to a male animate and the other referring to a female animate. The first three patterns are tested in this research.

2.2.1 First Pattern: Nouns Marked as Feminine by a Suffix

There are three feminine overt gender suffixes: first, the */-at/* or */-ah/* suffix (examples given in Table (1)) with the suffix sometimes changed into */-ah/*; second, the */-a/* suffix; and third, the */-a:ʔ/* suffix. The acquisition of only the first suffix is tested in this research; */-atu/* for example, is shown in Table 1:

Table 1: Example of feminine marked nouns and masculine unmarked nouns

	Human		Animal		Inanimates	
	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine
Morpho-phonemic	<i>/malik-ah/</i>	<i>/malik/</i>	<i>/qit-ah/</i>	<i>/qit/</i>	<i>/ma:ʔid-ah/</i>	<i>/kursi/</i>
English	queen	king	cat-f	Cat	table	chair
Arabic	ملكة	ملك	قطه	قط	مائدة	كرسي

This pattern applies to all animacies (human, animal, and inanimate); however, the other patterns are not applied to all three animacies, as shown below.

2.2.2 Second Pattern: Collective Nouns

Some animal and inanimate object nouns are marked with the feminine overt gender suffix */-ah/*; in this case it encodes a singular meaning. However, when the suffix is omitted, the noun encodes the plural meaning as shown in Table 2:

Table 2: Example of animal and inanimate collective nouns

	Animals		Inanimates	
	Feminine- sg	Masculine - pl	Feminine- sg	Masculine - pl
Morpho-phonemic	<i>/baqarah/</i>	<i>/baqar/</i>	<i>/naxlah/</i>	<i>/naxal/</i>
English	One cow	More than 2 cows	One date tree	More than 2 date trees
Arabic	بقرة	بقر	نخلة	نخل

2.2.3 Third Pattern: Inanimate Feminine Nouns with No Overt Gender

Marking

A few inanimate feminine nouns are unmarked for gender. Most of these nouns are names for body parts, the sun, and the earth for example, */ʕayn/* eye عين , and */ʃams/* sun شمس .

All Arabic nouns (all patterns), adjectives, verbs, adverbs, and pronouns come either in a singular, dual, or plural forms. In the next section number forms are presented.

2.3 Number System

There are three number divisions in the Arabic language: singular, indicating one thing; dual, indicating two things; and plural, indicating three things or more things.

2.3.1 Singular Forms

All masculine and feminine singular forms are unmarked for number, as shown in the example in Table 3:

Table 3: Examples of masculine and feminine singular forms

	Human		Animal		Inanimates	
	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine
Morpho-phonemic	<i>/mudaris-ah/</i>	<i>/mudaris/</i>	<i>/nimr-ah/</i>	<i>/nimr/</i>	<i>/madi:n-ah/</i>	<i>/ʒabal/</i>
English	a female teacher	a male teacher	tigress	tiger	city	mountain
Arabic	مدرسه	مدرس	نمره	نمر	مدينة	جبل

All three animate (human and animal) and inanimate noun categories are investigated in this research. For the animal category in */alfushah/*, in some cases the feminine is formed by adding the word “feminine” to the noun, as shown in the example in Table 4:

Table 4: Example of masculine and feminine animal forms

	Masculine	Feminine
Morpho-phonemic	<i>/batrɪq/</i>	<i>/ʔunta al batrɪq/</i>
English	Penguin	(female a penguin) a female penguin
Arabic	بطريق	انثى البطريق

Nevertheless, in most vernacular dialects, the feminine suffix */-ah/* is added to the stem of the word to indicate femininity, as shown in Table (3) above.

2.3.2 Dual Forms

Both feminine and masculine nouns are marked as dual and are formed by adding the suffix */-a:n/*. However, the feminine form contains the feminine and the dual marks */-at-a:n/*, where the */-at/* is the feminine mark and */a:n/* the dual. The masculine form is marked only for number, as shown in Table 5:

Table 5: Examples of masculine and feminine dual forms

	Human		Animal		Inanimates	
	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine
Morpho-phonemic	<i>/mudaris-at-a:n/</i>	<i>/mudaris-a:n/</i>	<i>/nimr-at-a:n/</i>	<i>/nimr-a:n/</i>	<i>/madi:n-at-a:n/</i>	<i>/ʒabal-a:n/</i>
English	two female teachers	two male teachers	tigress-du	tiger-du	city-du	mountain-du
Arabic	مدرستان	مدرسان	فمرتان	فمران	مدینتان	جبلان

2.3.3 Plural Forms

The Arabic plural noun takes one of two possible forms:

sound plural forms, and broken plural forms.

2.3.3.1 Sound plural Forms

Under this possibility, adding a suffix to the base of the noun forms the plural. The masculine sound plural is formed by adding */-u:n/*, and it is only applicable to human nouns. The feminine sound plural is formed by adding */-a:t/* to the base of the noun, and it is applicable to all feminine animacys, as shown in Table 6.

Table 6: Examples of feminine and masculine sound plural nouns

	Human		Animal		Inanimates	
	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine
Morpho-phonemic	<i>/mudaris -a:t/</i>	<i>/mudaris -u:n/</i>	<i>/nimir-a:t/</i>	-	<i>/sajar-a:t/</i>	-
English	teachers	teachers	tigresses	-	Cars	-
Arabic	مدرسات	مدرسون	نمرات	-	سيارات	-

2.3.3.2 Broken Plural Form

In this case the root of the noun changes internally for the broken forms, and these forms are applicable to all noun categories: masculine and feminine; and human, animal, and inanimate. Relevant examples are shown in Tables 7 and 8.

Table 7: Examples of masculine broken plurals

	Human masculine		Animal masculine		Inanimate masculine	
	singular	broken plural	singular	broken plural	Singular	broken plural
Morpho-phonemic	<i>/tabib/</i>	<i>/atibb:a2/</i>	<i>/kalb/</i>	<i>/kila:b/</i>	<i>/bustan/</i>	<i>/basatin/</i>
English	a doctor	doctors	a dog	dogs	a garden	gardens
Arabic	طبيب	أطباء	كلب	كلاب	بستان	بساتين

Table 8: Examples of feminine broken plurals.

	Feminine animal		Feminine inanimate	
	singular	broken plural	singular	broken plural
Morpho-phonemic	/qɪʔ-ah/	/qɪʔaʔ/	/sur-ah/	/suwar/
English	a cat	cats	a picture	Pictures
Arabic	قطه	قطط	صورة	صور

Broken plurals have many patterns, depending on the root of the word (three-, four-, or five-consonant root words). Approximately 64% of the roots are composed of three consonants (Khoja, Garside, and Knowles, 2001). There are approximately fifteen patterns for the three-consonant root words, and many of these fifteen patterns have two or more forms. Four-consonant root words have about six patterns, and the five-consonant root words have about three patterns (Al-Yaseen, 1996).

Under some conditions nouns do not take the plural form when following certain numerals (eleven and above).

2.3.4 Quantified Nouns

In the quantified noun category, when the numbers three to ten precede the noun, the noun takes a plural form. For example:

/sabʔ ʔawla:d/

seven boy-pl

Seven boys.

On the other hand, when the numbers eleven and above precede the noun, the noun takes a singular form. For example:

/iθna ʃafara waladan/

two – ten boy-sg

Twelve boys. (Greenberg, 1978; b)

In the next section, adjective and verb structures are presented.

2.4 Adjectives

In Arabic, adjectives agree with the gender and number of the nouns.

2.4.1 Adjectives in Agreement with Noun Gender

The Arabic adjective is in agreement with the noun gender and its number (singular, dual, and plural), as shown in Table 9:

Table 9: Examples of human singular adjectives

	Human	
	Feminine	Masculine
Morpho-phonemic	<i>/al bintu hazin-ah/</i>	<i>/al waladu hazin/</i>
English	the girl sad-f the girl is sad	the boy sad the boy is sad
	Animal	
Morpho-phonemic	<i>/al zaraʔa-tu kabir-ah/</i>	<i>/al hisanu kabir/</i>
English	the giraffe-f big-f the giraffe is big	the horse big the horse is big

	Inanimates	
Morpho-phonemic	<i>/sajara-ah saʕira-ah/</i>	<i>/kita:b sayir/</i>
English	car-f small-f a small car	book small a small book

2.4.2 Adjectives in Agreement with Genders and Numbers (Dual and Plural)

Adjectives are also in agreement with duals and plurals, because they are marked for both. Dual adjectives are marked with the suffix */-a:n/*, as shown in table 10:

Table 10 Examples of human, animal and inanimate dual adjectives

	Human	
	Feminine	Masculine
Morpho-phonemic	<i>/al bint-a:n hazin-at-a:n/</i>	<i>/al walad-a:n hazin-a:n/</i>
English	the girl-du sad-f-du the two girls are sad	the boy-du sad-du the two boys are sad
	Animal	
Morpho-phonemic	<i>/al zaraf-at-a:n kabir-at-a:n/</i>	<i>/al hisan-a:n kabir-a:n/</i>
English	the giraffe-f-du big-f-du the two giraffes are big	the horse-du big-du the two horses are big
	Inanimate	
Morpho-phonemic	<i>/sajara-at-a:n sayira-at-a:n/</i>	<i>/kita:b-a:n sayir-a:n/</i>
English	car-f-du small-f-du two small cars	book-du small-du two small books

The adjective dual form is not frequently used in Arabic vernacular dialects.

Adjective agreement with plurals:

Adjectives are in agreement with noun plural forms. Adjectives referring to human masculine nouns take both sound and broken forms, as shown in Table 11 below.

However, adjectives referring to human feminine nouns take the feminine sound forms, as shown in an example given in Table 12. Animal and inanimate feminine and masculine adjectives take only the feminine singular form, as shown in Tables 13 and 14.

Table 11: Examples of adjectives referring to human masculine nouns in both sound and broken forms

Human		
	Sound adjective masculine form	Broken adjective masculine form
Morpho-phonemic	<i>/al 'awla:d hazana/</i>	<i>/al mu'alim-u:n tuwa:l/</i>
English	the boys-pl,br sad-pl,br the boys are sad	the teachers-pl-sa tall-br-pl the male teachers are tall

Table 12: Example of adjectives referring to a human feminine noun

Human	
	Sound adjective feminine form
Morpho-phonemic	<i>al banat hazin-at/</i>
English	girls-pl sad-pl the girls are sad

Table 13: Examples of animal plural adjectives

Animal		
	Feminine	Masculine
Morpho-phonemic	<i>/al zara'-at kabira-ah/</i>	<i>al 'ahsinah kbir-ah/</i>

	Animal	
	Feminine	Masculine
English	the giraffe-f,pl big-f,sg the giraffes are big	the horse-pl,br big-f,sg the horses are big

Table 14: Examples of inanimate plural adjectives

	Inanimates	
	Feminine	Masculine
Morpho-phonemic	<i>/al saʒara-a:t kabir-ah/</i>	<i>al kutub-sayir-ah</i>
English	car-fpl small-f,sg small cars	book-pl,br small-f,sg small books

In the previous examples regarding adjective agreements, suffixes are used to indicate gender and number. Verbs, on the other hand, are marked with prefixes and suffixes to indicate gender and number, as is shown next.

2.5 Verbs

Arabic verbs are also in agreement with the gender and number of nouns.

2.5.1 Verbs in Agreement with Noun Gender

Arabic verbs come in three tenses: past, present, and imperative. The masculine past tense is unmarked for gender or number, while the feminine form is marked for gender by a suffix *-t*. The masculine present tense is marked for gender by a prefix */ja-*, the feminine present tense is also marked for gender by a prefix */ta-*. The masculine

imperative is unmarked, while the feminine imperative is marked by a suffix */-i/*, as shown in Table 17.

2.5.2 Verbs in Agreement with Gender and Number (Dual and Plural)

Verbs are also in agreement with duals and plurals. Dual verbs are marked for number by the suffix */-an/* for both feminine and masculine and on all animacy types (human, animal, and inanimate). Present tense dual verb forms are also marked by the suffix */an/*. The masculine plural verb forms are marked by a suffix */-u/*. The feminine plural verb forms are marked by a suffix */-n/*. Feminine imperative verb forms are marked for gender by a suffix */-n/*, as shown in Table 15.

Table 15: Examples of Arabic verb tenses

	Feminine	Masculine
Past (went)		
sg	<i>/ðahab-at/</i> went-f ذهبت	<i>/ðahab/</i> went ذهب
du	<i>/ðahab-at-an/</i> went-f-du ذهبتنا	<i>/ðahab-an/</i> went-du ذهبنا
pl	<i>/ðahab-n/</i> went-fpl ذهبن	<i>/ðahab-u/</i> went-pl ذهبوا
Present (going)		
sg	<i>/ta-ðahab/</i> f-going	<i>/ja-ðahab/</i> m-going

	Feminine	Masculine
du	تذهب <i>/ta-ðhab-a:n/</i> f-going-du	يذهب <i>/ja-ðhab-a:n/</i> m-going-du
pl	تذهبن <i>/ta-ðhab-n/</i> f-going-pl	يذهبن <i>/ja-ðhab-u:/</i> m-going-pl
Imperative (go)		
sg	إذهبي <i>/iðhab-i/</i> go-f	إذهب <i>/iðhab/</i> go
du	إذهبا <i>/iðhab-a:/</i> go-du	إذهبا <i>/iðhab-a:/</i> go-du
pl	إذهبن <i>/iðhab-n/</i> go-fpl	إذهبوا <i>/iðhab-u:/</i> go-mpl

Verbs are in agreement with noun gender, singular, and dual form for all animacy types (human, animal and inanimates). Plural forms of verbs are also in agreement with human nouns, whereas with animal and inanimate nouns verbs take the feminine singular form even if the noun is masculine and in a plural form, as shown in Table 16:

Table 16: Examples of verbs referring to animal and inanimate plural nouns

	animal	Inanimates
Morpho-phonemic	<i>/al ʔusu:du ta-ʔkul/</i>	<i>/al ʕaqla:mu taktub/</i>
English	The lions-pl,br fsg-eat The lions are eating.	The pens-pl-br fpl-writ The pens are writing

All of the above forms apply to classical Arabic. However, spoken dialects vary from classical, as shown in the next section.

2.6 The Arabic Vernacular

Modern Arabic vernacular dialects were established by the interaction between */al fushah/* Arabic, the old Arabic vernacular dialects, and the languages of the countries into which the Arabs spread Islam (Qasim, 1983).

Bentahila (1983) reports some considerable differences between */al fushah/* Arabic and Moroccan colloquial Arabic in terms of phonology, grammar and vocabulary. Some of the phonemes of */al fushah/* Arabic have no counterparts in colloquial dialects, which also lack many of the inflections of */al fushah/*, and some of the vocabulary differs between the two varieties of the language. There are also differences between */al fushah/* and vernacular Arabic in gender and number.

2.6.1 The Saudi Arabic Vernacular

2.6.1.1 Nouns

Nouns in the vernacular Arabic share many characteristics of */al fushah/* Arabic, though in some cases people add the feminine morpheme */-ah/* when it is not needed, because there is a difference in the noun form between the masculine noun and the feminine noun, for example:

Groom */ʕariz/* عريس

Bride (cl) */ʕarus/* عروس

Bride (vr) */ʕarusah/* عروسه

2.6.1.2 Numbers

For nouns, number divisions in the vernacular are the same as in */al fushah/* Arabic.

For adjectives and verbs, however, the dual is not marked in the vernacular dialects.

Here, verbs take the masculine plural forms, as shown in Table 17:

Table 17: Examples of masculine dual verbs in the vernacular dialect

Masculine		
	<i>/al fushah/</i>	Vernacular
Morpho-phonemic	<i>/al walad-a:n na:ʕim-a:n/</i>	<i>/al walad-i:n nai:m-i:n/</i>
English	The boy-du sleeping-du The 2 boys are sleeping.	The boy-du sleeping-pl The 2 boys are sleeping.

Feminine plural verbs are marked with masculine plural forms in the vernacular dialect, as shown in Table 18:

Table 18: Examples of feminine dual verbs in the vernacular dialect

Feminine		
	<i>/al fushah</i>	Vernacular
Morpho-phonemic	<i>/al ban-at xarag-na/</i>	<i>/al ban-at xarag-u/</i>
English	The girl-f,pl went out-f,pl. The girls went out.	The girl-f,pl went out-m,pl. The girls went out.

In these two examples, the subjects and verbs are in agreement in the */al fushah/* form, while subjects are not in agreement with number or gender in the vernacular forms.

2.7 Summary

In this chapter, the Arabic noun gender patterns and the number systems investigated as part of this research have been presented, and the agreement of adjectives and verbs with noun gender and number in */al fushah/* and in the Saudi vernacular dialects in general have been discussed.

Children are exposed to */al fushah/* less frequently than the vernacular dialects; */al fushah/* becomes a more frequent part of language input when children begin their formal education (by the age of six), and by the age of ten (fourth grade) they start studying */al fushah/* grammar. As with any language, Arabic has some straightforward and transparent grammatical forms, including the sound plural (others such as the broken plural forms are more complex); moreover, some forms appear more frequently in the language input, as in the case of plural verb forms, while others appear less frequently, as in the case of dual verb forms. Both varieties interact side by side around Arabic-

speaking children, who are required to comprehend and produce both varieties in appropriate situations.

Overall, the vernacular dialects share many characteristics with */alfushah/*. For example noun gender categories in all number forms are identical. See matrix (1), where it shows that the singular, dual, and plural forms are used in correspondence with human feminine and masculine nouns, and with animal feminine and masculine nouns in both varieties (*/alfushah/* and the vernacular).

Matrix (1). The similarities and differences between classical Arabic and the Saudi vernacular dialect for noun gender and number.

	Type of dialect	Feminine nouns		Masculine nouns	
		H	A	H	A
Singular	ver ³	Fsx	u	u	u
	cla	Fsx	u	u	u
Dual	ver	Fsx+Dsx	Fsx+Dsx	Dsx	Dsx
	cla	Fsx+Dsx	Fsx+Dsx	Dsx	Dsx
Plural	ver	Fplsx	Fplsx	Mplsx or Brpl	Brpl
	cla	Fplsx	Fsxpl	Mplsx or Brpl	Brpl

³ Abbreviations used for matrixes (1)

ver = Vernacular. cla = Classical.

Fsx = feminine suffix.

Dsx = dual suffix.

Fplsx = feminine plural suffix.

Mplsx = masculine plural suffix.

Brpl = broken plural form.

u = unmarked for gender or number.

However, there are some differences between the /*alfushah*/ and the vernacular when it comes to verbs, see matrix (2). Where singular forms with both genders and all animacies are identical. The dual is only obligatory in the /*alfushah*/ but not in the vernacular dialect, instead the masculine plural form is used. Plural forms are identical within all animacies except for the human feminine form, where the masculine plural form is usually used in place of the feminine plural form.

Matrix (2): The similarities and differences between classical Arabic and the Saudi vernacular dialect for verb gender and number.

	Type of dialect	Feminine verbs			Masculine verbs		
		H	A	In	H	A	In
Singular	ver ⁴	Fpx	Fpx	Fpx	Mpx	Mpx	Mpx
	cla	Fpx	Fpx	Fpx	Mpx	Mpx	Mpx
Dual	ver	-	-	-	-	-	-
	cla	Fpx+Dsx	Fpx+Dsx	Fpx+Dsx	Mpx+Dsx	Mpx+Dsx	Mpx+Dsx
Plural	ver	Mpx+Mplsx	Fpx+Fsgsx	Fpx+Fsgsx	Mpx+Mplsx	Fpx+Fsgsx	Fpx+Fsgsx
	cla	Fpx+Fplsx	Fpx+Fsgsx	Fpx+Fsgsx	Mpx+Mplsx	Fpx+Fsgsx	Fpx+Fsgsx

⁴ Abbreviations used for matrix (2).
 ver = Vernacular. cla = Classical. Fpx = feminine prefix. Mpx = masculine prefix.
 Dsx = dual suffix. Mplsx = masculine plural suffix. Fplsx = feminine plural suffix
 Fsgsx = feminine singular suffix. - = the form does not occur in the language input.
 The highlighted forms are the forms that differ between the two varieties.

The adjective singular forms are also identical in both varieties as shown in matrix (3), while the dual differs, and in this case the masculine plural form is used in place of the dual. However, plural forms are identical across gender and animacy, except in the vernacular with the human feminine form, the masculine plural could be used in place of the feminine and is considered appropriate. This case is to some extent different from the verb situation, because verbs referring to human feminine forms do not exist in the CDS and it is always substituted with the plural masculine form in the vernacular dialect. Yet, the plural adjective feminine form is used in the input and CDS in alteration with the plural adjective masculine form.

Matrix (3). The similarities and differences between classical Arabic and the Saudi vernacular dialect for adjective gender and number.

	Type of dialect	Feminine adjectives			Masculine adjectives		
		H	A	In	H	A	In
Singular	ver ⁵	Fsx	Fsx	Fsx	u	u	u
	cla	Fsx	Fsx	Fsx	u	u	u
Dual	ver	-	-	-	-	-	-
	cla	Fsx+Dsx	Fsx+Dsx	Fsx+Dsx	Dsx	Dsx	Dsx

⁵ Abbreviations used for matrix (3).

ver = Vernacular.

cla = Classical.

Fsx = feminine suffix.

Dsx = dual suffix.

Fplsx = feminine plural suffix.

Mplsx = masculine plural suffix.

Fsgsx = feminine singular suffix.

Brpl = broken plural form.

u = unmarked for gender or number.

- = the form does not occur in the language input.

The highlighted forms are the forms that differ between the two varieties.

	Type of dialect	Feminine adjectives			Masculine adjectives		
		H	A	In	H	A	In
Plural	ver	Fplsx or Mplsx or Brpl	Fsgsx	Fsgsx	Mplsx or Brpl	Fsgsx	Fsgsx
	cla	Fplsx	Fsgsx	Fsgsx	Mplsx or Brpl	Fsgsx	Fsgsx

The acquisition of Arabic has not been studied thoroughly. To date, few studies have been conducted on the acquisition of different Arabic dialects. Some of these studies are presented in the next chapter.

Chapter 3

Review of Related Research

3.0 Introduction

In the preceding chapter, Arabic gender and number systems were presented, as were adjective and verb agreement systems. In this chapter, the small amount of research conducted to date on the acquisition of Arabic gender and number systems is presented and reviewed. Specifically, six studies related to this research are discussed. Significantly, only one of these six was conducted on the comprehension of the Saudi dialect.

3.1 Acquisition of Arabic

Omar (1969) investigates the developmental stages of acquiring the Arabic Egyptian dialect as a native language. Thirty-seven monolingual Egyptian Arabic-speaking children, ranging in age from six months to fifteen years are studied. Children's spontaneous speech was observed and tape-recorded, and through tests of imitation, comprehension, and production, their language development was tested. Adults from the same speech community as the children were also interviewed to determine the social attitudes that may affect language acquisition. Some of the results of this study provide information on the development of number and gender. The first stage of using the dual form is the use of the numeral two followed by the uninflected singular noun for example, */itnin kalb/* ('two dog') for the correct form */kalb-in/* (dog-du) ('two dogs')

كلين . This pattern appears at around four to five years of age. The second stage is the use of the numeral two followed by a pluralized noun--for example: */itnin kilab/* ('two dogs', pl-br). This pattern is used mostly by five-year-olds, sometimes along with stage one. The dual suffix */-in/* is acquired late and does not appear consistently until about the ages of five to six. "Most children older than age 6;6 used the dual in alternation with the construction of numeral two plus noun, tending to dualize real and familiar nouns, more often than unfamiliar and nonsense nouns" (Omar, 1969: 380). This is considered stage 3, and once the dual suffix is acquired it is used accurately.

The development of the use of plurals is also studied in Omar's research. The youngest age group in the study does not inflect nouns for the plural. Thus, stage one can be considered use of the uninflected forms. Stage two starts when the plural form is acquired; overgeneralization occurs during this stage with the feminine suffix */-at/*, but never with the masculine suffix. This is most likely due to the fact that sound masculine plural forms are restricted to human masculine nouns, while the regular (sound) feminine suffix is used with all nouns types (animate and inanimate). These results also show that in general when children learn the irregular (broken) plural forms they do not "back slide" into overregularizing irregular plurals once these are learned. All children in this study pluralize nonsense nouns in the sound feminine form.

Overall, according to Omar, pluralizing nouns is the most difficult and latest aspect of the language structure to be mastered; older children err while pluralizing even familiar nouns. Correct irregular plural nouns are acquired item-by-item, just as singular vocabulary words are.

This research also sheds light on the development of the use of nouns with numerals (quantified nouns). When the numerals three to ten come before nouns, young children use the singular noun form instead of the plural form; for example, a child might substitute */talata kalb/* ('three dog') for the correct form */talata kilab/* ('three dogs', pl, br). However, when numerals eleven or above come before the noun, younger children use the correct singular noun form. This is because children of this age have not acquired the plural form yet. This pattern could be considered stage one. After they acquire plural forms, children tend to use them with all numerals, including eleven and above; for example, they might use */sitasfar kuwar/* ('sixteen balls') for the correct form */sitasfar kurah/* ('sixteen ball', sg). This finding is not surprising. For a time after learning plural forms, children apply them with all numerals. No age groups studied in this research master this category; incorrect responses are detected frequently in all of them.

The overall age and order of acquiring the Arabic number system as presented in Omar's research is:

2;6 The beginning of using the morphological inflections. Stage 1 in pluralizing nouns, by using an uninflected noun form, instead of a plural form.

3;0 Mastery of some regular nouns.

3;6 Stage 2 in plural development (overregularizing), and using plural noun forms with numerals.

4;0 Stage 1 in dual development--use of numeral 2 with an inflected noun.

5;0 – 5;6 Beginning of mastery of some irregular (broken) noun plurals. Stage 2 in dual development involves the use of numeral two with plural nouns. Stage 3 in acquiring the dual also starts around this time, where the mastery of the dual form begins.

7;0+ Further acquisition of some irregular noun plurals.

Rules and stages for adjective inflection and agreement:

The study shows that adjective inflections for gender are acquired at an early stage; this is because the feminine and masculine adjective forms are considered simple and their structure is regular. The inflection for adjective plurals appears to follow the same stages of development found for the acquisition of noun plurals. Stage one of acquiring adjectives begins when younger children use the uninflected adjective for the plural--for example, using */ʔil-wila:d kabir/* ('the boys',pl,br 'big',sg) for the correct form */ʔil-wila:d kubar/* ('the boys',pl,br 'big',pl,br). At stage two the children have a tendency to regularize all plurals with the regular (sound) masculine suffix */-in/*, for example, they use */ʔil-wila:d ʔawil-in/* ('the boys tall'-pl,sa) for the correct form */ʔil-wila:d ʔuwal/* ('the boys tall',pl,br). Although the feminine suffix */-at/* (but never the masculine suffix */-in/*, is used by children in this study for regularizing noun plurals. The acquisition of irregular plural structures for adjectives is considered stage three.

The overall age and order of acquiring Arabic adjective inflections and agreement are:

3;0 Mastery of adjective gender inflections; stage 1 in using some plural regular adjective inflections.

3;6 Stage 2 of adjective plurals: the use of overregularized adjective plural inflection, and the mastery of adjective agreement.

Acquisition of verb inflections and their agreement:

In general, children in this study know all inflections for verbs and use them correctly at an early stage. Most verb inflections are mastered by the age of 3;0.

Overall, all the above data shows late acquisition in general; however, the results of this study indicate that the children comprehend some grammatical contrasts by the age of 3;0. This study also points out that the first use of grammatical inflections began by age 2;6. Some grammatical forms can be mastered by the age of six to seven, yet errors are detected in other grammatical forms as late as ages fourteen and fifteen. This late acquisition could be due to the complexity of the native language.

According to Hermiz (1987), children's vocabulary increases between the second and third year of life. By the end of two and the beginning of three years of age, feminine and masculine forms are produced. The use of plural forms goes through several stages. At the first stage, children use the singular form in place of the plural. At the second stage--between 2;6 to 3;0--they learn the concept of plural. The feminine sound plural is acquired first, then the sound masculine. Production of broken plurals is delayed until the age of five. At the age of three, many grammatical mistakes occur; by the age of four to five children produce grammatical forms more frequently.

In a more recent study conducted on the acquisition and production of the Arabic Egyptian dialect, Ahmad (1993) investigates, in a longitudinal study, the acquisition of some aspects of Arabic and detects some subject-verb or adjective agreement errors.

Ahmad reports that three-year-old children exchange suffixes, using the feminine forms

in place of an obligatory masculine form and vice versa. For example, a child uses */ba:ba: xaraʒ-at/* ('daddy'-m 'went out'-f), where the correct form is */ba:ba: xaraʒ/* ('daddy'-m 'went out'-m); in the correct form neither subject nor verb are marked for gender. However, children also use the masculine form in place of the feminine, as in the case of */albint ʔawiʃ/* ('the girl tall'-m). In this example, the masculine adjective form is used in place of the correct feminine adjective form, */albint ʔawi:lah/*, in which the *-ah* suffix is attached to the adjective.

Ahmad (1993) also detects the use of the sound plural instead of the broken plural form. For example the plural of */ʔinsa:n/* ('a person') إنسان is in the broken form */ʔuna:s/* أوناسر, but a three-year-old child may add the sound plural */ʔinss:ma:t/* إنسانات by adding the feminine plural suffix to the noun.

Common errors are also detected in children attempting to use dual forms. Three-year-old children sometimes use the word "two" after a subject in the dual form to support the dual meaning. For example, a child could say */ba:ba: ʔstara: li: qalam-ain ʔanain/* ('dad bought me pen-du two'), or s/he might use the noun twice to explain two things, as in the example

/ba:ba: ʔstara: li: qalam wa qalam/ ('dad bought me a pen and a pen'). In this example the child did not use the dual suffix on the noun, but used the noun twice to indicate the presence of two things.

Overall, the results of this investigation show that three-year-old children produce subject-verb and adjective errors, and they also make mistakes while producing plural and dual forms.

A more recent study conducted on the comprehension of Arabic concerns the Saudi dialect. Al-Akeel (1998) investigates the rate, order, and developmental patterns of the acquisition and comprehension of some morpho-syntactic structures. This research is divided into two studies; twelve Saudi children (eight boys and four girls) between the ages of 2;4 and 5;6, and their fathers, participated in the Child-Directed Speech (CDS) section. For the morpho-syntactic structure section, 120 Saudi children participated (sixty boys and sixty girls), ranging in age between 3;0 and 6;0 and divided into six age groups. A language comprehension object and picture test (children were asked to point to the correct picture of four) was used to collect the data for the second section.

The results of the CDS section show that fathers in the study use singular nouns more frequently than verbs inflected for gender. These results also indicate that fathers of children in the older age groups use both a greater variety of structures and more complex forms in comparison with fathers of children in the younger age groups. Fathers of younger age group children also use verbs less frequently in their utterances than those of older group children. Nevertheless, the fathers of all age groups use inflected forms while talking to their children, and do not omit any inflections in general. The use of non-standard sentences (sentences with an element that violates the rules of Arabic grammar) is detected in the utterances of only five fathers, who use wrong gender, wrong number (use of the singular instead of the plural form), and incorrect pluralizations. As stated by the researcher, these results may be attributed to the fact that the fathers might have been simplifying their language when talking to their children. It could also be attributed to the fact that the fathers might have been treating these inflections as non-essential to

meaning. Al-Akeel also points out that the fathers, while talking to their children, use some vocabulary words that are used only in their regional vernacular dialect.

The results for the morpho-syntactic structures section in general show that age has a strong effect on performance; children aged 5;6 to 5;11 perform much better than children in the younger age groups. However, the results show no effect of children's gender on the acquisition of these structures. The results show early comprehension (3;0 or younger) of verb inflection for gender, and suggest that nouns and verbs inflected for number are comprehended by 4;0 to 4;5 of age, whereas children of the younger age group do not distinguish between dual and plural forms. The outcomes of the comprehension task of singular noun and verb forms include more mistakes than on dual and plural forms. Almost all the children who did not point to the correct singular picture did point to a single item in the plural form picture. It could be argued that the children were pointing to one representative in the plural picture; in other words, instead of choosing 'a cat', they chose 'the cats' but pointed to only one of the cats in the picture. This response was considered incorrect. The study also points out that children easily comprehend the most frequent structures used by their fathers. Overall, the findings suggest that the younger children rely on their lexical knowledge, while the older children rely on both lexical and syntactic knowledge for comprehending many linguistic structures.

Palestinian Arabic has also been researched by Ravid and Farah (1999), who investigate the acquisition of the Arabic noun plural forms in the Palestinian dialect of 48 Arabic native-speaking children (24 boys and 24 girls) aged 2;0 to 5;0 years. The

children are divided into four age groups. The participants were asked individually to give the plural forms for forty-two familiar nouns, divided into three groups (masculine sound plural, feminine sound plural, and broken plural forms).

The results indicate a corresponding rise in the number of correct responses with age. The results also indicate that the sound feminine plural is easier to acquire than the broken and sound masculine plurals. The errors that the children produce are analysed and categorised into six error groups:

1- No response, or repetition of the noun presented. This response appears only in the two-year-olds' responses.

2- Analytical response, in which plurality is indicated by a separate lexical item, for example:

/zamal/ 'camel' *جمال*

/kitir zamal/ 'many camel'.

The correct broken form is */zamal/* 'camels' . *جمال*

3- Overregularization, broken to sound, where the broken stem is treated as a sound stem, for example: */subbak/* 'window' *شباك*

The children's form is sound */subbakat/* ('window'-f,pl) 'windows' *شباكات* .

The adult plural form is broken */sababik/* 'windows' *شبابيك*

This response type indicates a U-shaped curve, in which the middle age group (three-year-olds) has more overregularization errors than the younger and older age groups.

4- Suffix exchange, masculine sound form to the feminine sound form, for example:

/falla:h/ 'male farmer' فلاح .

The children's form is */falla:ha:t/* ('farmer'-f,pl) 'female farmers' فلاحات

The adult plural form is */falla:hi:n/* ('farmer'-m,pl) 'male farmers' فلاحين

The children use the feminine suffix instead of the masculine suffix in this example.

5- Suffix exchange, feminine sound form to the masculine sound form, for example:

/sayarati/ 'car'-f. سيارة

The children's plural form is */sayarini/* 'car'-m,pl. سيارات

The adult's plural form is formed by attaching the feminine plural suffix */a:t/ /sayar-a:t/*

'car'-f,pl (cars). سيارات

The children pluralize the feminine inanimate object by adding the masculine suffix */i:n/*

In these situations children make more mistakes by changing masculine forms to feminine than by changing feminine forms to masculine, which appears more frequently at the ages of three and four.

6- Illicit stem change broken to broken, and broken to sound, for example:

-Broken to broken: */ʔabil/* 'drum' طبل.

The adult broken plural is */ʔubu:l/* 'drums' طبول.

The children's broken plural is */ʔibal/*. طبال.

These types of error occur more frequently at the age of 5 than at the younger ages.

-Sound to broken: */balu:n/* 'balloon' بالون.

The adult plural form is broken */balalim/* 'balloons'-br. بالالين.

The children's form is in the feminine sound form */balunat/* 'balloon'-f,pl. بالونات.

This error appears almost exclusively in the sound feminine forms.

These results indicate that the acquisition of the feminine plural is completed by the age of three. In contrast, five-year-olds still make mistakes in the sound masculine and broken plural forms. The results also show that the sound masculine plural is learned after broken plurals. In their conclusions, the researchers argue that the sound feminine and the broken plurals are acquired earlier than the masculine sound plurals because both feminine sound and broken plural forms are used on animate and inanimate items, and are less constrained semantically. The sound masculine plural, on the other hand, occurs only on human nouns, making it semantically restricted and therefore harder to acquire. 87% of all overregularized forms were the feminine sound plural suffix */-at/*.

Aljenaie (2000) examines the emergence of verb tense in the Kuwaiti dialect through two longitudinal studies of two Kuwaiti children. The children, between the ages of 2;0 and 2;6, were audio recorded in free-speech settings by the investigator. The results of this study show that the children's use of inflection increases over time. Both children appear to share a similar developmental order regarding the present tense inflection paradigm. In this order, the first person singular appears first, third person second, and the first plural comes last. Masculine forms also appear before feminine and singular before plural. However, the results of the past tense inflection paradigm reveal more differences than similarities in their production; in fact, two different developmental orders appear.

One of the children shows early implementation of the first singular, third masculine, and third feminine, while the other child makes use of the third person inflections before the first singular. This study reveals that the children's verb system is not limited to a few adult inflections; on the contrary, by the age of 2;6 they acquire a variety of verb inflections.

More recently, Ravid and Hayek (2003) investigated the acquisition of Sound Feminine Noun Plurals (SFP), dual forms, and collective nouns, in Palestinian Arabic. Fifty-eight Palestinian monolingual children (twenty seven boys and thirty one girls) between the ages of 3;6 and 8;0, were divided into four age groups. The data was collected through thirty target noun picture stimuli denoting types of fruits and vegetables familiar to pre-school children. The results are organised into correct and incorrect responses. Results show that the children's correct responses increase with age. The results also show that in the SFP and dual forms, three- to four-year-olds perform worse than the older age groups, while on the collective nouns the performances of the different age groups are equivalent to each other.

Error analysis:

Incorrect responses were classified into ten types:

- 1- Repetition responses: repeating the singular stimuli indicates that the youngest age group uses no morphological strategy.
- 2- Numeral word: between the ages of three and six on the dual category, the participants give only a numeral word instead of the required morphological forms.

3- Quantifier + singular form: by expressing number lexically in a word such as

/kitiz/ ('a lot of') followed by the singular stimuli.

4- Erroneous broken plural: instead of using the collective plural form, a broken

form is used, for example:

/muz-ah/ ('banana'-f,sg) موزه

/muwaz/ ('bananas'-br,pl)--the children's incorrect broken form.

/muz/ ('bananas')--the adults collective plural. This type of error occurs only in the middle age group in the study.

5- Inappropriate dual: producing the dual form in place of the SFP form. This type of error occurs only in the youngest age group in the study.

6- Inappropriate collective: occurs in both SFPs and duals when required. It occurs on FSP more than on duals.

7- Numeral followed by inappropriate collective: the participants sometimes give an inappropriate collective preceded by a numeral word. This happens only in the dual context in the study; for example, */tini:n mu:z/* ('two bananas',br) is used instead of the correct form */muza-t-i:n/* ('banana'-f-du).

8- Inappropriate SFP: this type consists of inappropriate SFP responses in both contexts--where duals are required and where collectives are required; for example, */mu:z-a:t/* is used for */muzt-i:n/* ('banana'-du), or */mu:z/* ('banana',pl,col).

- 9- Numerals followed by inappropriate SFP: the participants sometimes give a numeral followed by an inappropriate SFP; for example, they use /*tini:n muz-a:t*/ ('two banana'-f,pl) for /*muz-t-i:n*/ ('banana'-f-pl).
- 10- Erroneous sound masculine plural: the participants sometimes give the masculine sound plural in place of a SFP; for example, they use /*bitinʒan-in*/ ('eggplant'-m,pl) for /*bitinʒan-aɪ*/ ('eggplant'-f,pl). This type of error occurs only in the middle age group responses.

Overall, the youngest age group in the study attains 50% accuracy, the middle age group attains 85% accuracy, and the children reach the mastery point by the age of seven. It seems that the dual form shows a similar learning curve, starting with a 40% rate of correct responses in the middle age group and reaching 90% correct performance by the age of seven. Both SFP and dual forms are considered simple and transparent because both are formed by adding a suffix, which explains their early acquisition and clear learning patterns. However, collective nouns have a different acquisition pattern than SFPs and duals. All age groups tested in this study reach a 50% average success rate. The collective acquisition results could be due to the fact that collective nouns are a restricted category (fruits, vegetables, and animals), which are less consistent than other forms and should be learned lexically. Moreover, forming a collective noun requires the omission of the final vowel from the singular form. The opaqueness of this form might explain the late acquisition of collectives.

3.2 Summary

On the whole, the results of the six previous studies show that some grammatical forms are acquired and mastered much earlier than other forms, some of which are acquired and mastered after the age of 15;0 because of the complexity of their forms.

Further, Omar and Hermiz have indicated that the Arabic sound plural is acquired by the age of three, while Ravid and Farah have clarified this by demonstrating that the feminine sound plural is acquired by the age of three and mastered by the age of seven. Al-Akeel reports that nouns inflected for numbers are usually comprehended around the age of four. Both Omar and Ravid's results indicate that children generally overregularize by applying the plural feminine suffix */-at/*.

It is also evident that the dual noun form is acquired around the age of five to six and mastered by the age of seven, and that children begin to master sound plural forms around the age of three, particularly feminine forms. Moreover, broken plural forms are considered one of the latest grammatical forms acquired. Overall, Subject-adjective agreement is acquired around the age of 3;6, whereas (according to Omar, 1969) verb forms and inflections are acquired by the age of 3;0. Significantly, language input seems to affect the early comprehension of some grammatical structures.

Finally, according to most of the studies presented in this chapter; simplicity and complexity of grammatical forms are important factors that affect the acquisition and command of these forms. The effect of these factors on the acquisition and command of a language seems to be shared by many languages, but each language has different characteristics. Complexity and input frequency as a situation or a factor existing in the

language would differ from one to another, depending on the system itself. As mentioned in Chapter 1, irregular forms are considered complex forms and are therefore learned later (Dabrowska, 2001). Regular and irregular forms occur differently across languages. For example, in English, irregular forms occur in the verb plural system, whereas in Arabic, the verb system does not have irregular forms but does have irregular agreement (Chapter 2).

All in all, complexity differs across languages; therefore, differences detected between languages even when their systems are similar could be attributed to the language system and the situation within which the language exists in a community.

The research presented here will differ in a number of respects from previous studies. First of all, this research will be conducted on the acquisition of Arabic by monolingual Saudi children. To our knowledge there has been only one such study conducted, and it was focused on comprehension of the language by 3;0- to 6;0-year-olds. This study aims to investigate the comprehension and production of some grammatical and morphological structures over a wider age range, because the previous studies conducted on the acquisition of Arabic show that some of the grammatical forms investigated in this research are not mastered by the age of six. Therefore, this study will investigate these forms and try to pinpoint the age at which the children reach adult performance levels.

This research will also differ from previous research in terms of the methodology used to collect data, as it will not rely on children's spontaneous speech (except in the case of the longitudinal study's participants).

The test used to collect the cross-sectional data is also different. Al-Akeel's test contained four pictures for each item (Al-Akeel, 1998). The test we will be using contains six pictures. Similarly, where the distracters in Al-Akeel's tests were lexical and syntactic, the distracters for our tests are syntactic.

Most of the prior studies did not present all the grammatically possible forms. E.g. Ravid and Farah (1999) investigated plural noun forms alone without adjectives and verbs, while in the present study we will investigate plural forms in nouns, verbs and adjectives. On the whole, most of the earlier studies conducted on the acquisition of Arabic have concentrated on one or two forms of a grammatical category. However, in our study we will try to widen the grammatical forms studied to include all gender and number categories for nouns, verbs, and adjectives and, different noun types including collective nouns, quantified nouns and feminine nouns with no overt gender markings.

This investigation will also examine the language input that three Saudi children are exposed to. In addition, we will consider the children's ability to apply the Arabic gender and number morphology system on novel words. In general, the research presented here will attempt to explore the acquisition of the Arabic gender and number system as well as adjective and verb agreement with gender and number (in both comprehension and production).

Chapter 4

Present studies

4.0 Introduction

In the following chapter, our research will be explained in terms of our aims, expected outcomes, goals, questions, and hypotheses.

4.1 Aim of the studies

After exploring the few studies that have investigated the acquisition of the Arabic gender and number systems in four different dialects, our aim is to investigate the rate and order in which Saudi children acquire the gender and number system and their agreement with adjectives and verbs (comprehension and production). A further aim of the study is to examine language input, Arabic language productivity, and some errors children of different age groups produce, by conducting both a cross-sectional and a longitudinal study.

4.2 Expected outcomes of the studies

The structure of language differs from one language to another and these differences affect the process of acquiring (comprehending and producing) the language.

This investigation will add to the understanding of Arabic acquisition in general, and grammar acquisition (gender and number system) in particular.

- It will shed light on the acquisition of a grammatical gender language (Arabic);
- it will shed light on the acquisition of a three-way number system (singular, dual, plural);
- it will shed light on the acquisition of Arabic noun-gender agreement.

4.3 Goals of the studies

The goals of these studies are to investigate:

- the acquisition of the Arabic gender system and children's ability to comprehend and produce feminine and masculine real and novel word forms;
- the acquisition of the three-way Arabic number system and children's ability to comprehend and produce singular, dual, and plural real and novel words;
- the acquisition of Arabic adjective, noun, and verb gender and number agreement;
- language input and CDS and its role in acquiring Arabic adjective, noun, and verb gender and number agreement;
- the acquisition of Arabic gender and number systems in the context of two language systems (diglossia).

The studies also aim to:

- identify some of the elements that affect the acquisition of Arabic gender and number system acquisition; and

- analyse some of the errors children produce to help us understand how and why some children comprehend and produce grammatical forms earlier or later than others.

4.4 Questions of the studies

This investigation will answer the following questions:

- 1- **When do children acquire (comprehend and produce) the noun gender system?**
- 2- **The Arabic number system is a three-way number system. When do children acquire (comprehend and produce) the Arabic number system and when do they distinguish between the number divisions (singular vs dual vs plural)?**
- 3- **The Arabic number system is in agreement with noun gender. When do children acquire number- gender noun agreement?**
- 4- **All Arabic human nouns are pluralized in sound and/or broken forms; the masculine animal and inanimate nouns are pluralized only in the broken forms. When do children acquire the Arabic sound and broken plural forms?**
- 5- **Arabic adjectives and verbs are in agreement with noun gender and number. When do children acquire (comprehend and produce) adjective and verb agreement with noun gender and number systems?**
- 6- **What makes an Arabic grammatical form easy or difficult to acquire?**

- 7- According to Tomasello and Brooks (1999), children between the ages of three and five become linguistically productive. **When do children acquiring Arabic as a first language start producing grammatical forms productively?**
- 8- **What are the errors produced by different age groups and why do these errors occur?**

4.5 Hypotheses

1- Masculine gender agreement with singular and dual forms will be acquired earlier than feminine gender agreement with singular and dual forms, but feminine gender agreement with plural will be acquired earlier than masculine forms.

Masculine noun forms are not marked for gender while feminine forms are. Both masculine and feminine dual forms are marked for number; therefore, feminine forms are expected to be acquired later than masculine forms.

The feminine regular plural mark is the suffix */-a:t/*, which is applied to all animacies (human, animal and inanimate nouns). In contrast, the masculine regular plural marks are the suffixes */-u:n/* or */-i:n/*, which are restricted to human nouns only, and this might make the acquisition of the masculine regular plural more complex than the feminine regular plural. The feminine plural form seems to occur more frequently in the language input and CDS than the masculine regular plural form does. Low-frequency and restricted forms are usually acquired later than frequent and transparent forms (Kopcke, 1998).

2- Singular forms will be acquired earlier than dual and plural forms.

Arabic singular forms are unmarked for number, unlike dual and sound plurals.

That is why the marked duals and plurals are expected to be acquired later.

3- Plural forms will be acquired earlier than dual forms.

Plural forms occur more frequently in the Arabic vernacular dialects, and in general are applied in place of the dual. Accordingly, the plural forms are expected to be acquired earlier than the dual forms.

4- Sound plural forms will be acquired earlier than broken forms.

Sound plurals are formed regularly by adding suffixes to the stem of the word. However, broken plurals occur in many different forms depending on the root of the word, and when children are exposed to many varieties of irregular (broken) forms, it increases the difficulty of learning these forms (Bybee & Slobin, 1982). Regular (sound) plurals will be acquired earlier because children find principle bases to distinguish between forms (Slobin, 1985, a).

5- Children will over-regularise the broken plural to the sound plural forms.

According to Slobin (1971, b) and Kuczaj (1977), children acquire regular past tenses and use them correctly at a young age; on the other hand, irregular past tense forms are acquired later than the regular forms. Children start to over-regularize the regular past tense after achieving a sufficient amount of control over the regular past tense form.

On the whole, this research examines the acquisition of Arabic gender and number systems by Saudi children. The following chapter is the first part of the cross-sectional

study conducted in this research. The methodology and results for the comprehension test are described first, followed by production methodology and results, error analysis, and then the longitudinal study.

Chapter 5

Comprehension

5.0 Introduction

The previous chapter states that this research is divided into three different studies: comprehension, production, and a longitudinal study. This chapter reports on comprehension, beginning with the participants from whom we collected the data and the stimuli used, followed by results and general discussion.

5.1 Methods

5.1.1 Participants

Ninety-eight normally developing children (having no reported language disorders) participated in this research: fifty-one girls and forty-seven boys from six schools, five of which were in Riyadh, Saudi Arabia, and one of which was in London, U.K. All participants were L1 monolingual speakers of Arabic (most of the children tested in the London-based school learn English as a second language but have not reached a mastery level because most of them have been living in London for less than a year. In addition, most of them are surrounded by Arabs and therefore do not use English frequently).

They were divided into four age groups: age group six (N = 22, mean age = 5;9, age range = 5;0–6;9); age group eight (N = 23, mean age = 7;7, age range = 7;0–8;6); age group ten (N = 26, mean age = 9;7, age range = 9;1–10;11); and age group twelve (N = 23, mean age = 11;9, age range = 11;1–12;11). In addition, seven female adults associated

with a school in Riyadh participated in all tasks, and they are considered age group A ($N = 7$, mean age = 35;6, age range = 28;0–43;0). In total, 105 individuals participated in this research.

101 subjects participated in the comprehension tasks. Four out of the 105 participants for this part of the research were excluded from the youngest age group (age group six) because they were not concentrating on the task and were instead pointing to any picture even before the experimenter said the target word.

5.1.2 Stimuli

A picture selection task was designed to test Saudi children's ability to comprehend Arabic nouns, verbs and adjectives, with special focus on agreement for noun gender and number.

5.1.2.1 Picture stimuli

In the picture selection task, participants were asked to choose one picture from a set of six pictures. The six pictures were designed to represent three number options--singular (sg), dual (du), and plural (pl)--as well as two gender options--feminine (f) and masculine (m). For example, the stimulus shown in Figure 1 consists of three pictures representing female falcons and three representing male falcons. Both females and males are represented in sets of sg, du, and pl. A ribbon was used to distinguish between the female and the male animal. A ribbon was also used in some inanimate object categories.

Similar stimuli were used for nouns, as shown in Figure 1, adjectives (“angry”) as shown in Figure 2, and verbs (“playing”) as shown in Figure 3.



Figure 1. An example of noun tasks

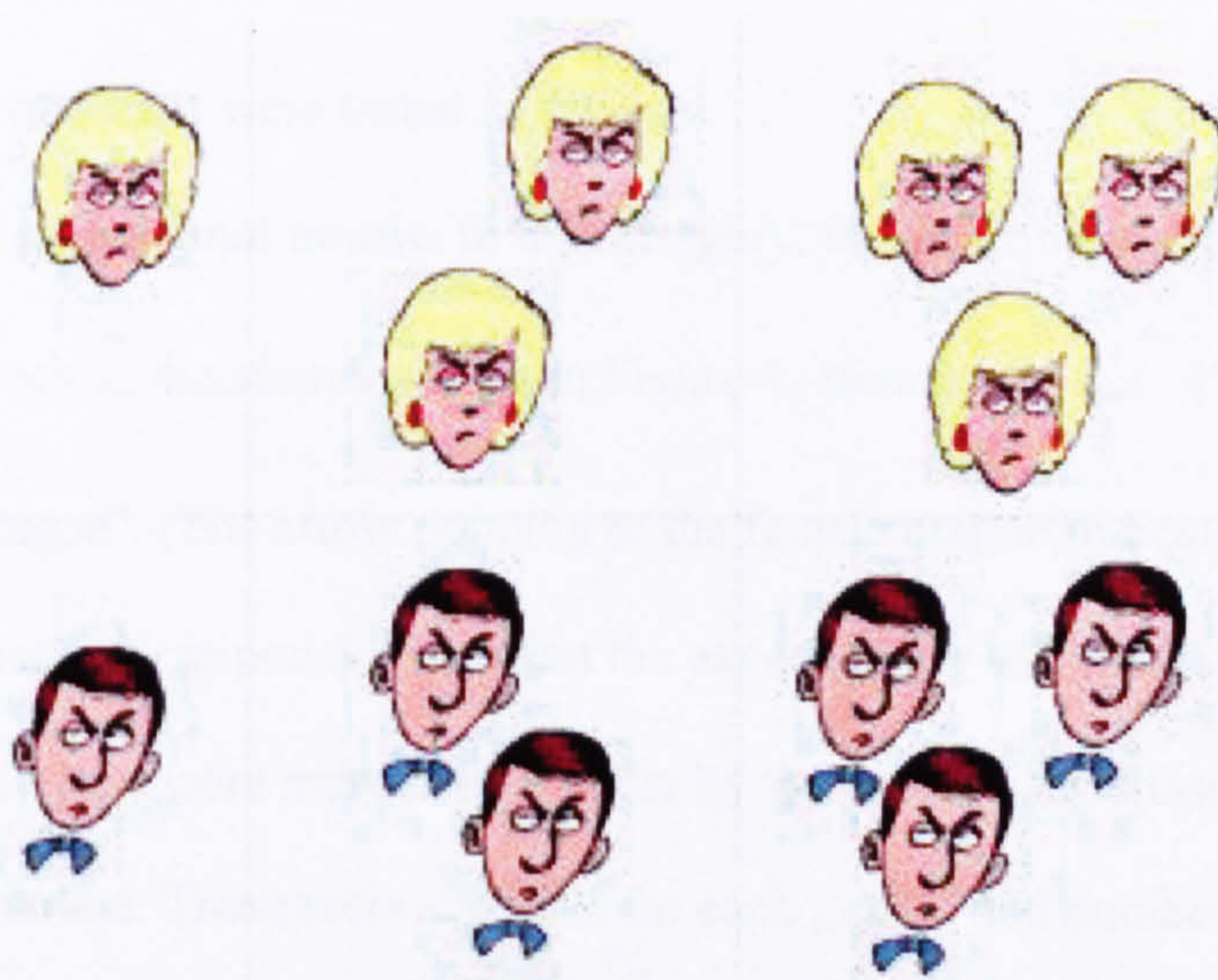


Figure 2 an example of adjective tasks

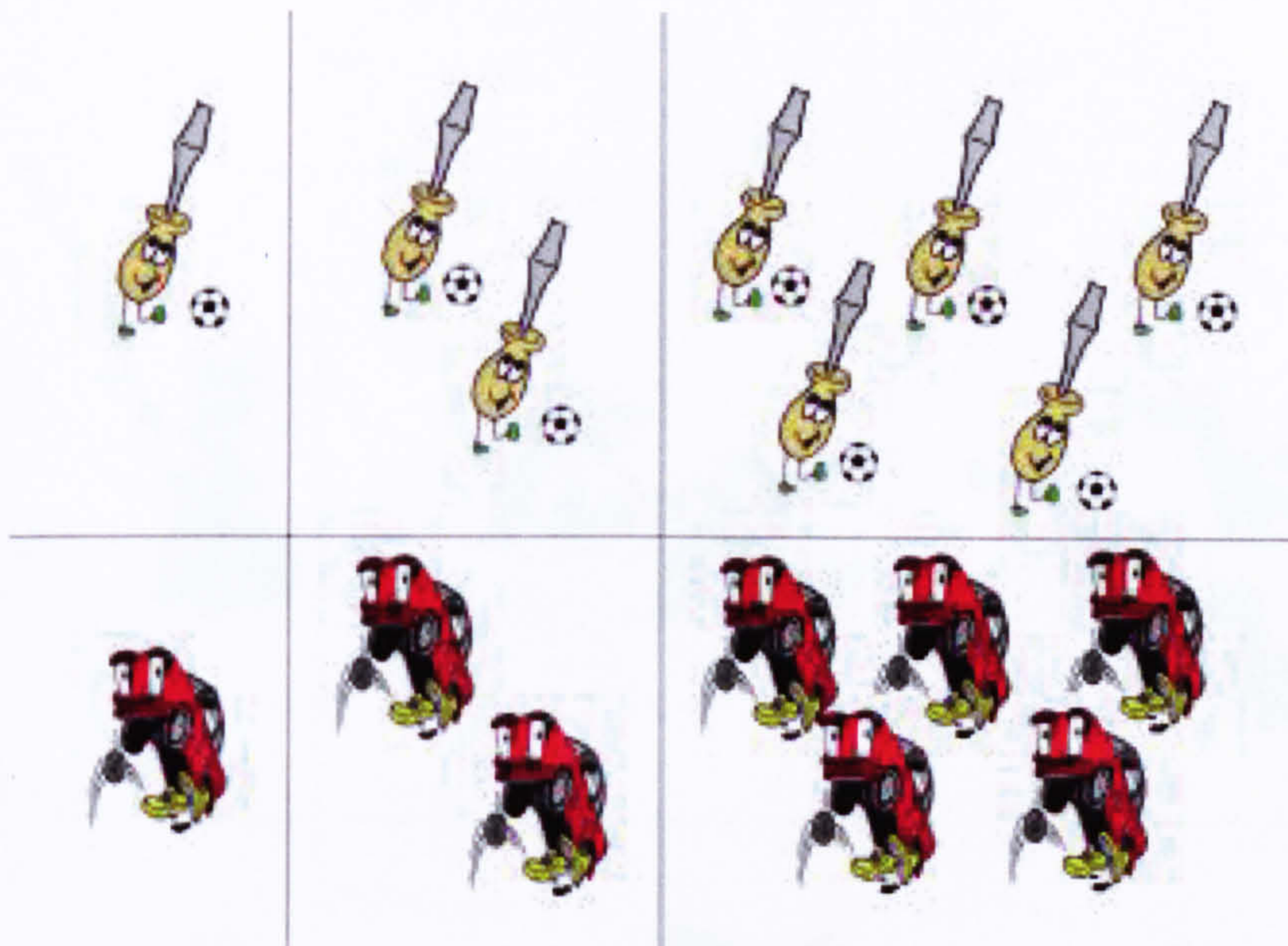


Figure 3. An example of verb tasks

5.1.2.2 Linguistic stimuli

Five sets of constructs were tested as follows:

- 1- **Humans and animal nouns:** In this category, the experimenter presented noun stimuli, such as the stimuli shown in Figure 4 */tinnin-ah/* تنينه ('dragon'-f) 'a female dragon'. (The arrow pointing to the female dragon indicates the picture that correctly corresponds with what the experimenter asked for). All feminine nouns used here were marked for gender by the suffix */-ah/*. Masculine nouns were unmarked. There were six trials for each gender and number within human and animal nouns, for a total of seventy-two trials (see appendix 1.1.1 for stimuli used).

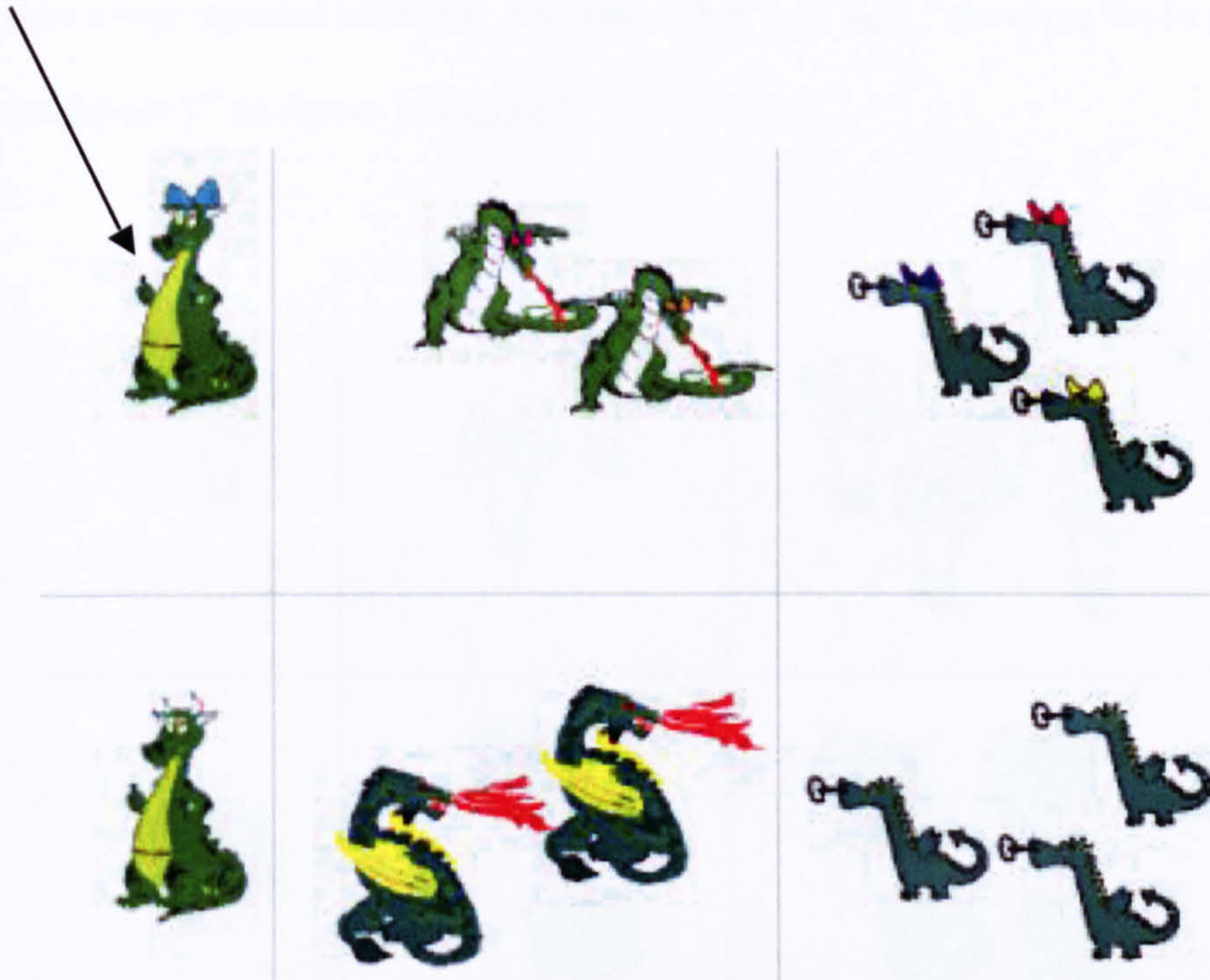


Figure 4. An example of animal nouns tested

2- Adjectives: In this category, adjective stimuli were presented, as shown in the example in Figure 5: */marixq-un/* ('ill'-m,pl) مريضون . Adjectives referred to humans, animals, and inanimates, both feminine and masculine, in the singular, dual, and plural forms. All adjectives referring to feminine nouns were marked for gender and number. Adjectives referring to masculine nouns were marked for number. Each construction included four to six trials, for a total of 102 trials (appendix 1.1.2). Adjective trials referring to inanimates were conducted by

naming the objects in the picture (e.g., “Now we will see a */lambah/*light bulb, and a */tilifizu:n/*television”), always in the noun’s singular form. The nouns were never repeated after that. The researcher then said, “show me the (e.g. */al-mariq-un/*)”⁶ as shown in Figure 5.

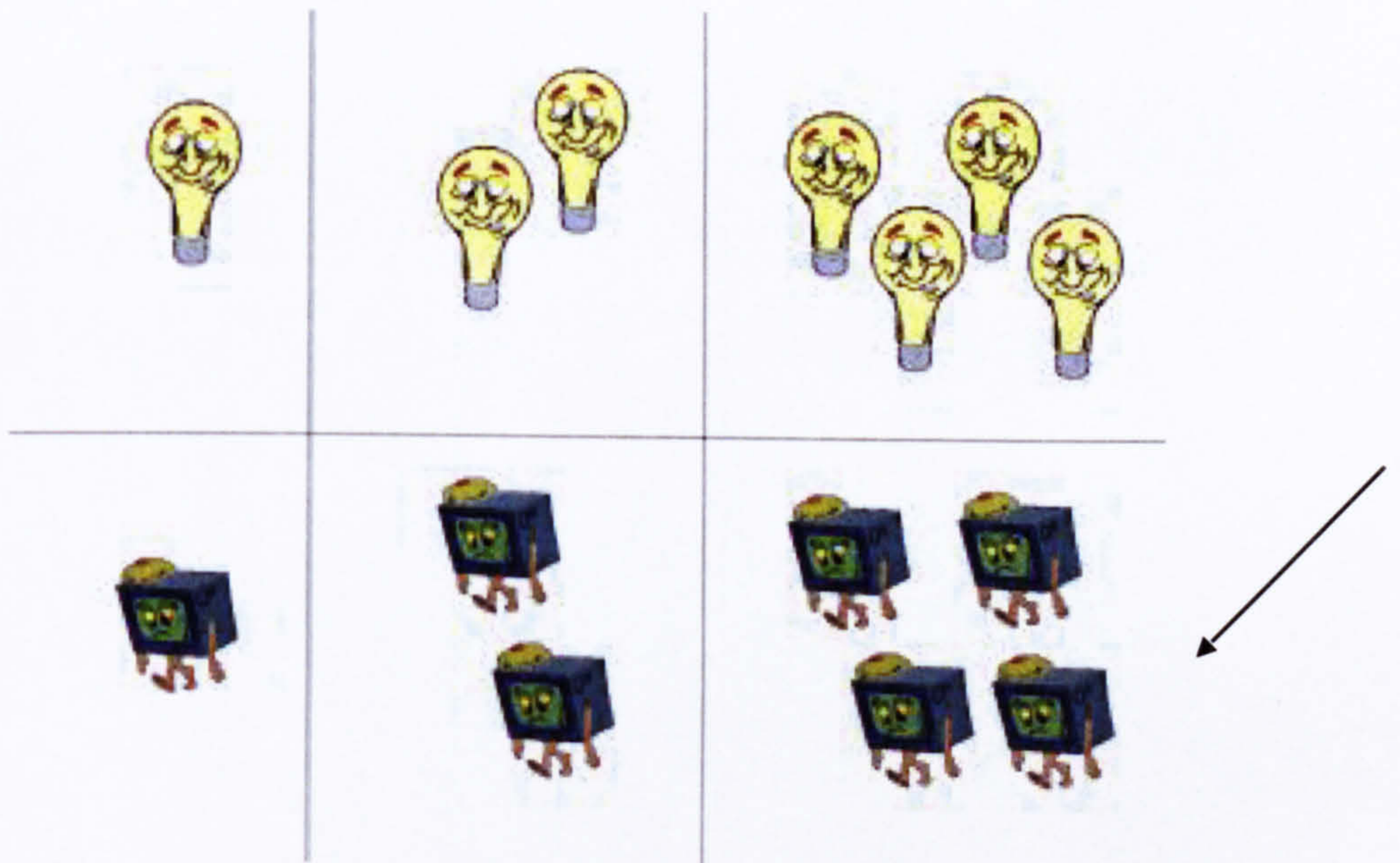


Figure 5. An example of adjectives tested

- 3- Verbs:** In this category, the experimenter presented verbs, such as */ta-lʕabna/* (f-‘playing’-pl) ‘playing’, تلعبين, as shown in Figure 3 above. All verbs in this category were presented in the present tense form. Verbs referring to feminine

⁶ Such constructions do not technically appear in an isolated sentence in Arabic. Adjectives and verbs referring to animals and inanimates take the feminine singular form only, even if the noun is in the plural masculine form (see section 2.4.2). However, the goal was to see to what extent children could rely on the form of the adjective and verb to determine gender and number.

referents were marked for gender by the prefix /*ta-*/, while verbs referring to masculine referents were marked for gender by the prefix /*ja-*/). Verbs referring to humans, animals, and inanimate objects were presented in the singular, dual and plural forms. For each form there were four to six trials, for a total of 102 trials (appendix 1.1.3). The experimenter conducted trials involving verbs that referred to inanimates by naming the objects in the picture (e.g., “Now we will see a /*masasah*/ (‘pacifier’) and a /*sillim*/ (‘ladder’)”), always in the singular form. The nouns were never repeated after that. The researcher then said, “Show me the (e.g. /*tazriy-a:n*/ f-‘running’-du)” as shown in Figure 6.

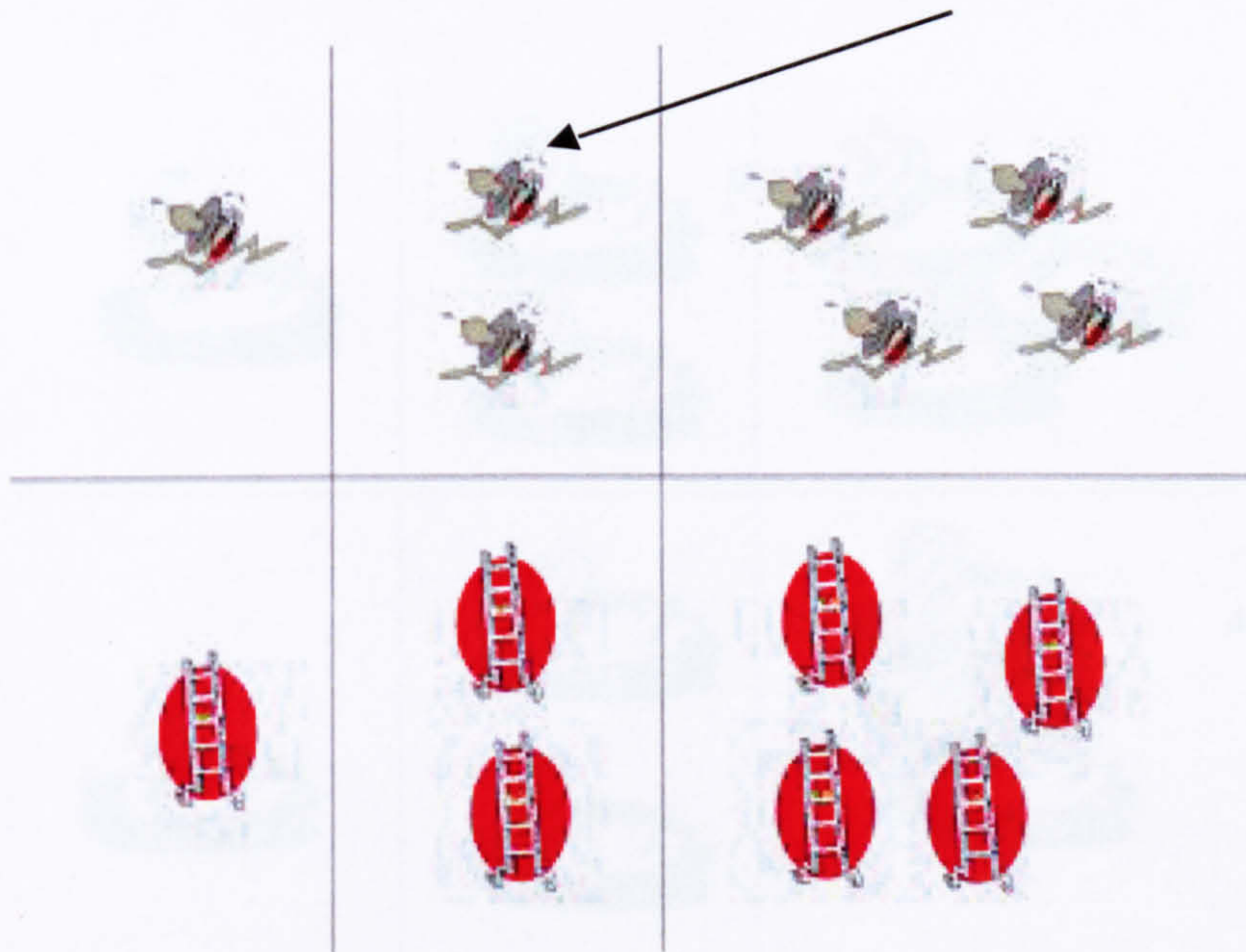


Figure 6. An example of verb tasks

- 4- Collective nouns:** In this category, the experimenter presented collective nouns --for example, /*bazaʕ*/ ‘swans’-m-pl جمع as shown in Figure 7. All nouns in this

category were presented in the feminine singular and in the masculine plural. (These two forms are the only forms investigated in this category because they are the main forms and they are different from other categories. The dual form is not investigated in this category because it is similar to all dual forms in all categories.). Adjectives and verbs were also presented. For each form there were four to six trials, for a total of ninety-eight trials (appendix 1.1.4). Trials involving noun, adjective and verb forms were conducted just as in the first three categories, where the participants were also asked to point to the picture or pictures that represents the target word.



Figure 7. An example of collective nouns category

5- Inanimate feminine nouns with no overt gender referent: In this category, adjectives and verbs referring to inanimate feminine nouns with no overt gender

referent were presented and investigated. An example is */naʕim-at-an/* ‘sleeping’-f-du نائماتان shown in Figure 8. Adjectives and verbs in this category were presented in both the feminine and masculine, and in the dual and plural forms only. Two trials were conducted for a total of twenty trials (appendix 1.1.5). Adjectives and verbs in this category were conducted in the same way as all the previous categories.

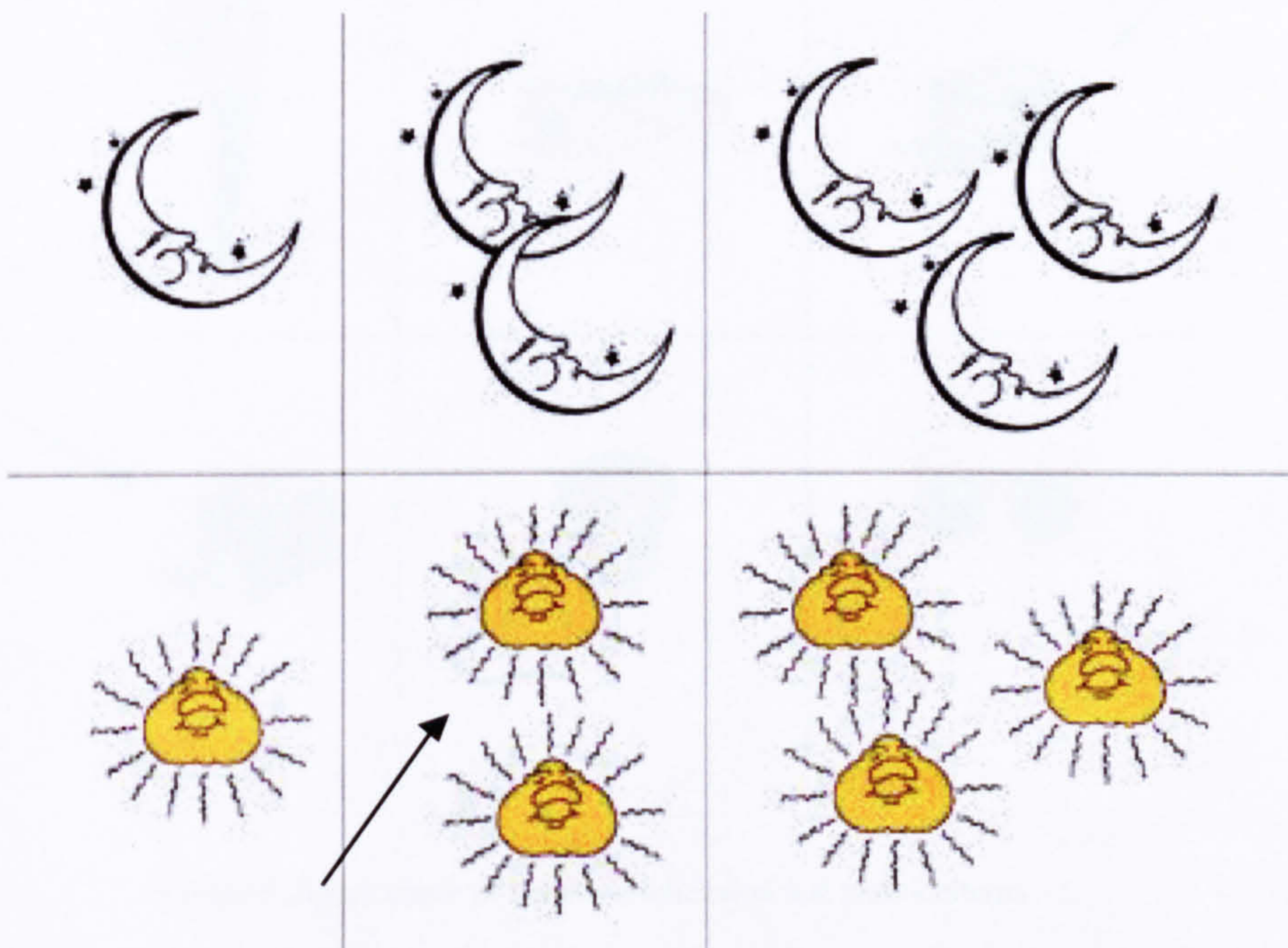


Figure 8. An example of the inanimate feminine nouns with no overt gender referent category

In addition to these five categories tested, nine practice items were introduced. The practice items did not concern gender and number, but were simply included to allow children to realise that they were to point to a picture in response to the experimenter's questions. For example: the child was shown the stimuli in Figure 9, and was asked

“Where is the box?” After pointing to a box, s/he was asked whether there was another box. The aim was to teach the participant that s/he could point to more than one picture if the additional picture(s) corresponded to the target word. All of our practice items involved pointing to singular objects.



Figure 9. An example of the comprehension test practice items

5.1.3 Procedure

The order of testing between comprehension and production tasks was balanced, so that roughly half the participants per group received the comprehension task first, and half received the production task first. Within the comprehension task, the trials for all

five construct types were randomised and then grouped into three folders: 1, 2, and 3.

Approximately equal numbers of children received folder 1, folder 2, and folder 3 first.

Children were tested individually, at school, and in a quiet room set aside for this purpose. Including comprehension and production tasks, the trials were distributed across three to seven sessions per participant. For the comprehension task, the participants were instructed to point to the picture(s) that corresponded to what the experimenter asked (“Where is the */tini:naɦ/* (‘dragon’-f)?”) After pointing at a picture, the participant was asked whether there was any other */tini:naɦ/* (see Figure 4 above). Responses were scored for the respondent’s choice on recording sheets. Their responses in both comprehension and production tasks were scored according to whether the participant chooses a picture with a gender or a number that differs from what is encoded in the construction. For example, if the target form was a verb in the plural feminine, and the participant choose a picture with male referents in the comprehension task, or used a plural masculine form in the production task, this was scored as a non-match with the linguistic form. In some cases, as noted earlier, the classical and vernacular forms diverge with regard to application. Thus, the scoring sometimes diverged from one of these varieties. Thus, the score does not necessarily represent a correct choice (for the particular dialect) but choice according to the linguistic form. This scoring method was chosen as a means to be able to compare children and adults’ performance. The adults’ performance would be taken as the ‘norm’ for comparison.

5.2 Results

The participants were tested on five sets of constructs. Each construct was analysed separately. Raw numbers were transformed into proportions because the trials across categories were not equally balanced, with between four and six trials in each category.

5.2.1 Human and animal nouns

The first set of analyses examine the responses for stimuli involving nouns for humans and animals. A multivariate test was conducted on the raw data (because the stimuli of this category were balanced). The variables tested were: age group (6, 8, 10, 12 and A); animacy (human (h), animal(an)); number (singular, dual, and plural); and noun gender (feminine (f) and masculine (m)).

The test revealed main effects of animacy ($F(1, 92) = 22.47, p < .001$), number ($F(2, 18) = 20.09, p < .001$), and age group ($F(4, 92) = 23.29, p < .001$), (see appendix 1.2.1 for Means and Std. Errors of human and animal nouns results).

The effect of animacy was that the participants in general performed significantly better on human nouns ($M = 5.04$) than on animal nouns ($M = 4.79$).

The effect of number was that the participants generally performed on singular ($M = 5.13$) and dual ($M = 5.04$) forms better than on plural forms ($M = 4.58$).

Performance by age group is shown in Figure 10. These results reveal that the effect of age was that six-year-olds performed significantly worse than all other age groups on human and animal nouns--all pairwise comparisons $p < .001$. These results in general show that by the age of eight, children have comprehension of gender and number in human and animal nouns equivalent to that of adults⁷. According to Brown's 90% correct responses as a criterion of mastery of a given grammatical form (Brown, 1973), the children seem to master human and animal gender and number by the age of ten. However, our data show that the difference between the performance of eight-year-olds and adults is not significant. Therefore, we have considered that eight-year-olds have reached adult levels in comprehending noun gender and number agreements.

⁷ Using the significant differences between the children's groups and the adult group to establish mastery of a grammatical form is used through the study, because this criterion points to the age children reach adult levels of comprehension and production.

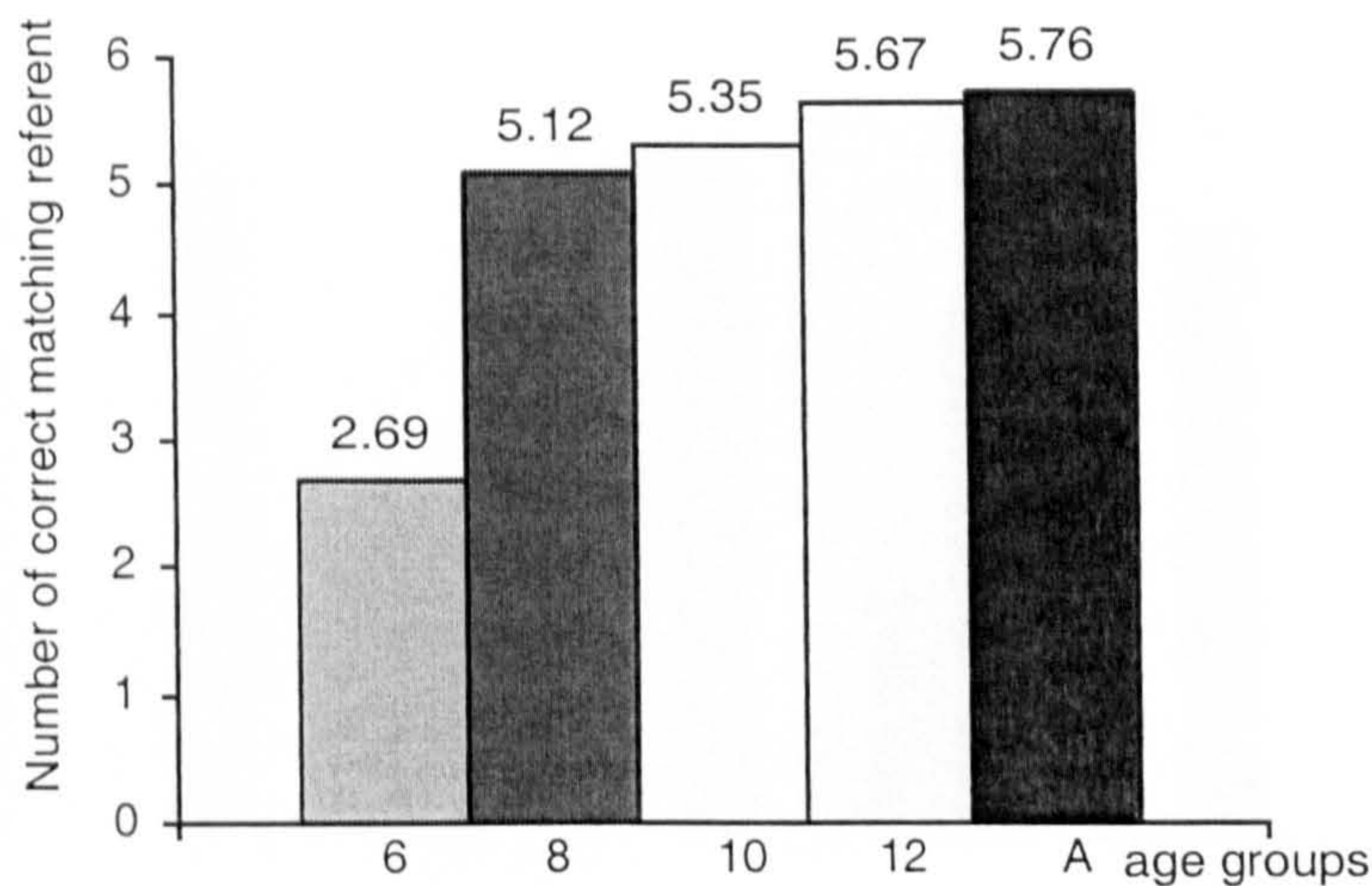


Figure 10. The effect of age group on noun comprehension

The main effects were moderated by the significant interactions of number x age group ($F(8, 18) = 2.61, p < .01$), noun gender x number ($F(2, 18) = 8.45, p < .001$), animacy x noun gender x age group ($F(4, 92) = 2.72, p < .03$), noun gender x number x age group ($F(8, 18) = 2.42, p < .02$), and animacy x noun gender x number x age group ($F(8, 18) = 2.44, p < .02$).

Performance by number x age group is shown in Figure 11. Simple effects analysis for each number reveals that on the singular, dual, and plural noun forms, six-year-olds performed significantly worse than all other age groups. On the plural noun forms, eight-year-olds performed significantly worse than twelve-year-olds, pairwise comparison $ps < .02$.

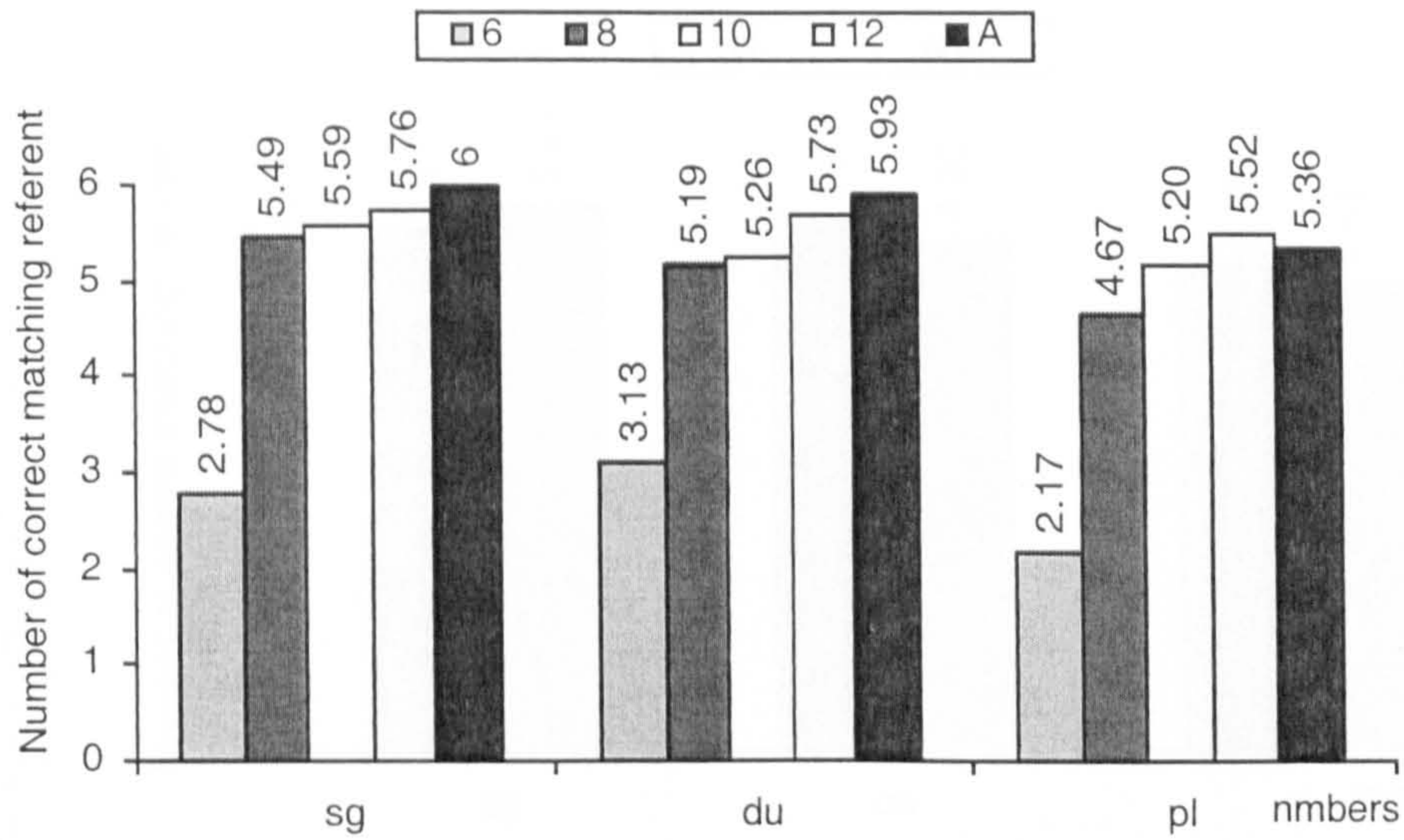


Figure 11. The effect of number \times age group on noun comprehension

Performance by noun gender \times number is shown in Figure 12. Simple effects analysis for each number reveals that on the singular form participants performed significantly better on masculine than on feminine nouns, and on dual forms they performed significantly better on feminine than on masculine nouns, all pairwise comparisons $p < .02$. The results generally show that the participants performed better on singular masculine than on feminine, and on feminine dual better than on masculine, while on plurals they performed equivalently on masculine and feminine forms.

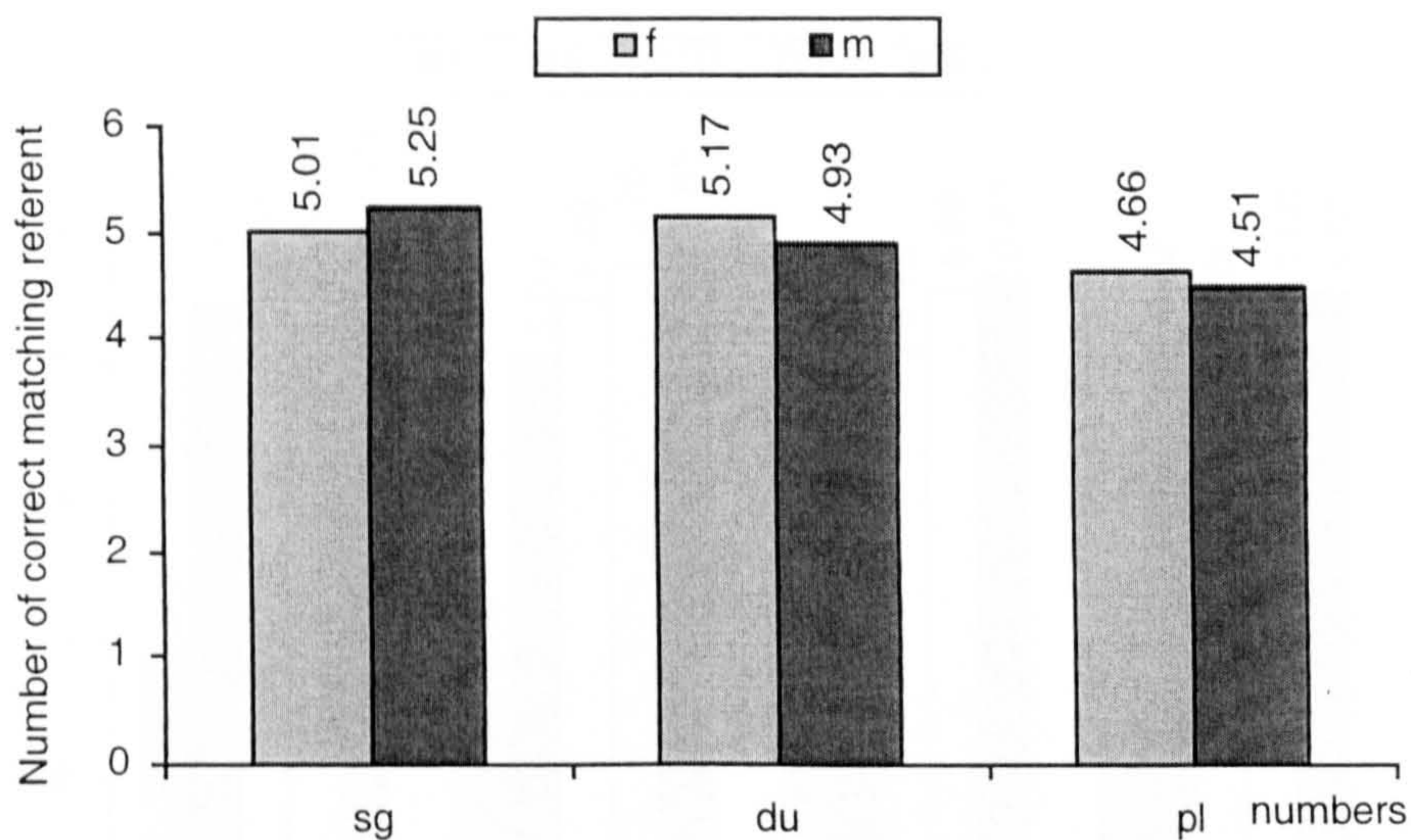


Figure 12. The effect of noun gender x number on noun comprehension

Performance by animacy x noun gender x age group is shown in Figure 13. This interaction shows that on the whole, age group six lagged behind all other age groups on both animacies and genders. Yet the results demonstrate that, overall, eight, ten, and twelve-year-olds and adults performed better on feminine forms than on masculine forms. It is assumed that masculine forms are more complex than feminine forms, because the masculine forms take sound and broken structures, while feminine forms usually take a sound structure. These results could be due to this complexity.

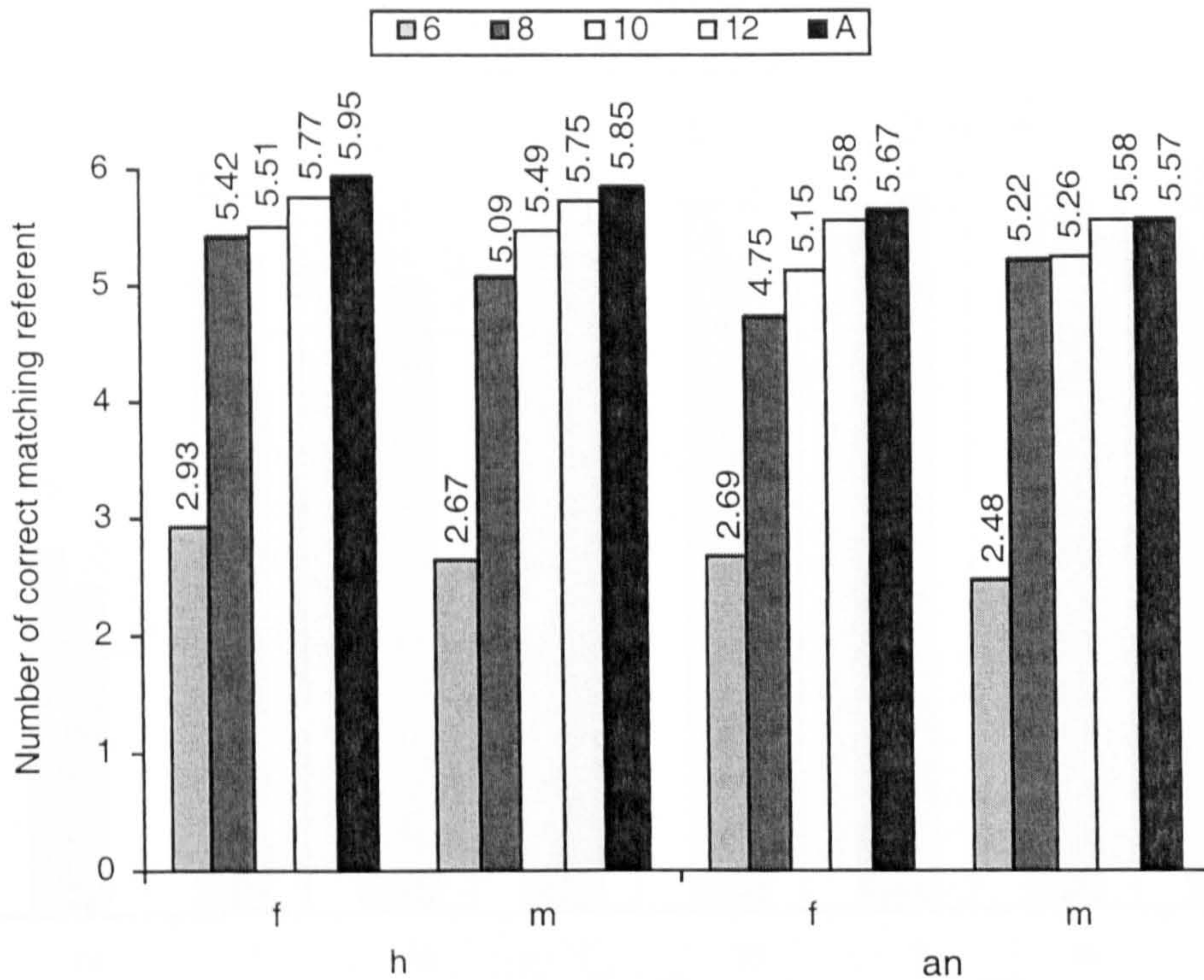


Figure 13. The effect of animacy x noun gender x age group on noun comprehension

Performance by noun gender x number x age group is shown in Figure 14. These interaction effects generally indicate that on both genders, singular forms scored higher than duals and plurals across all age groups, while dual, up until the age of ten, generally scored higher or equivalent to plurals. However, the performance of twelve-year-olds on the feminine dual and the masculine dual forms became equivalent to their performance on singular forms. This result suggests that singular forms are comprehended before other forms, followed by the feminine dual forms and then the dual masculine forms. Plural feminine forms also seem to be comprehended better than the masculine plural forms.

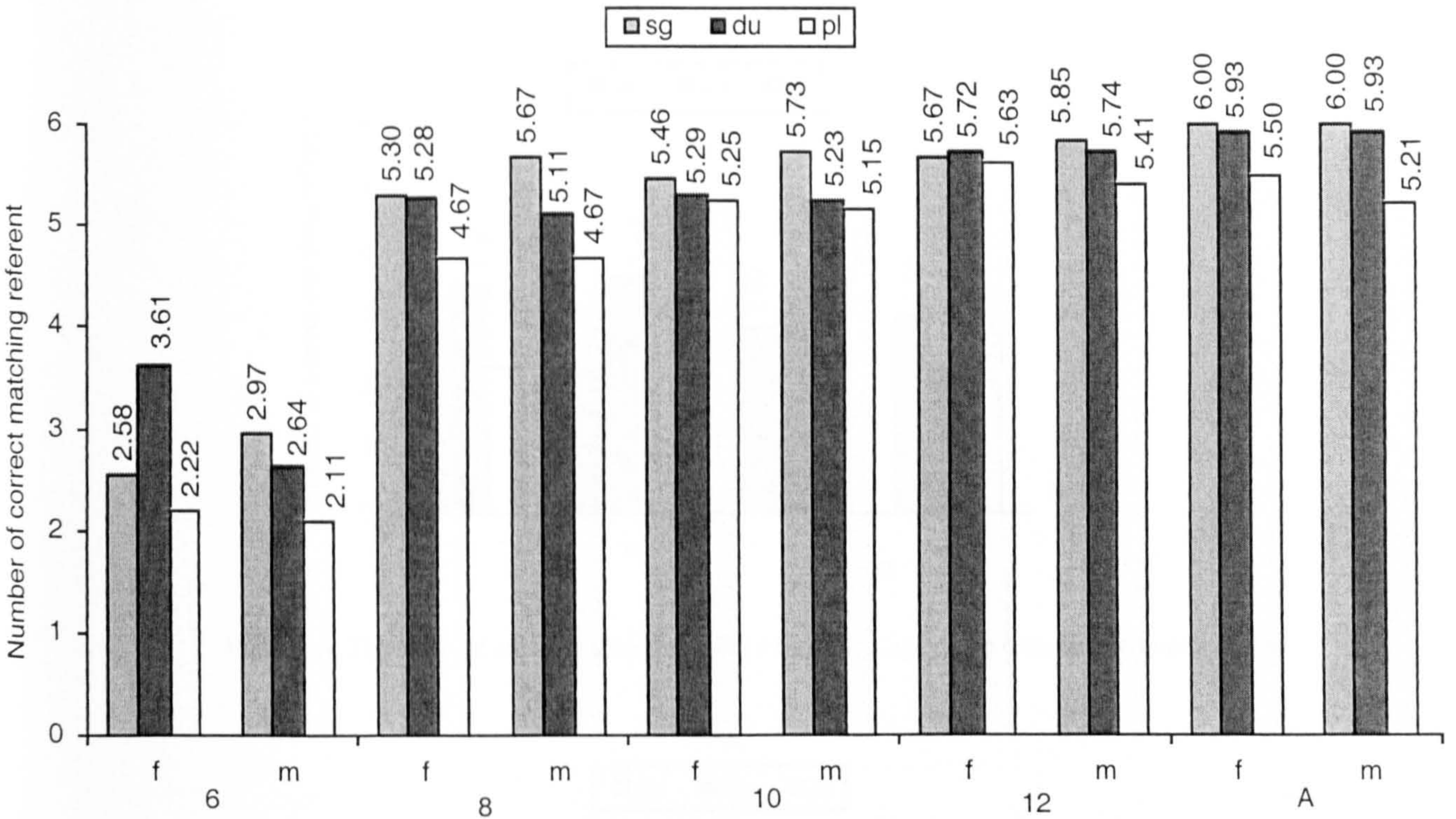


Figure 14. The effect of noun gender x number x age group on noun comprehension.

Performance by animacy x noun gender x number x age group is shown in Figures 15, 16, 17, 18, and 19. Overall, the pattern of interactions for age group six seems to be different from that of other age groups. Age group six performed better on human masculine and feminine duals than on the other forms, while age groups eight, ten, twelve, and adult comprehended the singular form better than the dual and plural forms.

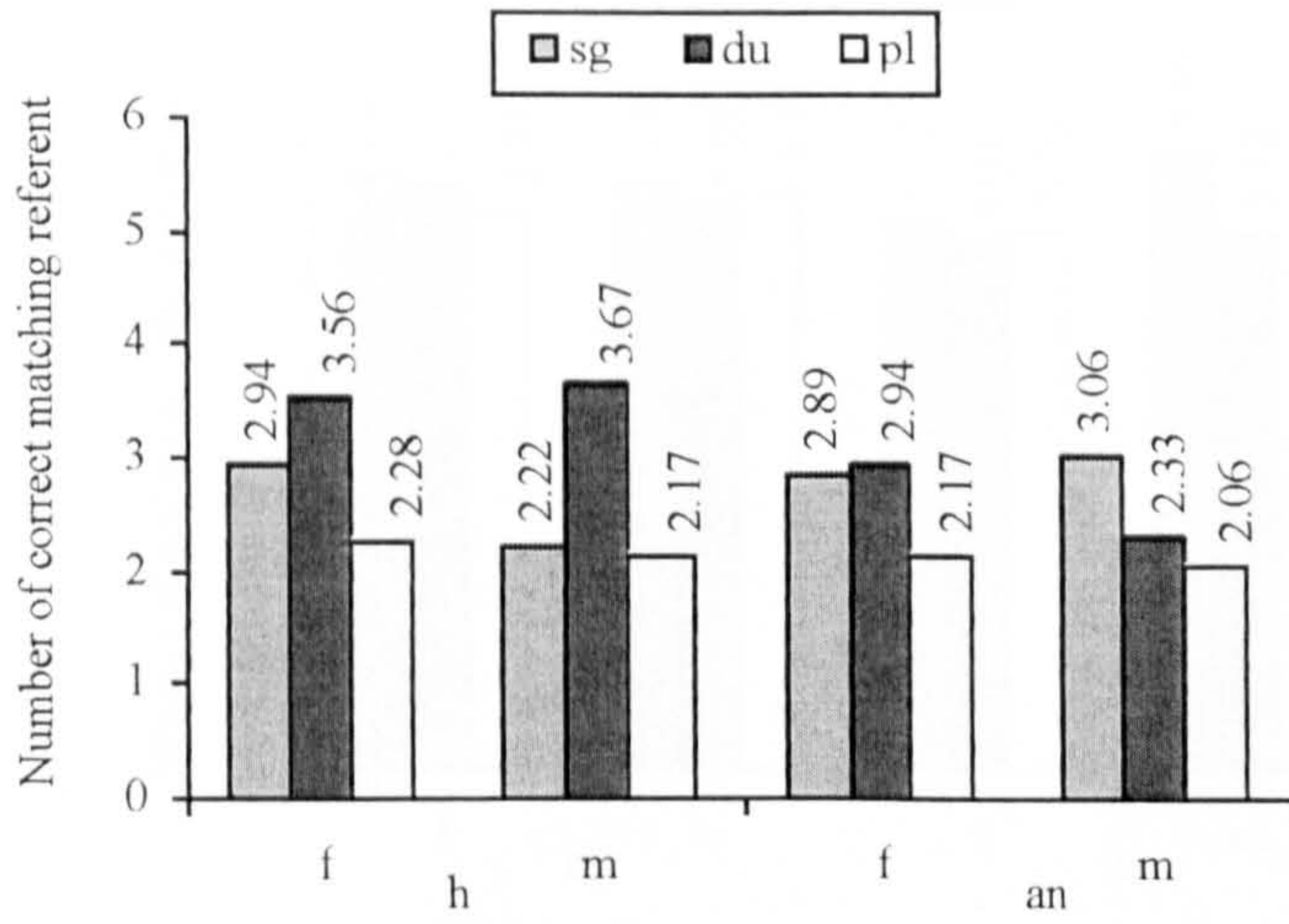


Figure 15. The effect of animacy x noun gender x number x age group 6 on noun comprehension

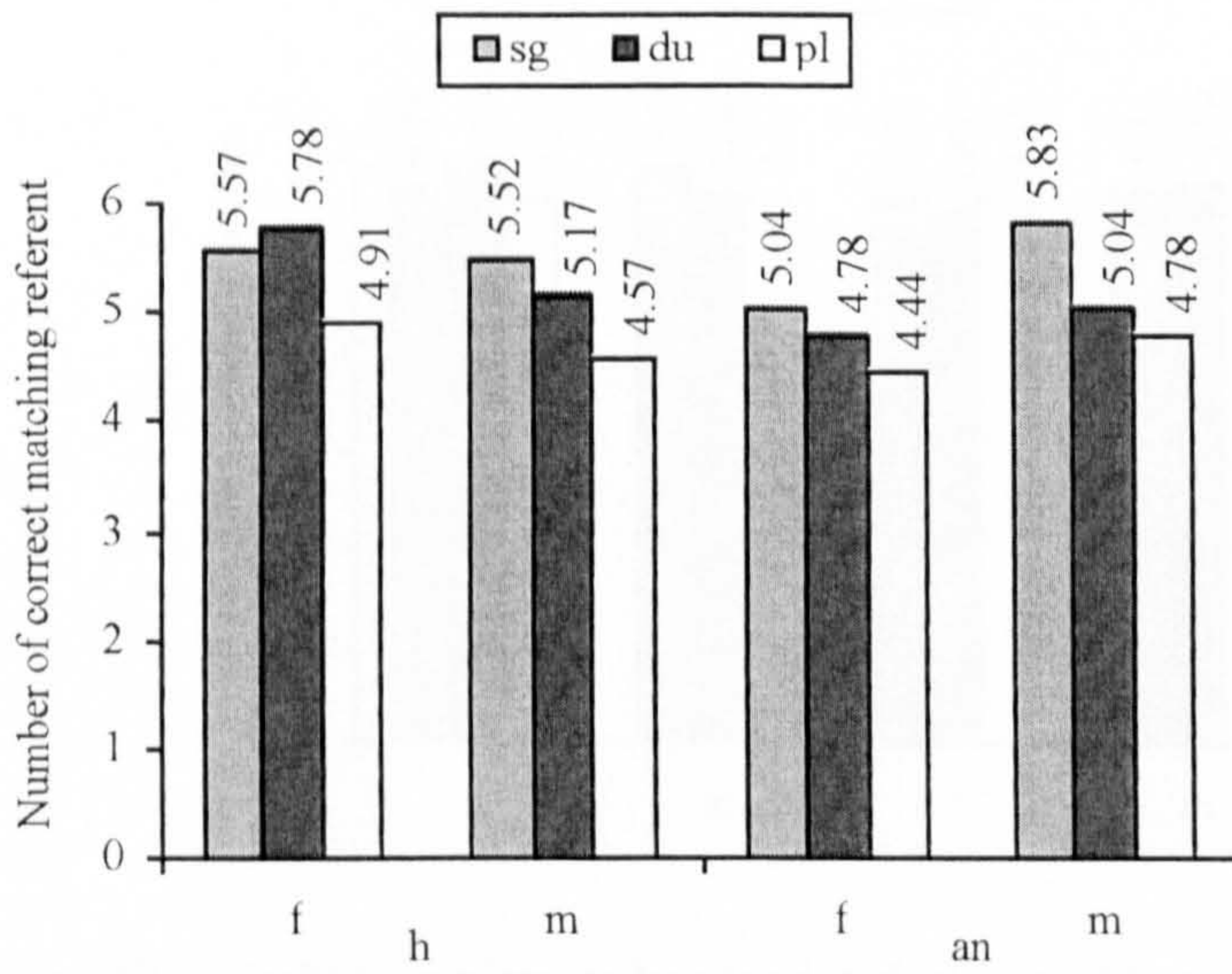


Figure 16. The effect of animacy x noun gender x number x age group 8 on noun comprehension

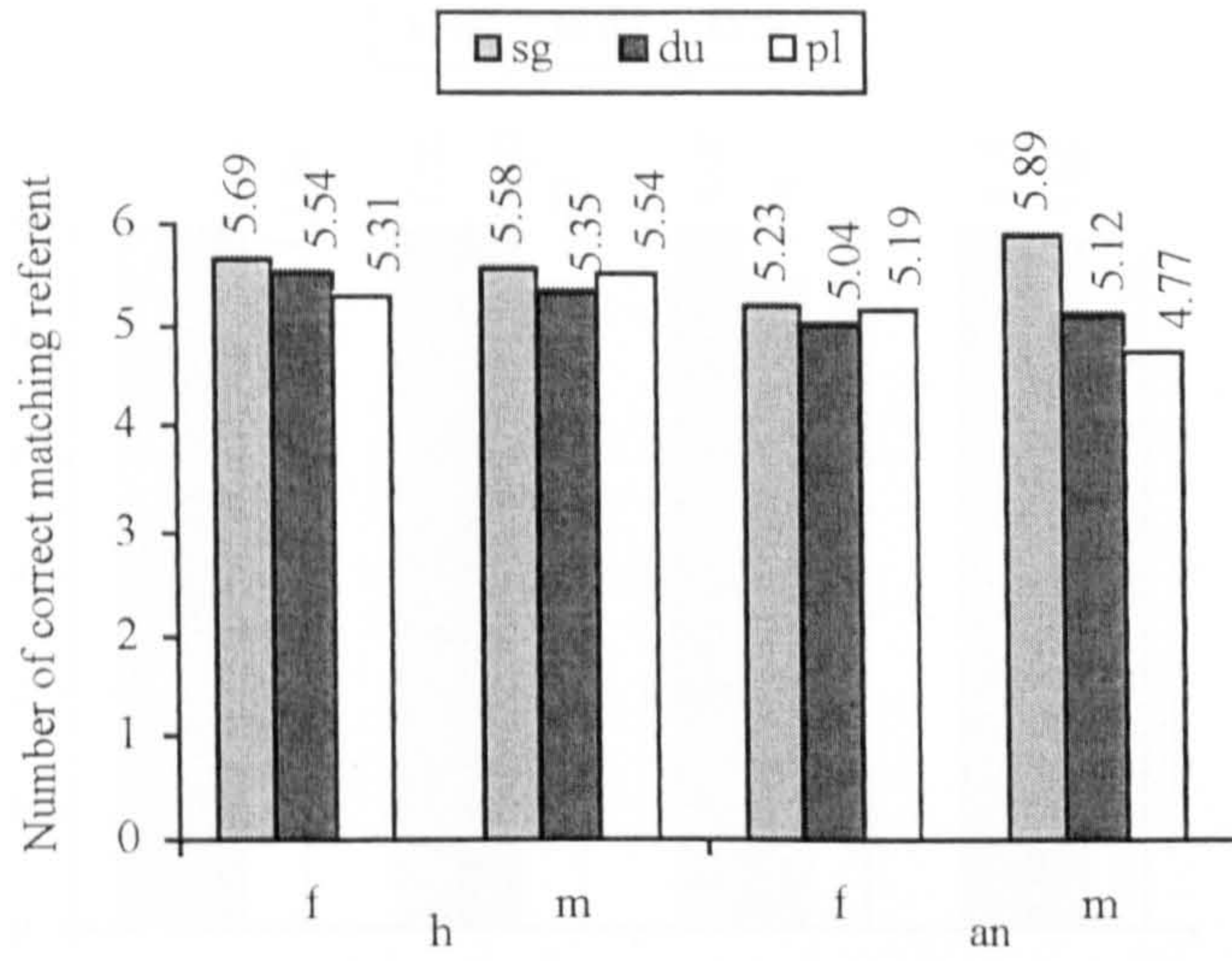


Figure 17. The effect of animacy x noun gender x number x age group 10 on noun comprehension

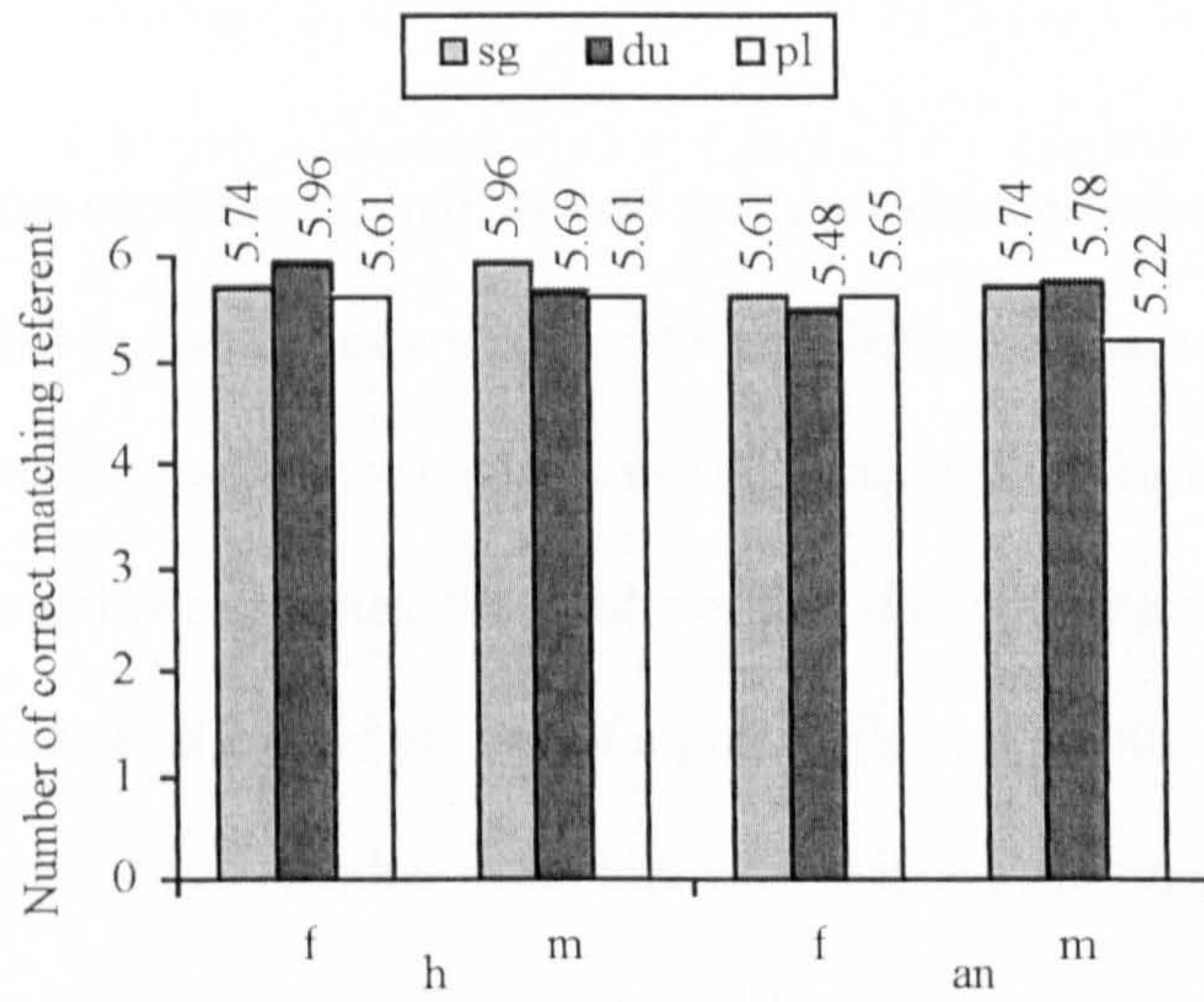


Figure 18. The effect of animacy x noun gender x number x age group 12 on noun comprehension

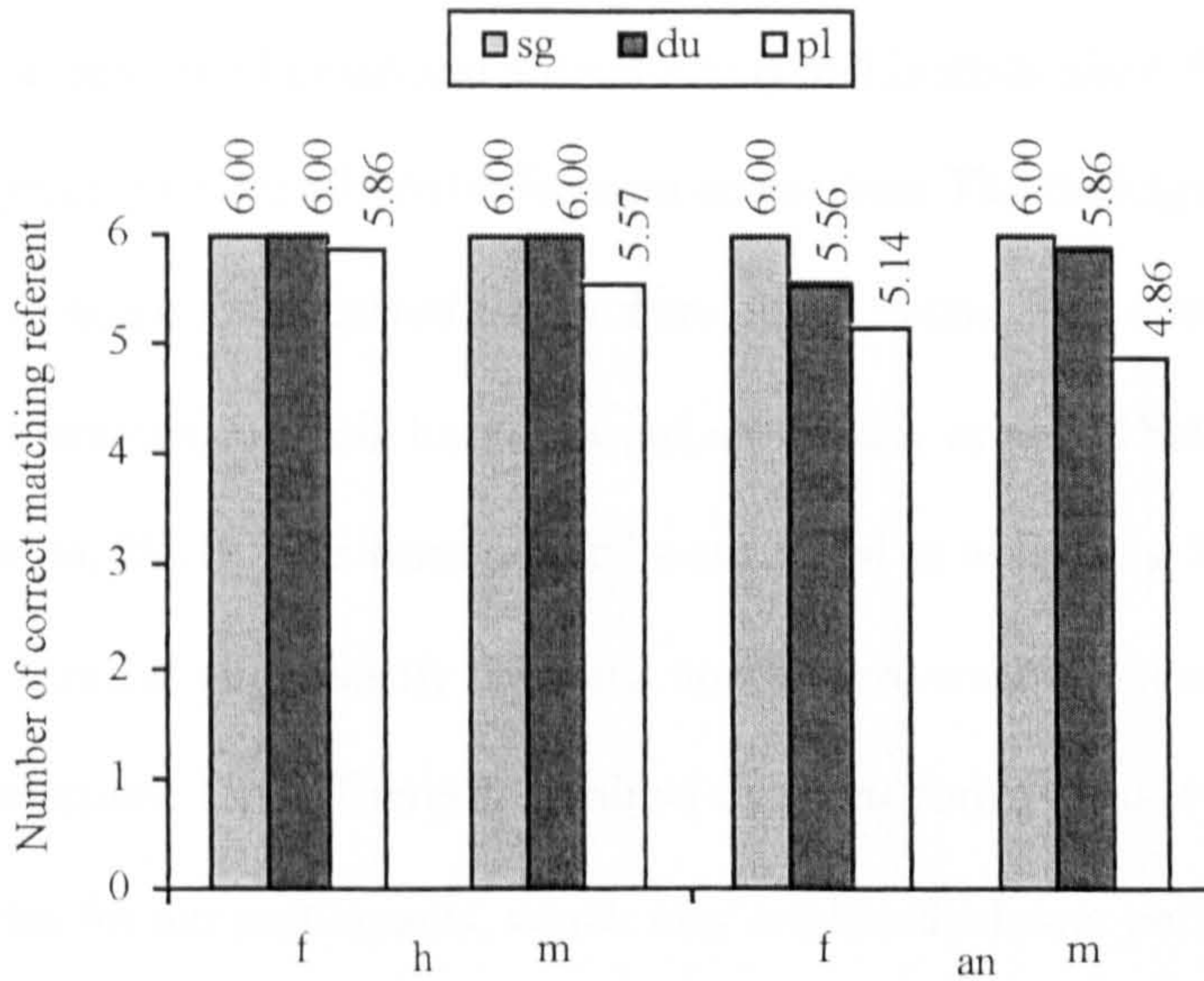


Figure 19. The effect of animacy x noun gender x number x age group A on noun comprehension

Summary: Nouns

To summarize the comprehension of human and animal nouns we can say that these results demonstrate that human nouns are comprehended before animal nouns.

Singular and dual noun forms are also comprehended earlier than plural noun forms. For the three number categories, the results of this study illustrate that singular and dual noun forms are mastered around the age of eight, while plural noun forms are mastered around the age of ten. Another result indicates that singular masculine forms are comprehended before feminine forms. Feminine dual forms are comprehended prior to masculine dual forms. However, the participants of this study perform similarly on the masculine and feminine plural forms.

Discussion: Nouns

Data regarding human and animal nouns in this study show that animacy, number, and age group have significant effects on acquisition. The findings of this research reveal that human nouns are acquired earlier than animal nouns. This could be due to an animacy hierarchy, wherein human nouns are usually acquired before animals (Dixon, 1994; Aissen, 2001). This result could be attributed as well to the fact that animal feminine forms are not usually used in a normal conversation, however, people tend to use the masculine form. Therefore, animal feminine forms used in this test might be novel forms for our participants, which may explain the lower performance detected on animal nouns vs. human nouns.

Comprehension of singular and dual noun forms before plural noun forms may be attributed to the fact that the plural is structured in two possible forms (sound and broken), whereas singular and dual nouns take only one form each by adding a suffix. Comprehending structures that come in one form appears easier than comprehending structures that take more than one form, as the plural does.

These results also indicate that, in general, at around the age of eight children perform equivalently to adults. The results also reveal significant differences in number x age group; six-year-olds lag behind all other age groups on all three number categories, while eight-year-olds lag behind twelve-year-olds on plurals only. These data also indicate that by the age of eight children comprehend dual forms equivalently to adults, and by the age of ten they comprehend the plural forms. Such results could be due to the transparency of singular and dual structures, which seems to make them easier to acquire than the plural.

The outcomes of this study also show significant interactions between gender x number. The results regarding singular forms may be attributed to the fact that masculine singular forms are not marked for gender while the feminine noun is, which may be a reason for better comprehension of the masculine singular form than the feminine singular form. However, the children's better performance on feminine dual forms than on masculine forms may be attributed to the transparency of the feminine dual structure, because it is marked for both gender and number whereas the masculine dual form is marked only for number, making it perhaps less transparent than the feminine.

5.2.2 Adjectives

The second set of analyses examines the responses to stimuli involving adjectives. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (h, an and in), gender (f and m), and number (sg, du, and pl).

The test reveals main effects of animacy ($F(2, 18) = 15.22, p < .001$), gender ($F(1, 92) = 38.39, p < .001$), number ($F(2, 18) = 33.42, p < .001$), and age group ($F(4, 92) = 21.68, p < .001$). Means and Std. Errors (appendix 1.2.2).

In terms of the effect of animacy, the outcomes reveal that the participants, in general, perform significantly better on adjectives referring to humans ($M = .8$) than on those referring to animals ($M = .78$) and inanimates ($M = .56$), and significantly better on adjectives referring to animals than on those referring to inanimates.

In terms of the effect of gender, the outcomes reveal that participants generally perform significantly better on feminine adjective forms ($M = .74$) than on masculine adjective forms ($M = .68$).

In terms of the effect of number, the participants generally perform significantly better on singular ($M = .76$) and dual adjective forms ($M = .74$) than on plural adjective forms ($M = .65$).

Performance by age group is shown in Figure 20. The main effects reveal that six-year-olds perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than ten and twelve-year-olds and adults. Ten-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .05$. This result generally shows that in terms of adjectives, by the age of twelve, children's performance was equivalent to adults'.

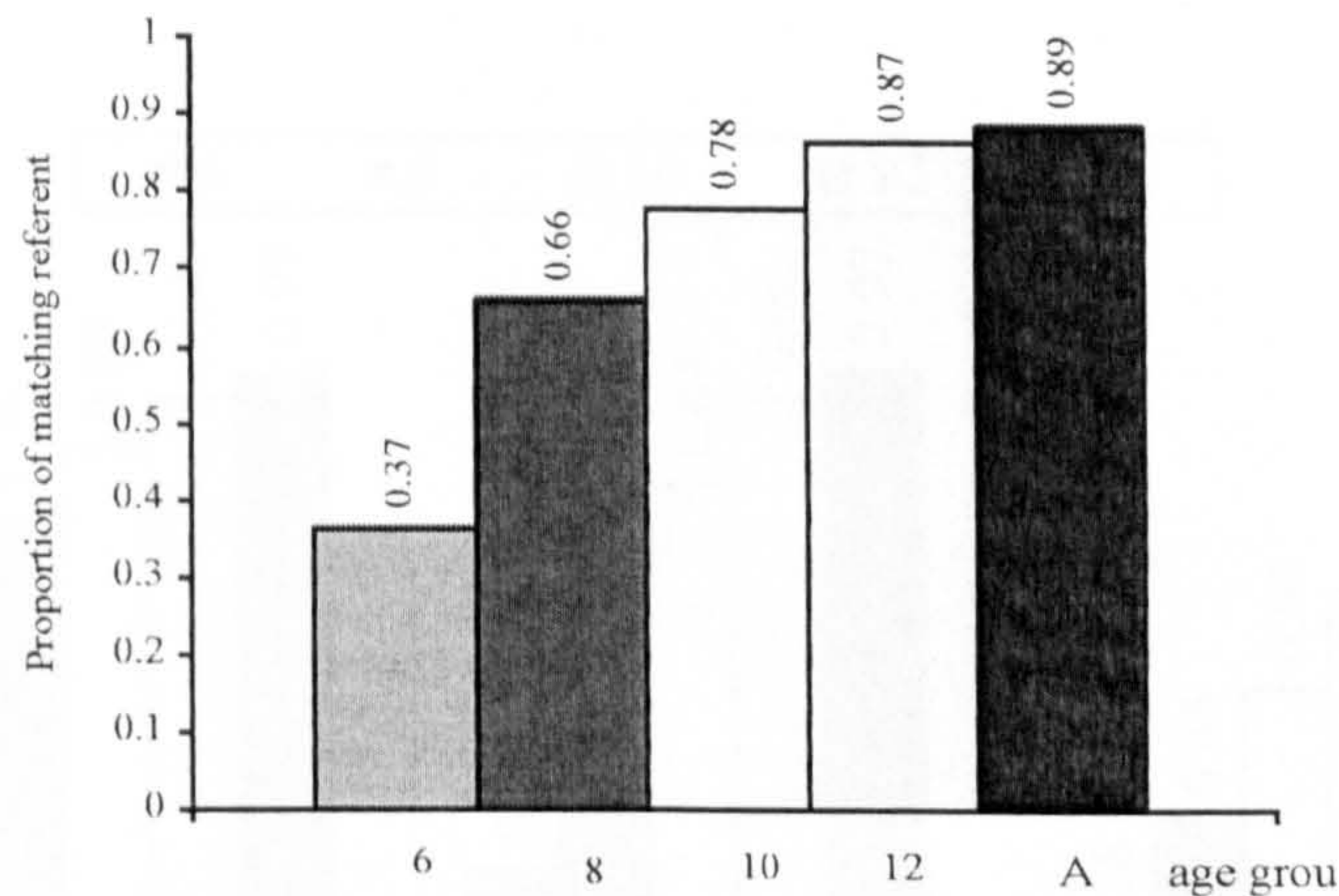


Figure 20. The effect of age group--adjectives

The main effects were moderated by the significant interactions of animacy x age group ($F(8, 18) = 4.08, p < .001$), animacy x gender ($F(2, 18) = 7.56, p < .001$), gender x number ($F(2, 18) = 3.06, p < .05$), and animacy x number x age group ($F(16, 37) = 2.36, p < .002$).

Performance by animacy x age group is shown in Figure 21. Simple effects analysis for each animacy type reveals that on adjectives referring to humans and animals six-year-olds perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than twelve-year-olds and adults. On adjectives referring to inanimates, six- and eight-year-olds perform significantly worse than ten and twelve-year-olds and adults; ten-year-olds likewise perform significantly worse than twelve-

year-olds and adults, all pairwise comparisons $p < .03$. These results, in general, show that by the age of twelve, children's performance becomes equivalent to adults' performance in comprehending animacy.

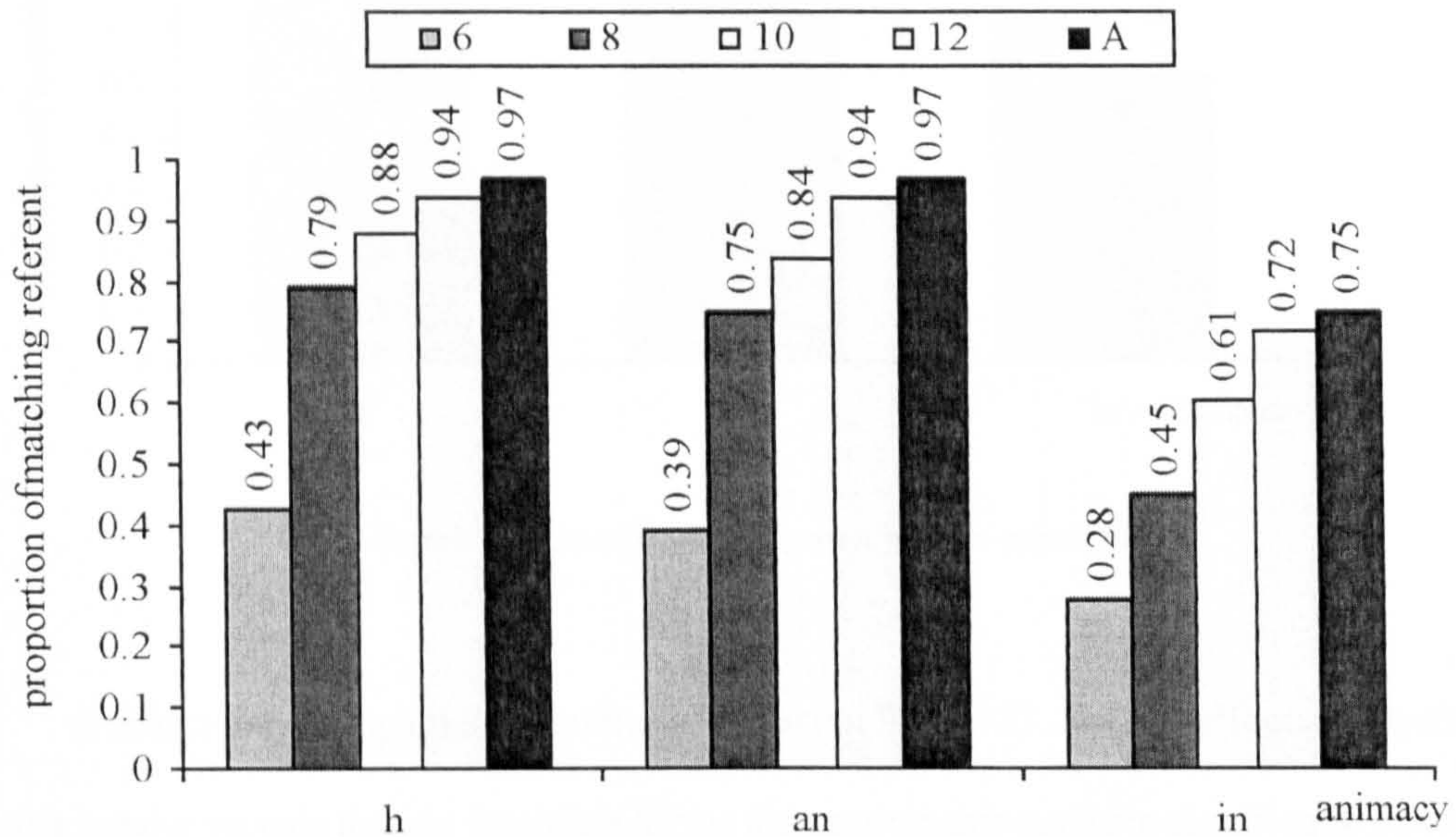


Figure 21. The effect of animacy x age group--adjective

Performance by animacy x gender is shown in Figure 22. Simple effects analysis for each animacy type reveals that on adjectives referring to human and inanimate nouns, participants perform significantly better on feminine than on masculine forms, all pairwise comparisons $p < .001$.

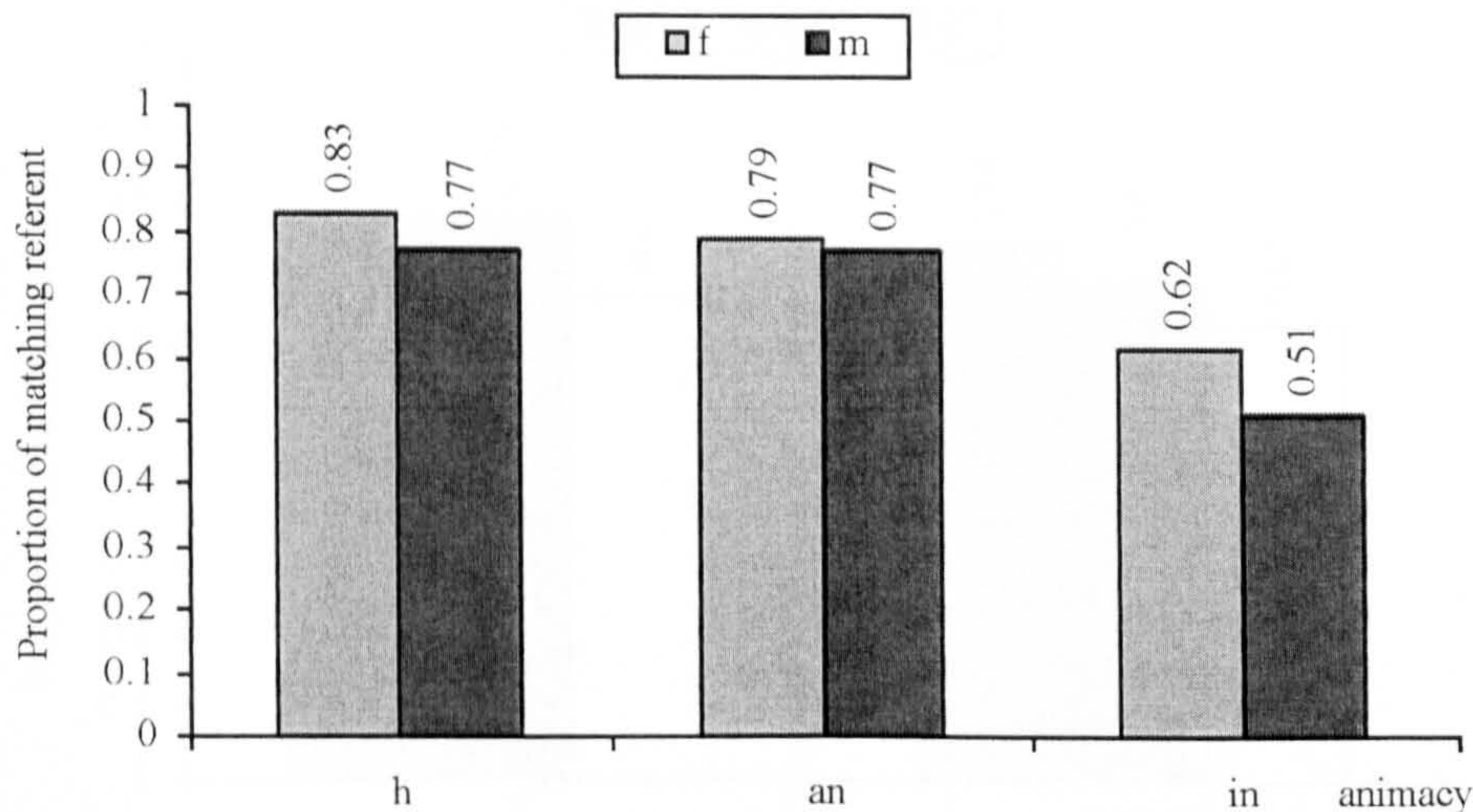


Figure 22. The effect of animacy x gender--adjective.

Performance by gender x number is shown in Figure 23. Simple effects analysis for each gender reveals that on feminine forms the participants perform significantly better on singulars and duals than on plurals. On masculine forms they perform significantly better on singulars than on duals and plurals, and better on duals than on plurals, all pairwise comparison $ps < .001$. These results overall show that the adjective plural forms are harder to comprehend in comparison to singular and dual forms.

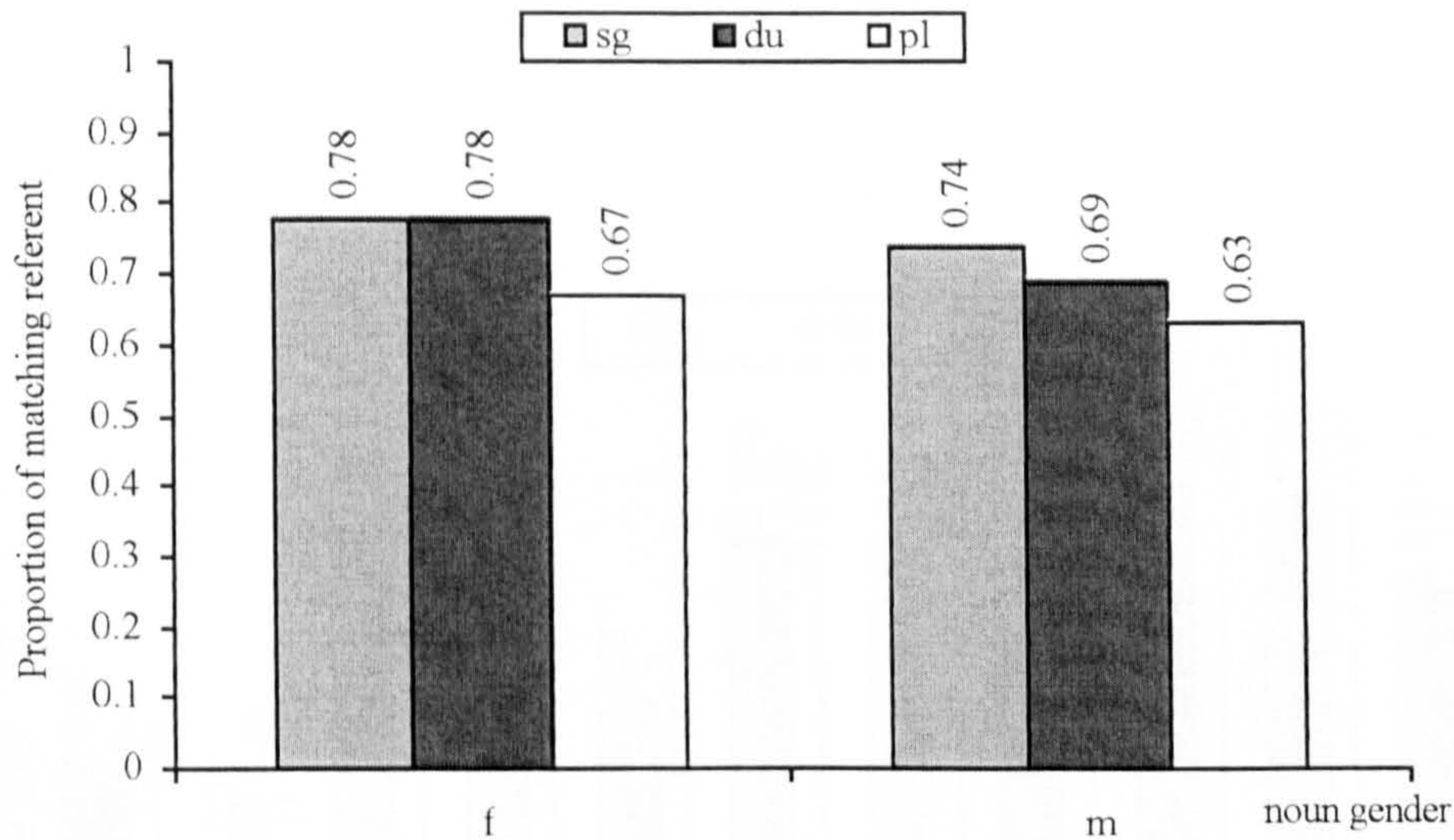


Figure 23. The effect of gender x number--adjective

Performance by animacy x number x age group is shown in Figure 24. On animacy types and numbers the effect of age is clear; age group six performs worse than all other age groups. However, improvement can be seen in performance on both animacy and number between the ages of eight and ten. Figure 24 also shows that performance on singular forms is better than on dual and plural forms; yet the results indicate that, overall, around the age of twelve the participants perform similarly on both singular and dual forms.

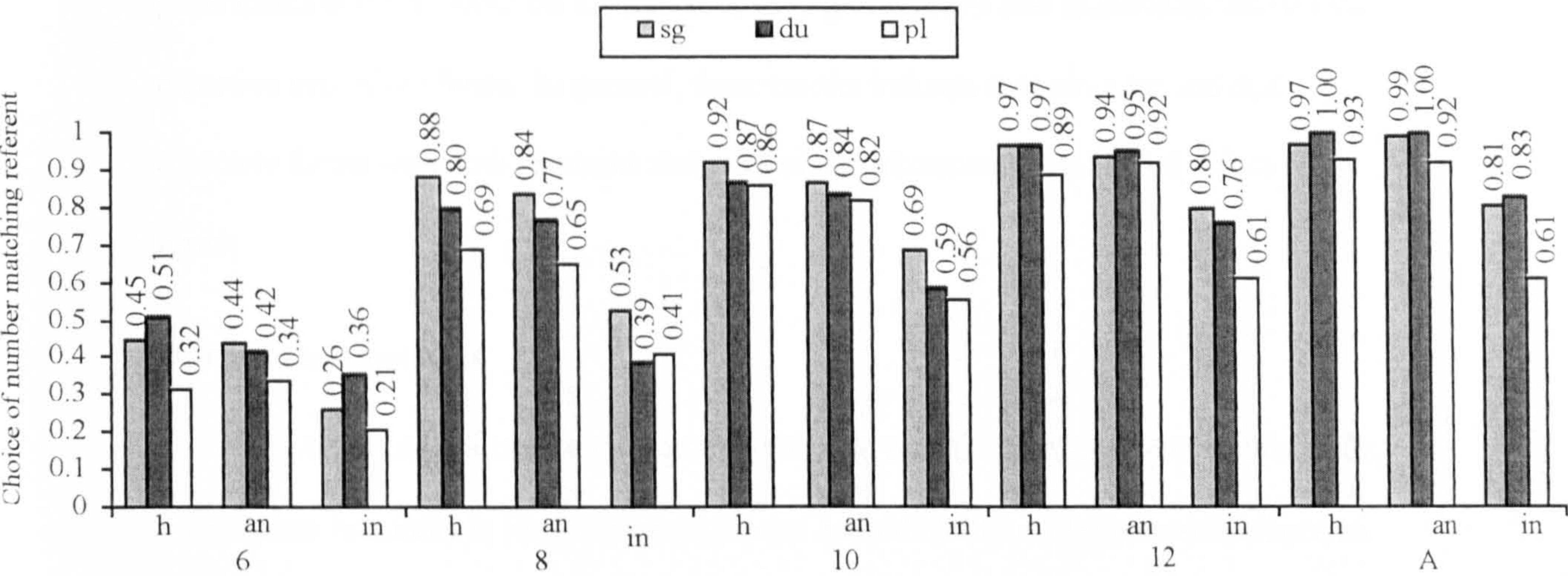


Figure 24. The effect of animacy x number x age group--adjective

Summary: Adjectives

In the results related to adjective comprehension, we can see that in general the participants perform better on adjectives referring to humans than on animals, while performance on adjectives referring to animals is better than on inanimates. The results also show that the participants comprehend feminine adjective forms better than masculine adjective forms, and they comprehend the singular and dual adjective forms prior to the plural forms. Performance by age group indicates that at around the age of twelve children reach adults' level on adjectives and subject-adjective agreement forms.

The results also illustrate that adjectives referring to humans and animals are comprehended by the age of ten, while adjectives referring to inanimates are comprehended by the age of twelve. Performance by animacy x gender reveals that the participants perform better on adjectives referring to humans and inanimates than on the adjective masculine forms. In general, these results indicate that singular and dual adjective forms with both feminine and masculine structures are mastered before plural forms.

Discussion: Adjectives

Data on noun-adjective agreement reveals that on adjective structures in this study, the animacy hierarchy is likely to be the reason behind children's better performance on humans than on animals and on animals than on inanimates (Dixon, 1994; Aissen, 2001). This study also illustrates that feminine forms are comprehended better in comparison to masculine forms. This could be due to the fact that masculine adjective forms have more broken forms than their feminine counterparts do; the result could correspond to Simoes & Stoel-Gammon's (1979) results on the acquisition of Portuguese irregular forms, wherein regular forms are shown to be mastered earlier than irregulars, because the latter have to be memorized by children.

Noun-adjective agreement seems to be more complicated than noun forms. In this study, in the noun category children had only to comprehend the noun form, while in the adjective category they had to comprehend the adjective in regard to the subject. This may explain the later comprehension (twelve years of age).

The differences found between gender x number show that participants perform better on feminine singular and dual adjectives than on feminine plural adjectives. Performance on masculine adjective forms shows that participants perform better on the singular than on the dual, and better on the dual than on the plural adjective forms. The participants' higher performance on feminine adjective forms could be due to these forms' transparency, because they are marked for both gender and number, while the masculine form is marked only for number. This result could indicate that because the feminine form is clear with its two marks attached to it, it would enable children to identify grammatical relations easily (Aksu-Koc & Slobin, 1985).

5.2.3 Verbs

The third set of analyses examines the responses to stimuli involving verbs for humans, animals, and inanimates. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (human, animal, and inanimate), gender (feminine and masculine), and number (singular, dual and plural).

The test reveals main effects of animacy ($F(2, 18) = 13.91, p < .001$), gender ($F(1, 92) = 10.47, p < .002$), number ($F(2, 18) = 13.83, p < .001$), and age group ($F(4, 92) = 19.40, p < .001$). Means and Std. Errors (appendix 1.2.3).

In terms of the effect of animacy, participants in general perform significantly better on verbs referring to humans ($M = .75$) and animals ($M = .74$) than on those referring to inanimates ($M = .54$).

In terms of the effect of gender, participants in general perform significantly better on masculine verb forms ($M = .69$) than on feminine verb forms ($M = .65$).

In terms of the effect of number, participants on the whole perform significantly better on singular verb forms ($M = .77$) than on duals ($M = .74$) and plurals ($M = .52$), and they also perform better on dual verb forms than on plurals.

Performance by age group is shown in Figure 25. The data reveal that the main effect of age group is that on subject-verb agreement six-year-olds perform significantly worse than all other age groups. Eight-year-olds also perform significantly worse than ten- and twelve-year-olds and adults. Ten-year-olds perform significantly worse than twelve-year-olds and adults, all pairwise comparisons $p < .04$. These results demonstrate that up until the age of ten, children lag behind adults on comprehending verbs.

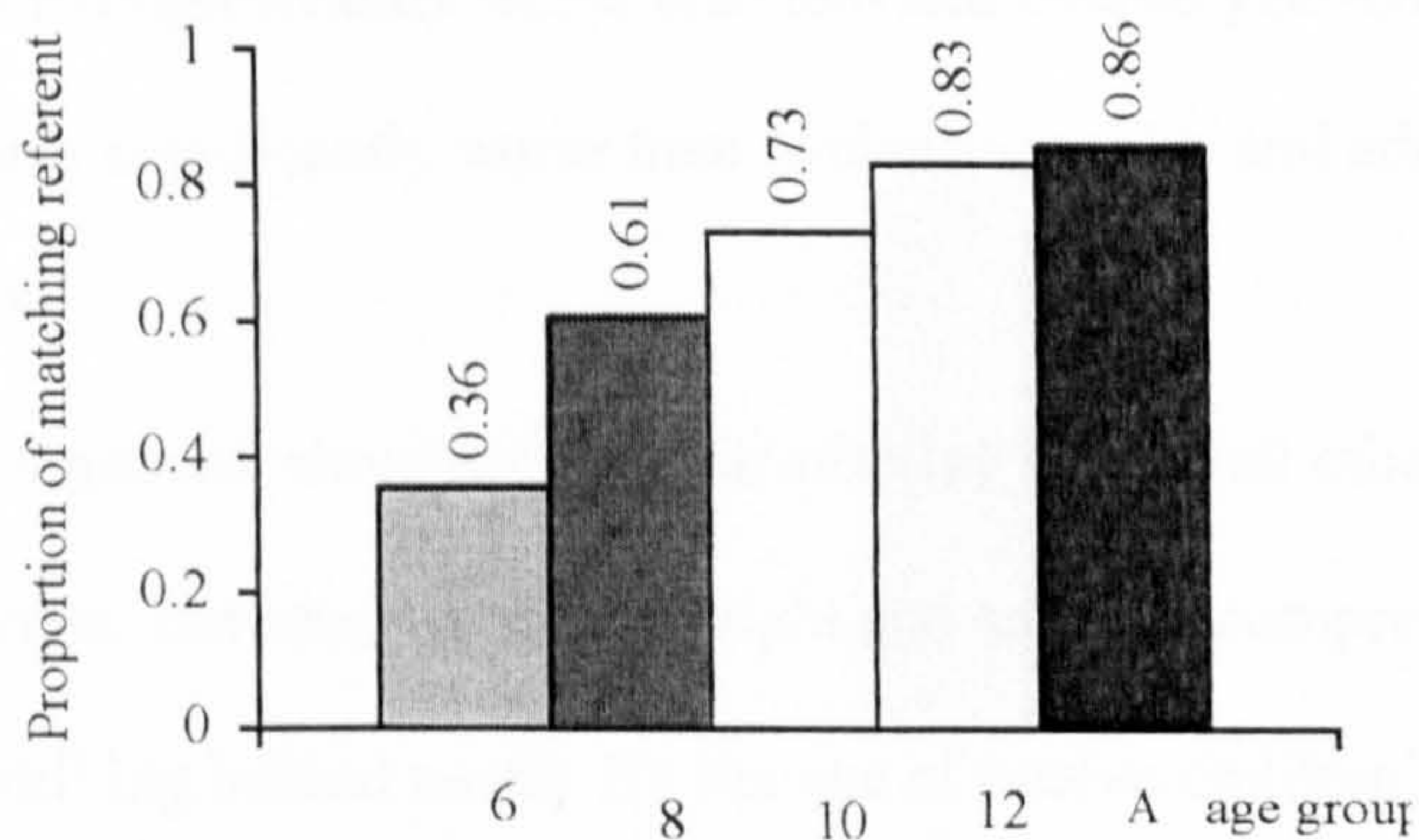


Figure 25. The effect of age group--verb

The main effects were moderated by the significant interactions of animacy x age group ($F(8, 18) = 5.44, p < .001$), number x age group ($F(8, 18) = 3.26, p < .002$), animacy x gender ($F(2, 18) = 17.64, p < .001$), animacy x number ($F(4, 37) = 6.25, p < .001$), gender x number ($F(2, 18) = 37.37, p < .001$), animacy x gender x age group ($F(8, 18) = 2.04, p < .04$), animacy x number x age group ($F(16, 37) = 1.83, p < .03$), gender x number x age group ($F(8, 18) = 2.76, p < .007$), and animacy x gender x number ($F(4, 37) = 6.06, p < .001$).

Performance by animacy x age group is shown in Figure 26. Simple effects analysis for each animacy reveals that on verbs referring to humans, six-year-olds perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than twelve-year-olds and adults. On verbs referring to animals, six-year-olds perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. On verbs referring to inanimates, six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten-year-olds perform significantly worse than twelve-year-olds and adults, all pairwise comparison $ps < .005$.

These results in general show that six-year-olds lag behind all other age groups on the three animacy types. Between the ages of eight and ten their comprehension increases, yet they still lag behind adults. By the age of twelve children's comprehension becomes equivalent to adults'.

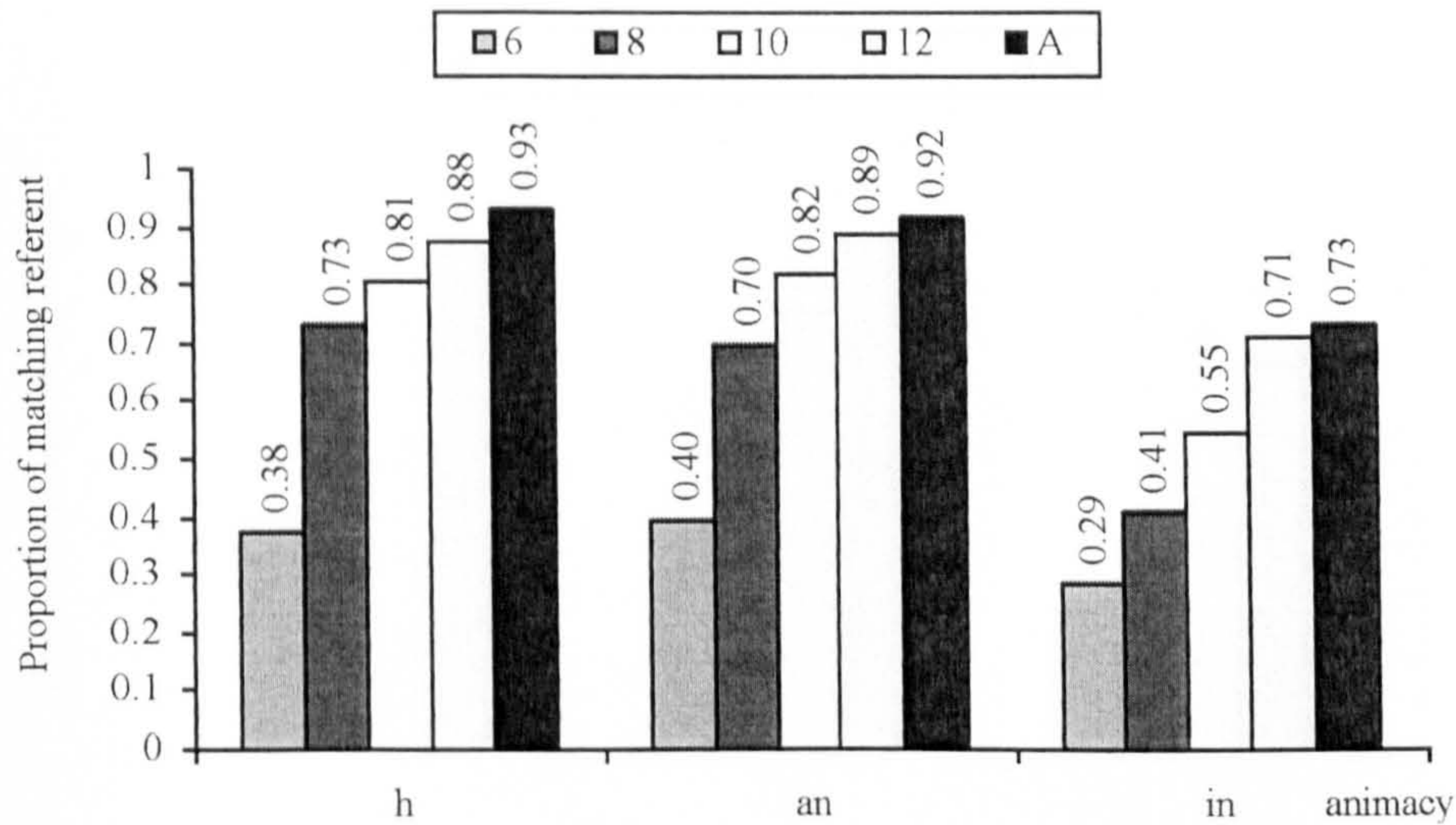


Figure 26. The effect of animacy x age group--verb

Performance by number x age group is shown in Figure 27. Simple effects analysis for each number reveals that on singular verb forms, six-year-olds perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than twelve-year-olds and adults. Ten-year-olds perform significantly worse than adults. On dual verb forms, six-year-olds perform significantly worse than all other age groups. Eight- and ten-year-olds perform significantly worse than twelve-year-olds and adults. On plural verb forms, six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults, all pairwise comparison $ps < .04$.

These results generally show that on singular verb forms, rapid development occurs between age groups eight and ten. For the dual verb forms, children's performance changes between the ages of ten and twelve. However, performance on verb plural forms reveals differences in the pattern between age groups eight and ten.

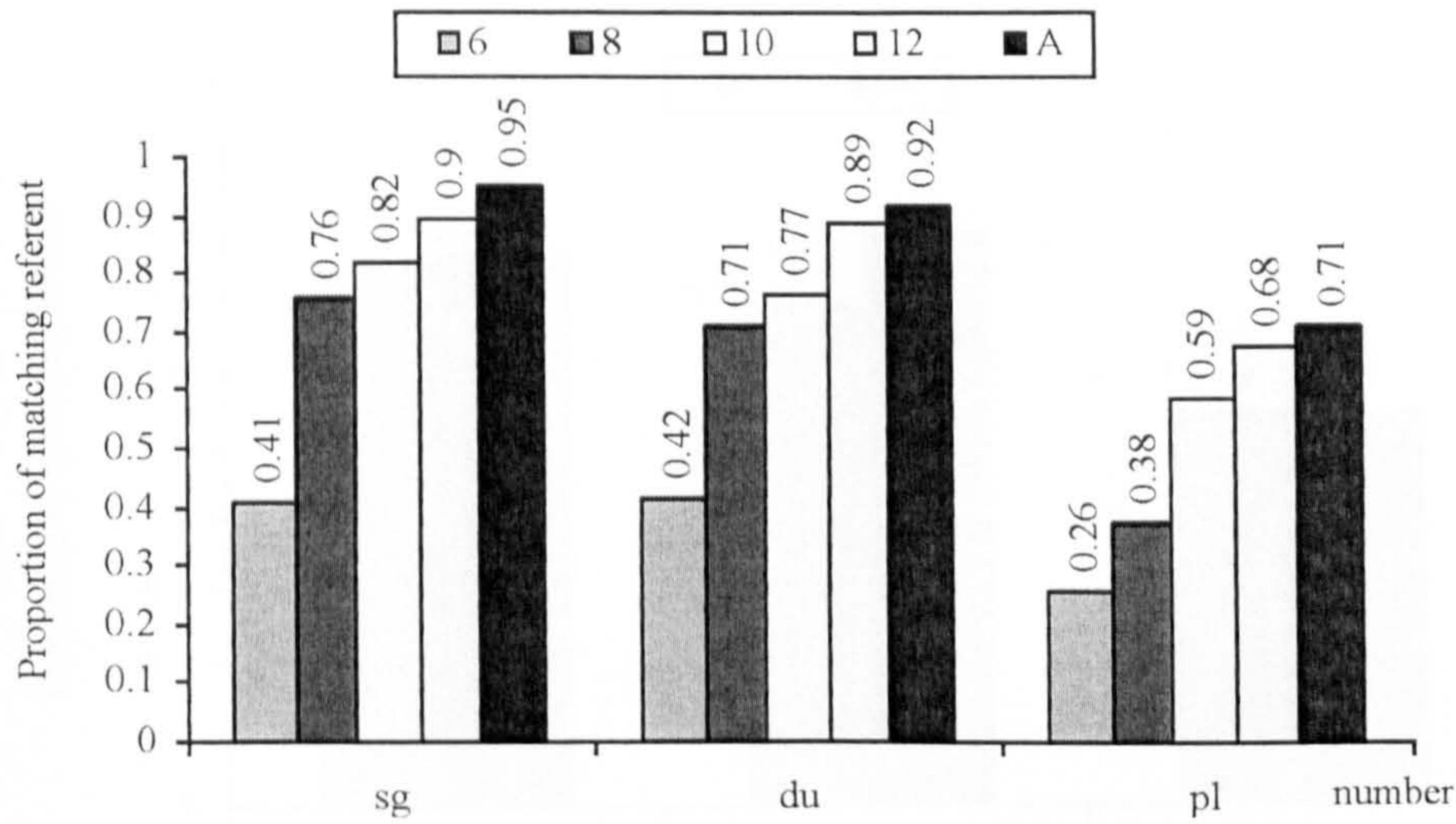


Figure 27. The effect of number x age group--verb.

Performance by animacy x gender is shown in Figure 28. Simple effects analysis for each animacy reveals that on verbs referring to animals, participants perform significantly better on masculine forms than on feminine forms, all pairwise comparisons $p < .001$. These results generally indicate that verbs referring to humans and inanimates in both genders do not result in any differences; however, the participants perform better on verbs referring to masculine animal subjects than on those referring to feminine animal subjects.

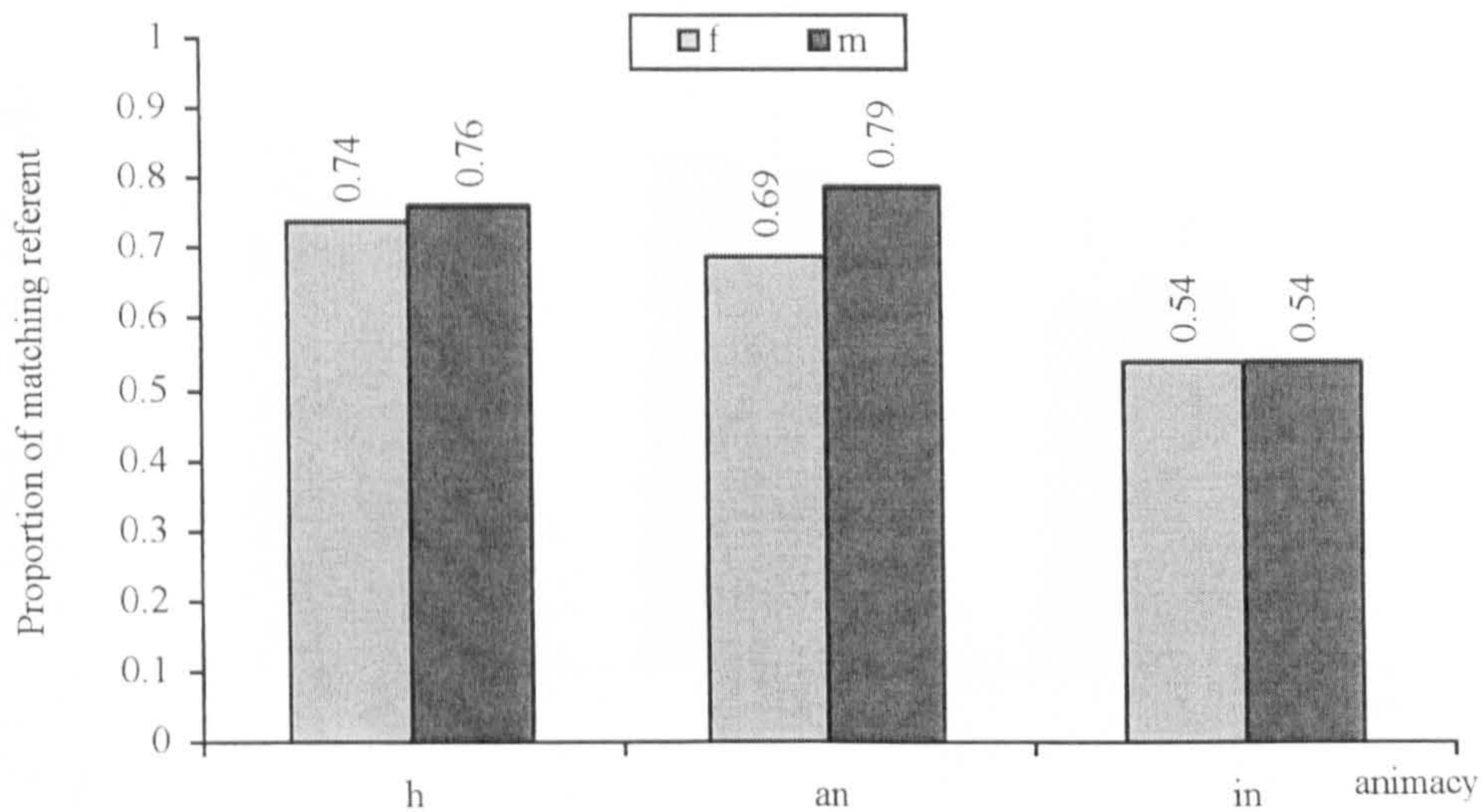


Figure 28. The effect of animacy x gender--verb

Performance by animacy x number is shown in Figure 29. Simple effects analysis for each animacy reveals that on verbs referring to humans and animals, participants perform better on singular forms than on dual forms, and better on duals than on plurals. On verbs referring to inanimates, participants perform significantly better on singular and dual forms than on plurals, all pairwise comparisons $ps < .05$. Overall, these results show that singular verb forms referring to humans and animals are comprehended more easily than dual forms referring to humans and animals, while on forms referring to inanimates, singulars and duals are comprehended equivalently. However, plural verb forms on all animacy categories are the most difficult to comprehend.

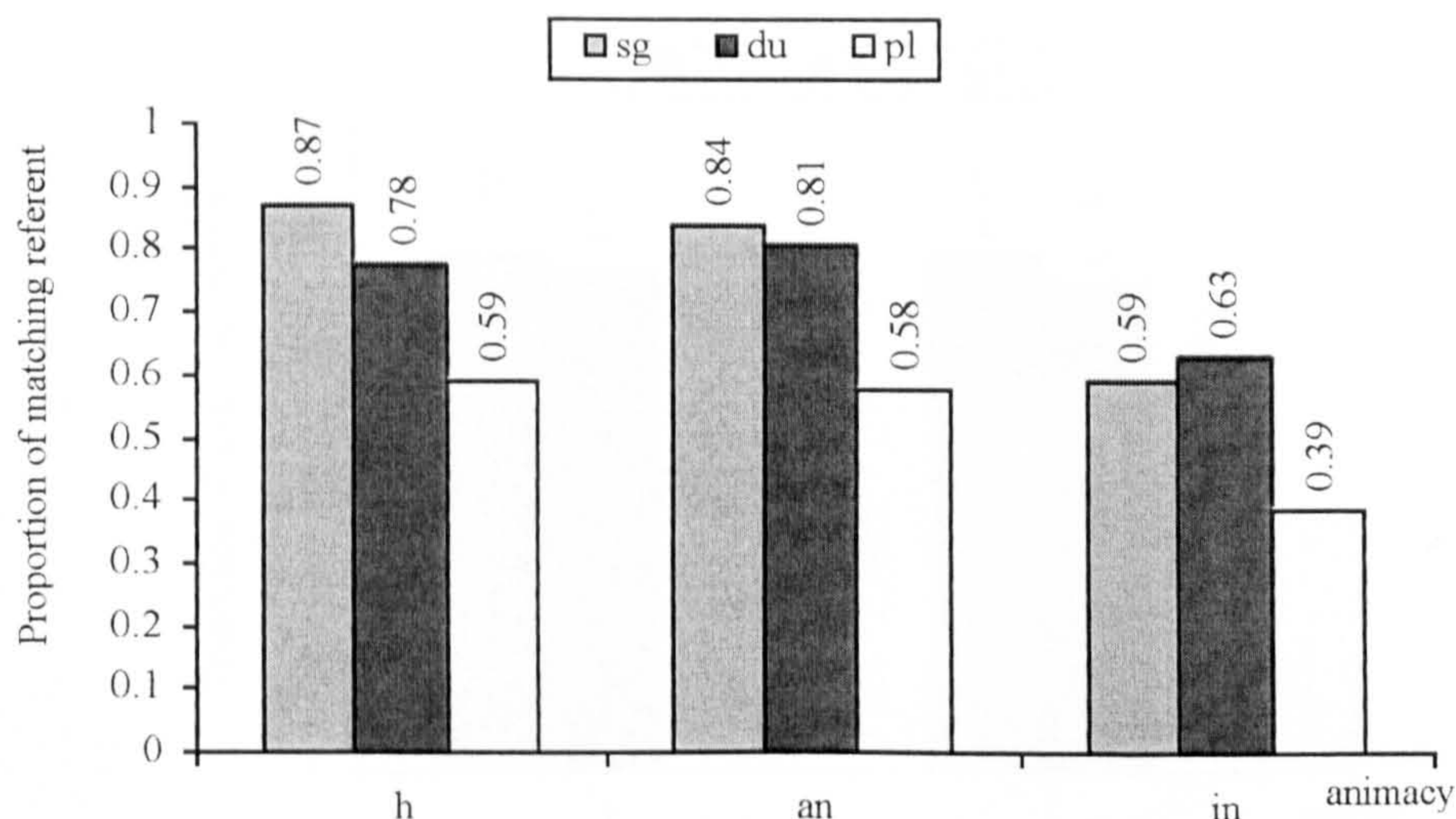


Figure 29. The effect of animacy x number--verb

Performance by gender x number is shown in Figure 30. Simple effects analysis for each gender reveals that on verbs referring to feminine subjects, participants perform significantly better on singular and dual forms than on plurals. On verbs referring to masculine subjects, participants perform significantly better on singular verb forms than on duals and plurals, and better on dual than on plural verb forms, all pairwise comparisons $ps < .002$.

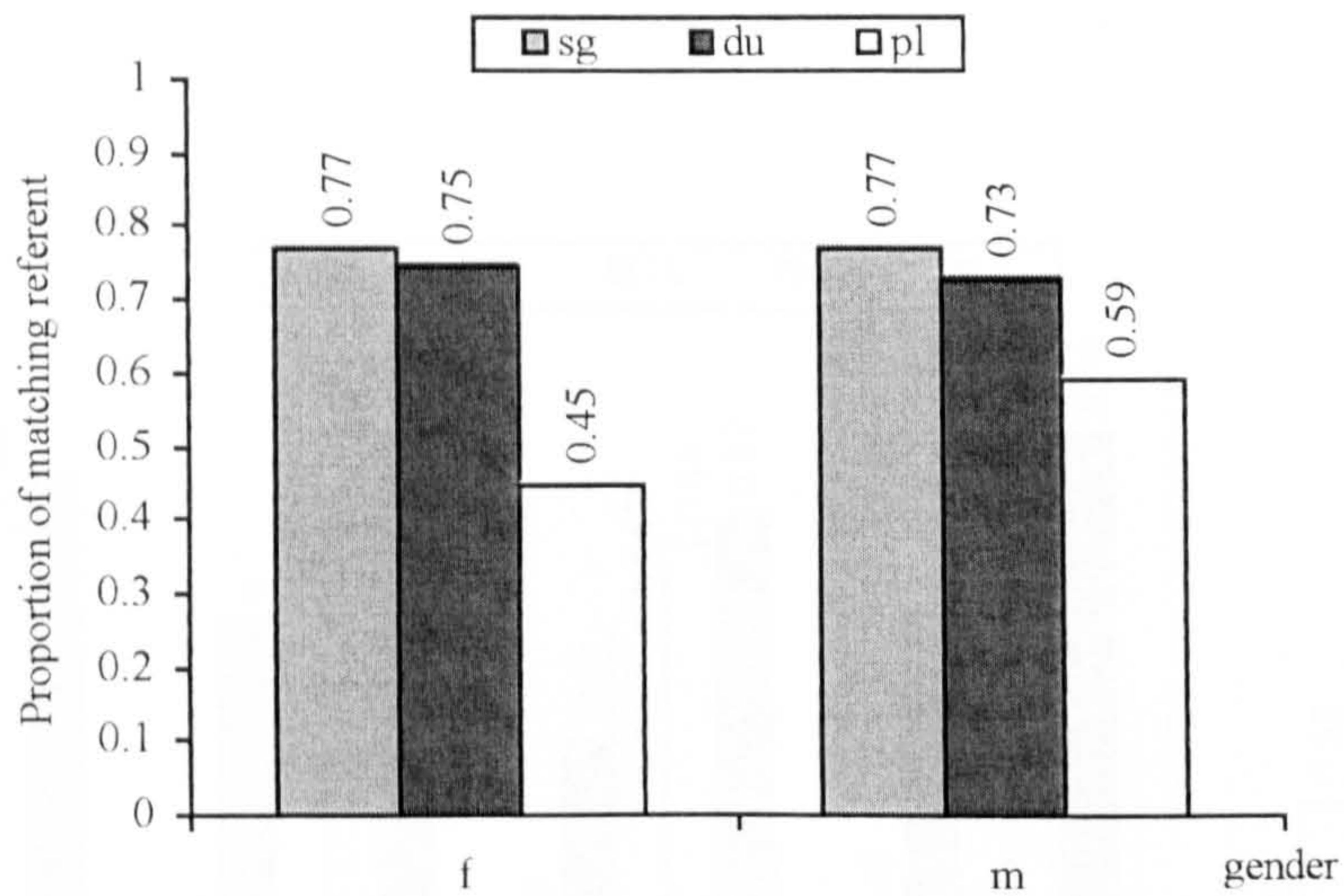


Figure 30. The effect of gender x number--verb

Performance by animacy x gender x age group is shown in Figure 31. This interaction, on the whole, indicates more differences between age groups in comprehending verbs referring to inanimates. These differences could be attributed to an animacy hierarchy. Even so, these differences seem to occur more in the feminine forms, possibly due to the language input and CDS, since feminine form constructions (the feminine plural form in particular) are not frequent in the language input and CDS.

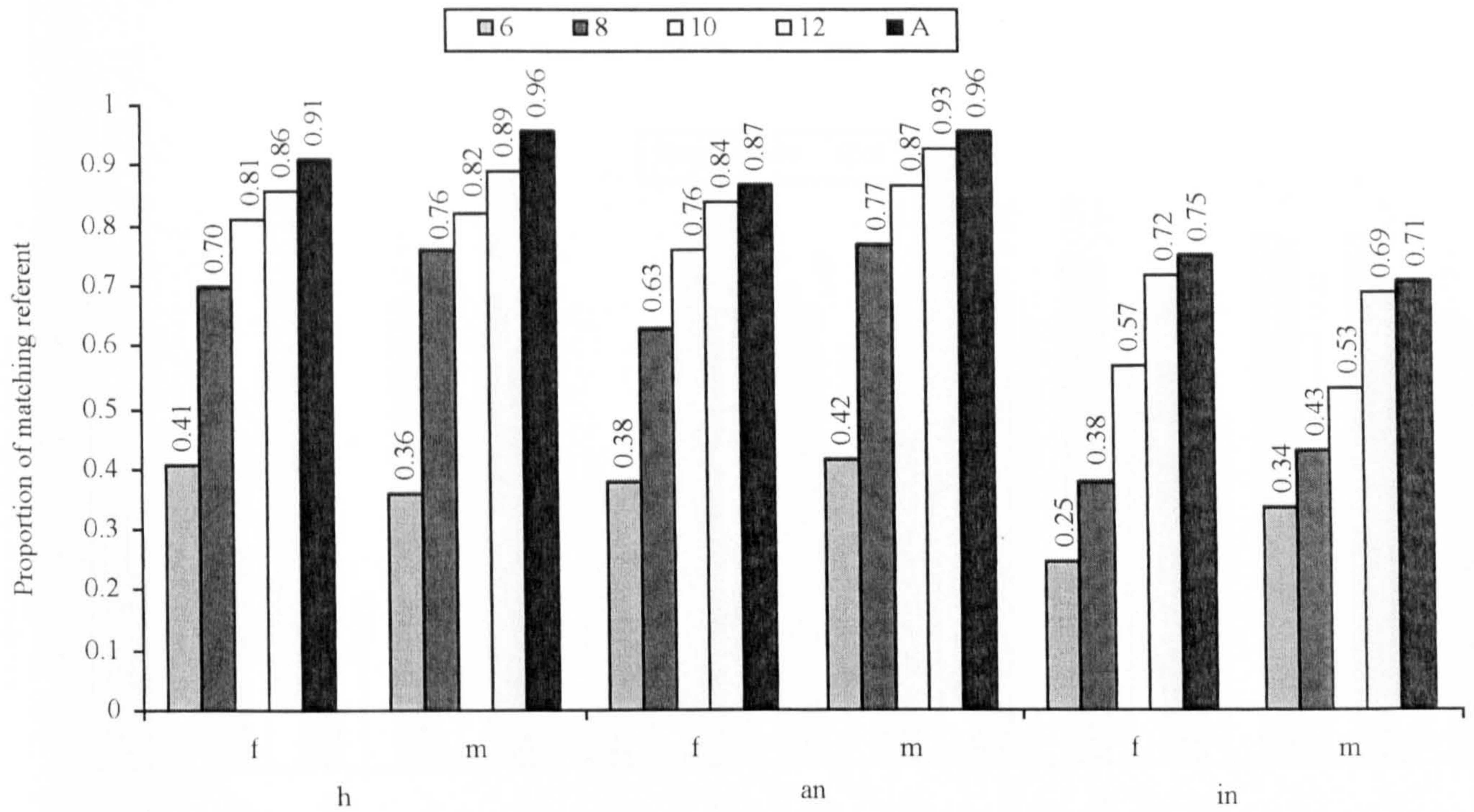


Figure 31. The effect of animacy x gender x age group--verb

Performance by animacy x number x age group is shown in Figure 32. These results show different interaction patterns; in some cases singulars and duals are comprehended equivalently, while in other cases the singular is comprehended better than the dual on animacy and across age groups. In these results, plural forms always score lower than singulars and duals, perhaps due to the fact that the plural verb form used in these tasks is restricted in the language input to human nouns only.

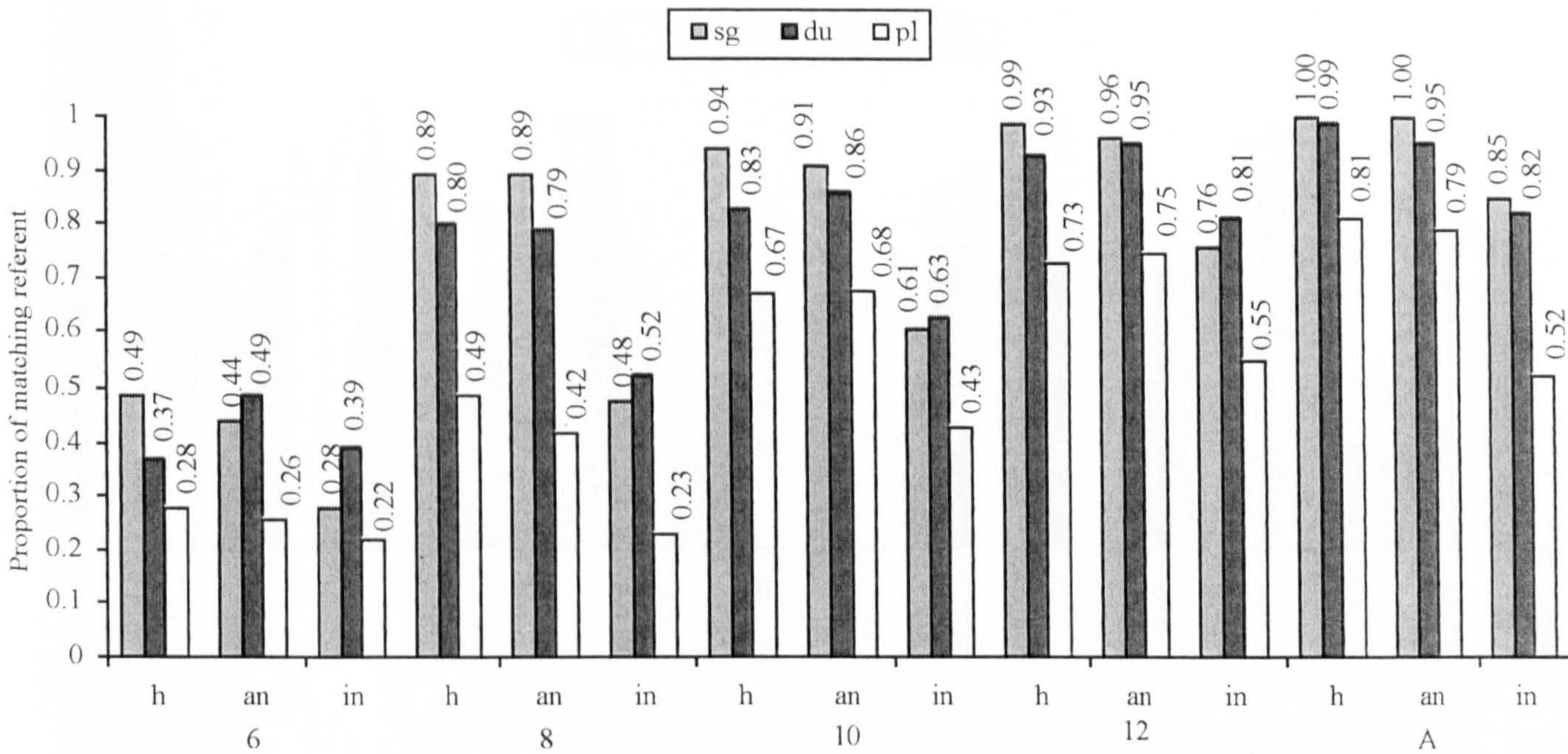


Figure 32. The effect of animacy x number x age group--verb

Performance by gender x number x age group is shown in Figure 33. These results overall show that on both singular and dual numbers, and on both feminine and masculine forms, some similarities occur across ages. However, on plural forms some differences emerge in the performance between feminine and masculine forms; feminine plural forms are comprehended later than masculine plural forms, as seen in the

performance of age groups six and eight. This may be due to the fact that plural feminine verb forms are not used frequently in the language input and CDS.

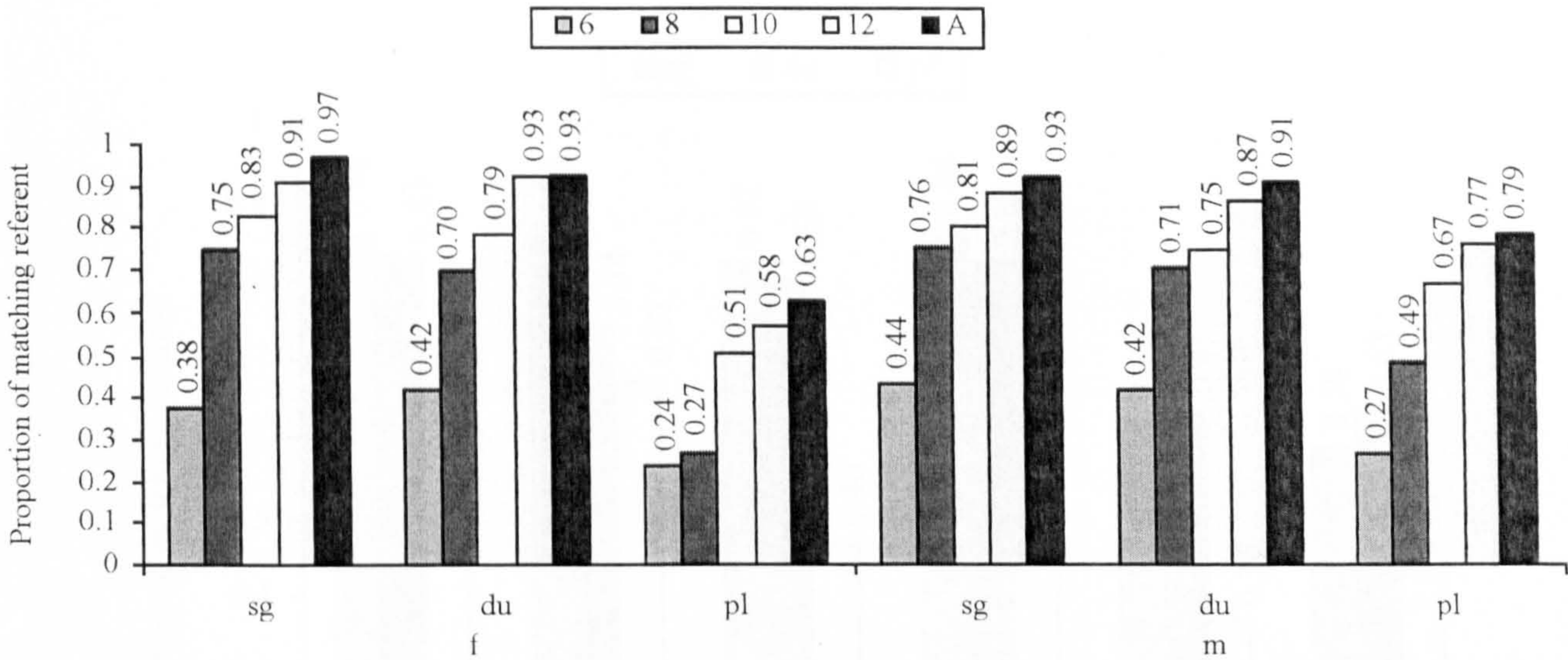


Figure 33. The effect of gender x number x age group--verb

Performance by animacy x gender x number is shown in Figure 34. These interactions show the effect of hierarchy; human verb forms are comprehended better than animals and inanimates in the study. These effects also indicate differences among the three masculine number forms, which were not as great as the three feminine number forms, especially on plurals. These findings may indicate that all masculine number forms are comprehended better than feminine number forms on human and animal verb types. However, inanimate verbs do not seem to be comprehended on the level of the

other two verb types, and this could be attributed to the language input and CDS in that participants are not used to associating verbs with inanimate objects in the language.

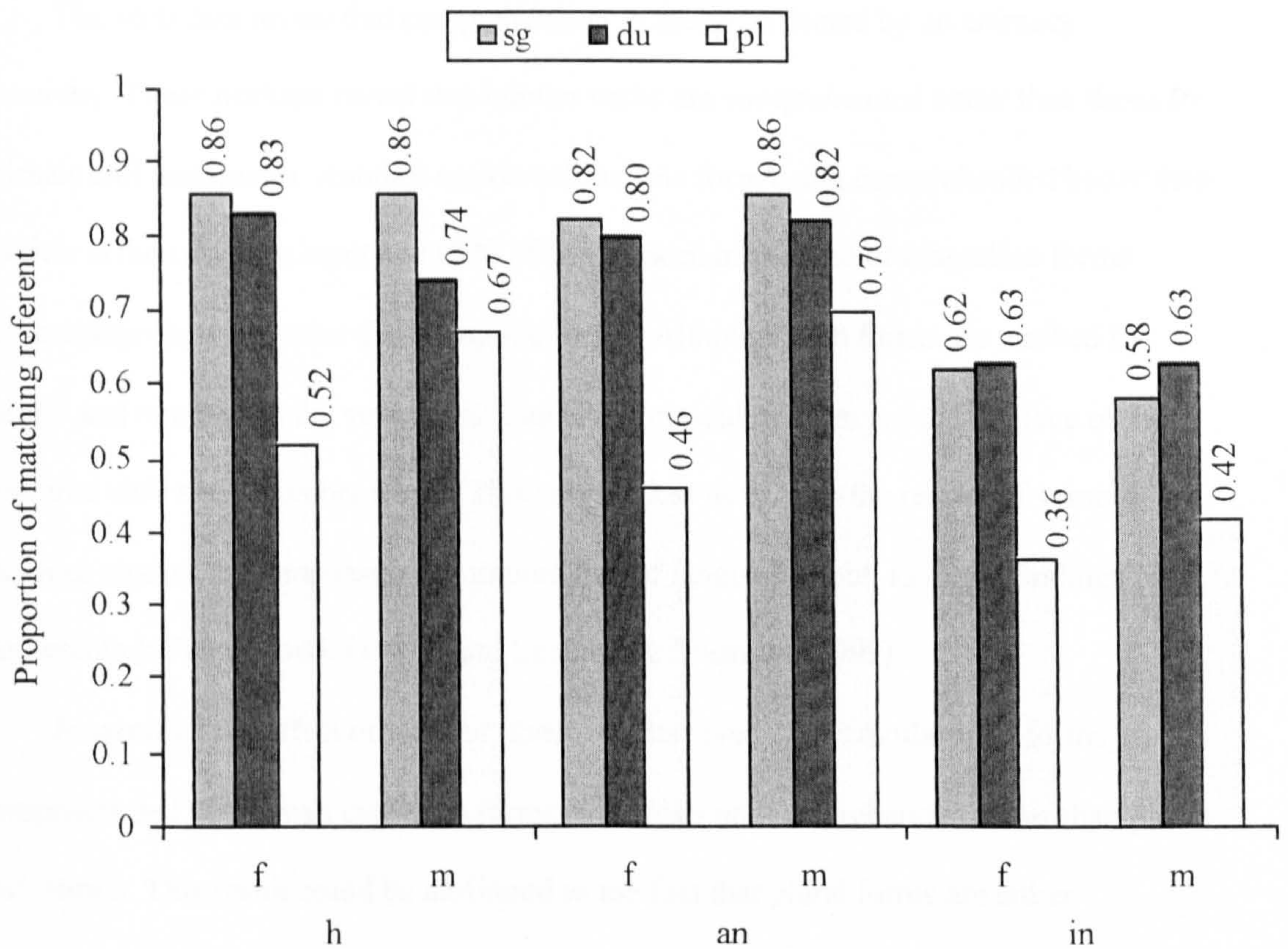


Figure 34. The effect of animacy x gender x number--verb

Summary: Verbs

To summarize comprehension of verbs we can say that our results indicate clear hierarchy effects, whereby verbs referring to human subjects are comprehended before verbs referring to animals and inanimate subjects. The findings also show that masculine

verb forms are comprehended prior to feminine verb forms. Number effects indicate sg > du > pl. On the whole, participants reach adult's verb comprehension level on verb forms at around the age of ten.

Discussion: Verbs

The verb data reveal that comprehension is usually affected by an animacy hierarchy. These findings reveal that human verbs are comprehended better than those for animals and inanimates. Another reason behind one form being comprehended better than another is the language input and CDS effect, as seen in the case of masculine forms being comprehended better than feminine forms. Although both forms are marked for gender and number, in the vernacular dialect the masculine form is used in place of the feminine with some number forms. This result takes us back to the results of some previous studies that emphasize the importance of language input, as in the findings of Gathercole (1986), Moerk (1992), and Leonard & Swanson (1999).

In terms of the effect of number, these results reveal that singular verb forms are comprehended better than dual verb forms, and duals are comprehended better than plural verb forms. This result could be attributed to the fact that plural forms are either infrequent in the language input and CDS, as in the case of the feminine plural forms, or to the fact that the masculine plural verb form is restricted to human nouns only, while animal and inanimate nouns would take the singular feminine forms. This result disagrees with Al-Akeel's (1998) findings, which indicate that around the age of 4;0 to 4;6, children comprehend these forms. According to our findings, overall, children do not reach adults' comprehension levels until around the age of ten. The differences between

these findings and Al-Akeel's could be due to the different methodologies used, where Al-Akeel's participants were faced with a target word and four lexical and syntactic distracters, while our participants were faced with a target word and five syntactic distracters.

The data in this study also show that both genders (m and f) on verbs referring to human nouns are comprehended equivalently, perhaps because the forms used in our tests are the same forms existing in the input. However, participants exhibited better performance on the masculine animal forms than on the feminine animal forms, which could be attributed to the fact that the masculine forms are used in the input and CDS more frequently than the feminine forms are.

Performance by animacy x number and gender x number overall shows that on both gender and all animacies, the plural form is the hardest to comprehend. This could be due, as discussed earlier, to the restrictions and infrequency of some plural forms. The three-way interactions detected in this category on the whole show that the language input and CDS contributes a great deal to comprehension of grammatical forms.

5.2.4 Collective nouns

The fourth set of analyses examines the responses to stimuli involving collective nouns for animals and inanimates. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (animal and inanimate), gender (feminine form, which has a unit reference, and masculine, which has a collective reference), and word type (noun, adjective, and verb).

The test reveals main effects of word type ($F(2, 18) = 45.68, p < .001$), animacy ($F(1, 92) = 6.99, p < .01$), gender ($F(1, 92) = 9.23, p < .003$), and age group ($F(4, 92) = 21.09, p < .001$). Means and Std. Errors (appendix 1.2.4).

In terms of the effect of word type, participants in general perform significantly better on collective nouns ($M = .79$) than on adjectives referring to collective nouns ($M = .76$) and verbs referring to collective nouns ($M = .62$), and better on adjectives than on verbs.

In terms of the effect of animacy, participants perform significantly better on collective inanimates ($M = .74$) than on collective animals ($M = .72$).

In terms of the effect of gender, participants generally perform significantly better on the masculine collective forms ($M = .74$) than on feminine forms ($M = .71$).

The main effect of age group is shown in Figure 35. Six-year-olds in this study perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than twelve-year-olds and adults. These results in general show that six-year-olds' comprehension of collective nouns lags behind that of all other age groups. Between the ages of eight and ten, more rapid development occurs in the comprehension of collectives. By the age of ten, children in this study comprehend the collective category equivalently to adults.

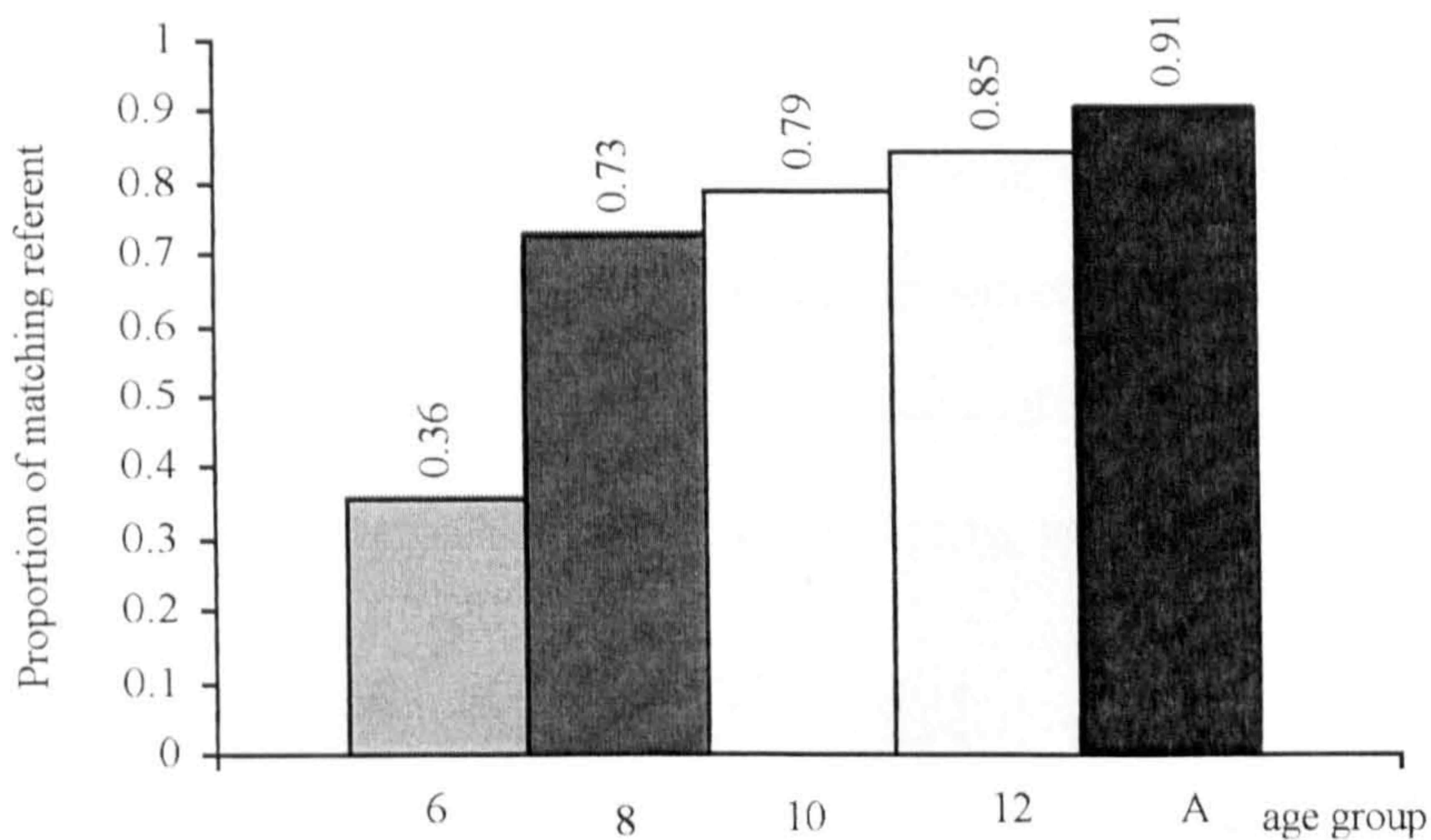


Figure 35. The effect of age group--collective nouns

The main effects were moderated by the significant interactions of word type x age group ($F(8, 18) = 2.66, p < .009$), animacy x age group ($F(4, 92) = 4.25, p < .003$), gender x age group ($F(4, 92) = 2.92, p < .03$), word type x animacy ($F(2, 18) = 15.89, p < .001$), word type x gender ($F(2, 18) = 13.5, p < .001$), word type x animacy x age group ($F(8, 18) = 2.31, p < .02$), and word type x animacy x gender ($F(2, 18) = 20.84, p < .001$).

Performance by word type x age group is shown in Figure 36. Simple effects analysis for each word type reveals that on the collective noun type--adjectives and verbs referring to collective nouns, age group six performs significantly worse than all other age groups. On collective nouns, eight-year-olds perform significantly worse than ten-year-olds, twelve-year-olds, and adults. On adjectives referring to collective nouns, eight-

, ten-, and twelve-year-olds perform significantly worse than the adult group. On verbs referring to collective nouns, eight-year-olds perform significantly worse than twelve-year-olds, all pairwise comparisons $ps < .04$.

These results in general show that six-year-olds' comprehension of these word type categories lags behind that of all other age groups. On collective nouns and verbs, the results indicate that by the age of ten performance is equivalent to that of twelve-year-olds and adults. On adjectives, all non-adult age groups lag behind adults.

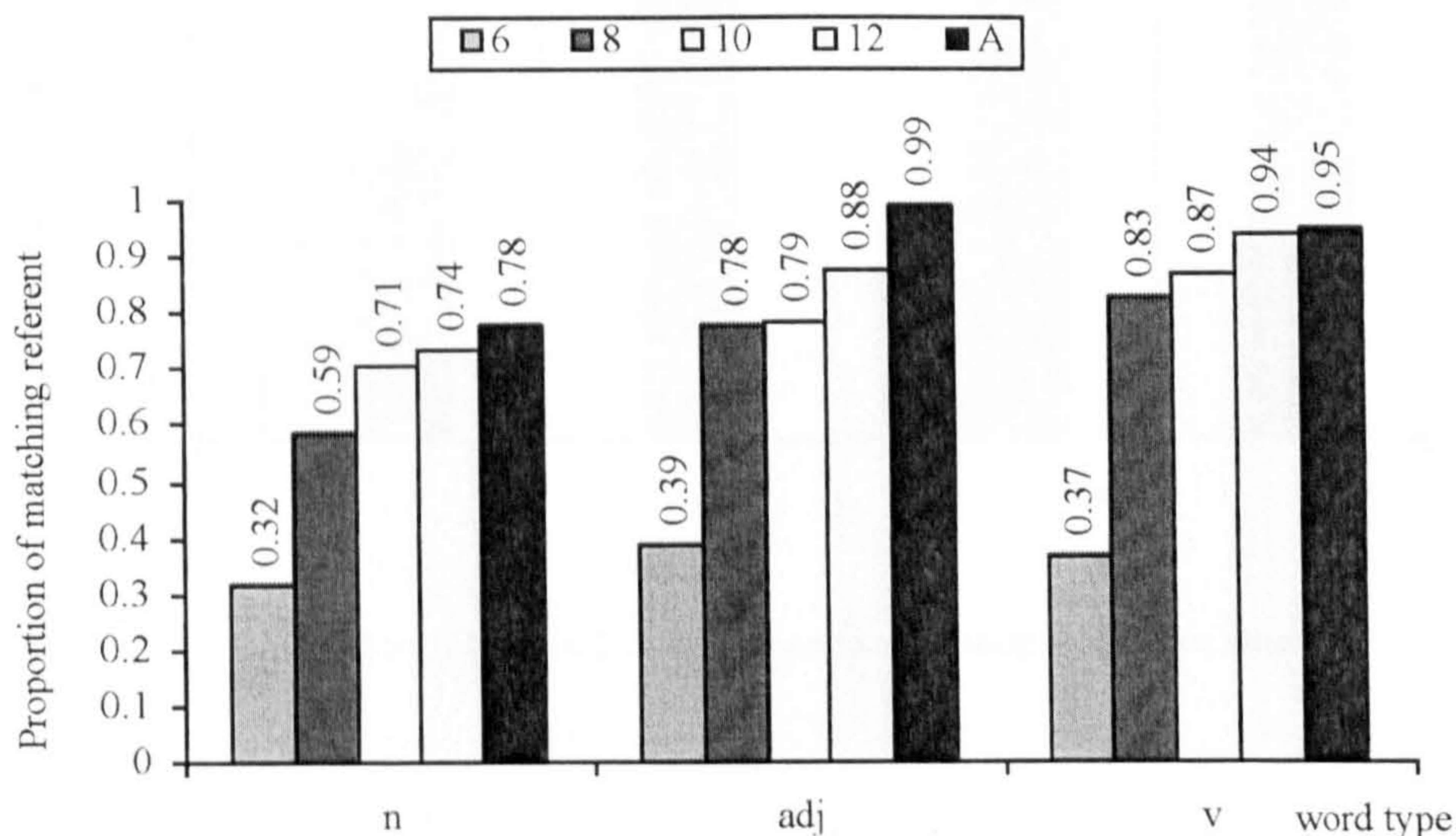


Figure 36. The effect of word type x age group--collective nouns

Performance by animacy x age group is shown in Figure 37. Simple effects analysis for each animacy reveals that on both animal and inanimate collectives, six-year-olds perform significantly worse than all other age groups. On animal collectives eight- and ten-year-olds perform significantly worse than twelve-year-olds and adults, all pairwise comparisons $ps < .05$. These results generally show that six-year-olds' performance on

both animacy categories lags behind that of all other age groups. On collective animals, the results indicate that by the age of twelve, children's performance is equivalent to that of adults. However, on inanimate collectives, eight-year-olds' performance was already equivalent to that of adults.

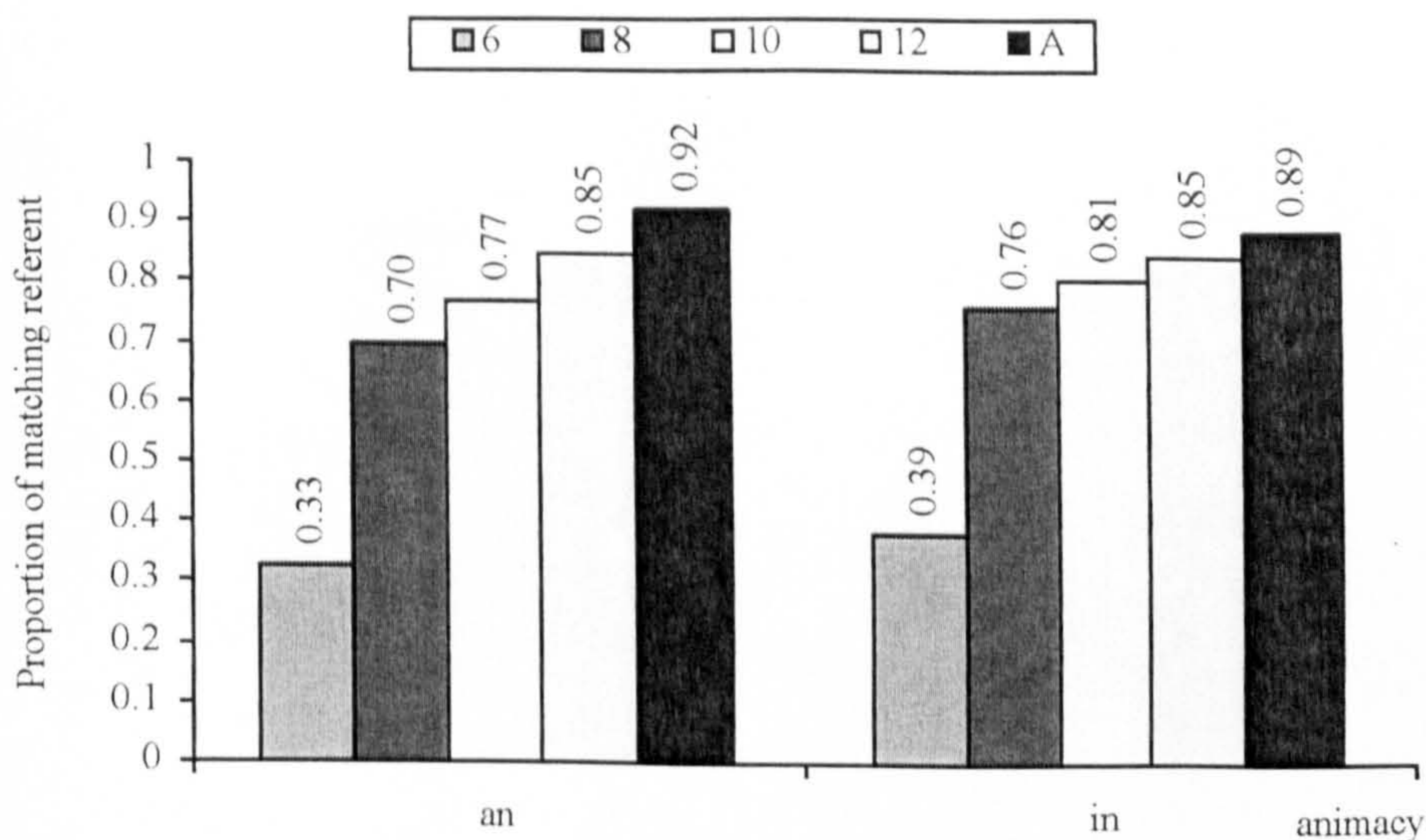


Figure 37. The effect of animacy x age group--collective nouns

Performance by gender x age group is shown in Figure 38. Simple effects analysis for each gender reveals that on both noun genders (m and f), six-year-olds perform significantly worse than all other age groups. On the feminine (unit) collective category form, eight-year-olds perform significantly worse than twelve-year-olds and adults. Ten-year-olds perform significantly worse than adults. On the masculine (collective) collective category form, eight-year-olds perform worse than twelve-year-olds, all pairwise comparisons $ps < .02$.

These results show that twelve-year-olds' comprehension of the feminine (unit) collective category is equivalent to that of adults; while ten-year-olds' comprehension of the masculine (collective) collective category was equivalent to that of adults.

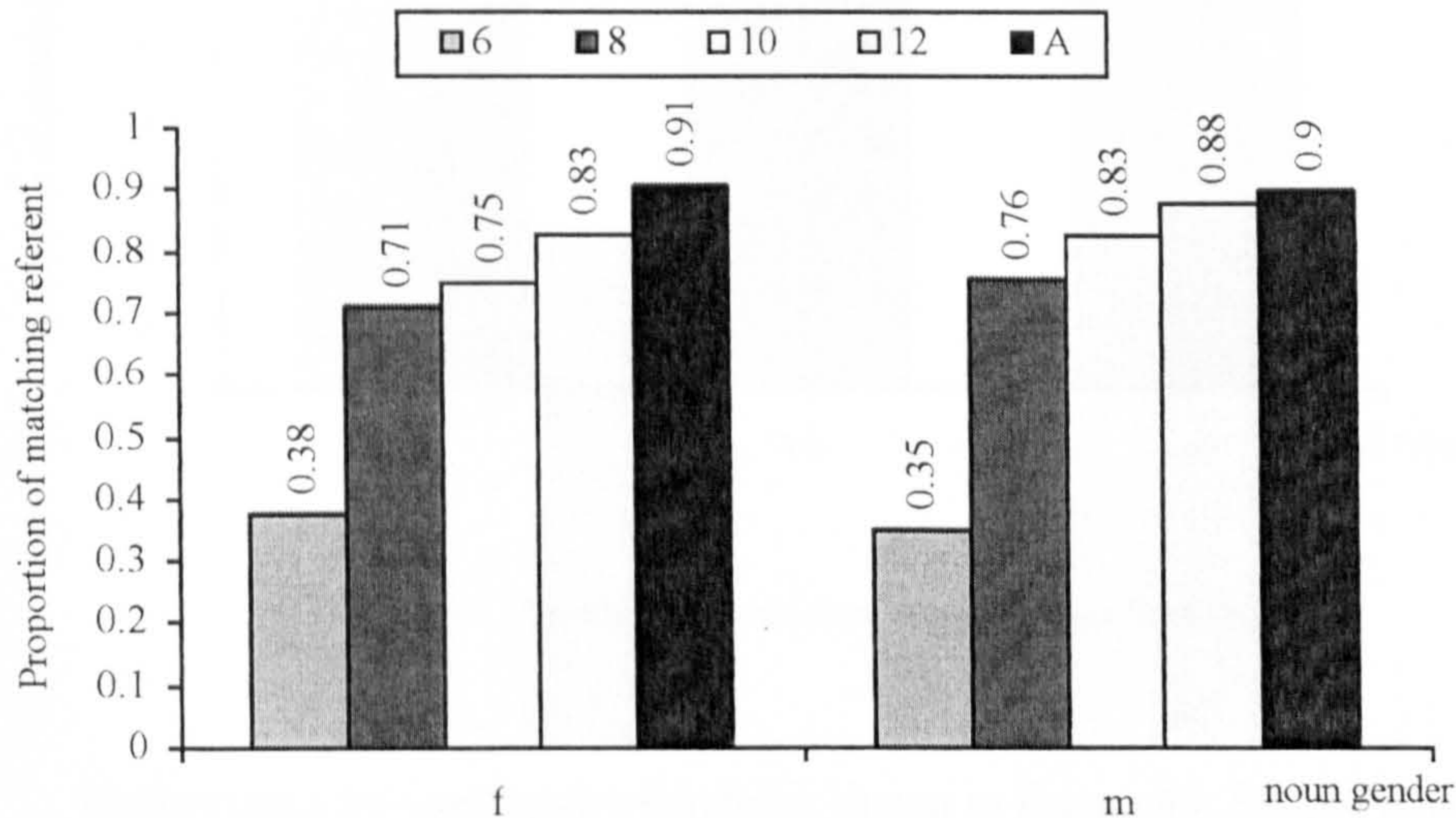


Figure 38. The effect of gender x age group--collective nouns

Performance by word type x animacy is shown in Figure 39. Simple effects analysis for each word type reveals that on collective nouns, participants perform significantly better on animal nouns than on inanimates. On adjectives and verbs participants perform significantly better on inanimates than on animals, all pairwise comparisons $ps < .01$.

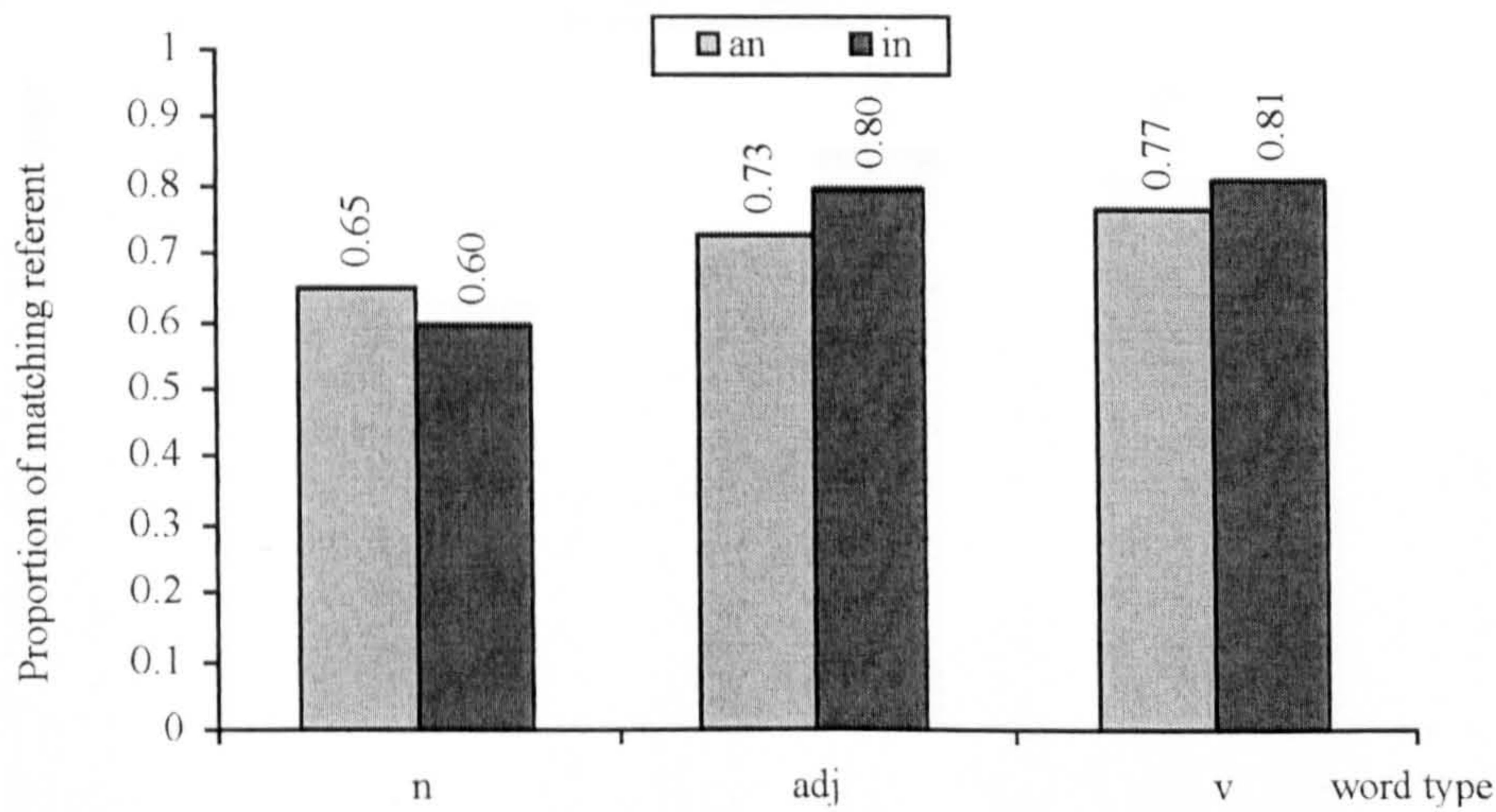


Figure 39. The effect of word type x animacy--collective nouns

Performance by word type x gender is shown in Figure 40. Simple effects analysis for each word type reveals that the participants perform significantly better on adjectives referring to masculine (collective) form collectives than on the feminine (unit) collective category forms, all pairwise comparisons $ps < .001$. These results in general show that masculine adjectives are easier to comprehend than feminine adjectives, while on both nouns and verbs, the feminine and masculine forms are comprehended equivalently.

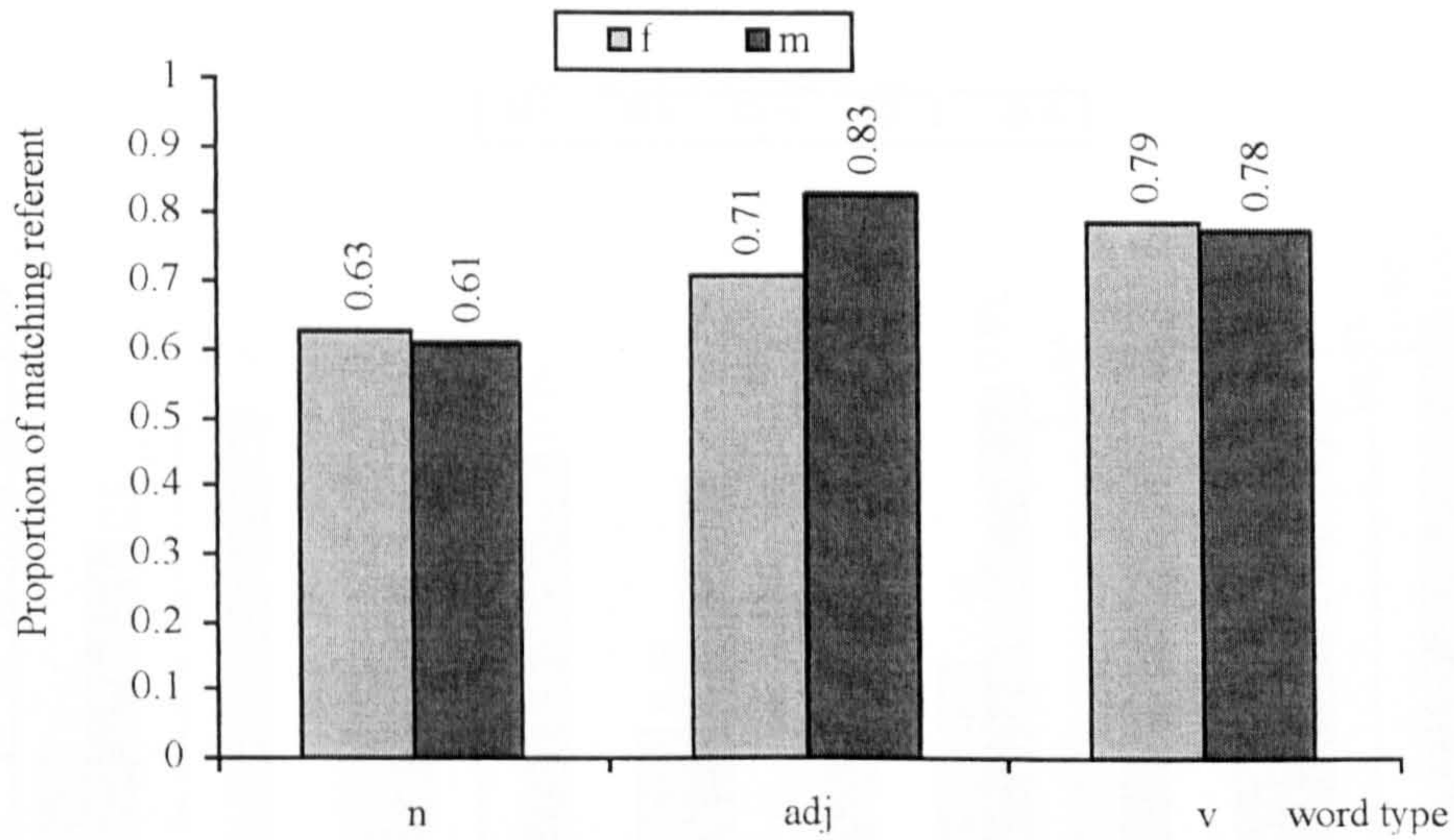


Figure 40. The effect of word type x gender--collective nouns

Performance by word type x animacy x age group is shown in Figure 41. These interaction effects show that different age groups exhibit fewer differences in the inanimate verb category, while the largest difference detected seems to be in the adjective category, all pairwise comparisons $ps < .02$.

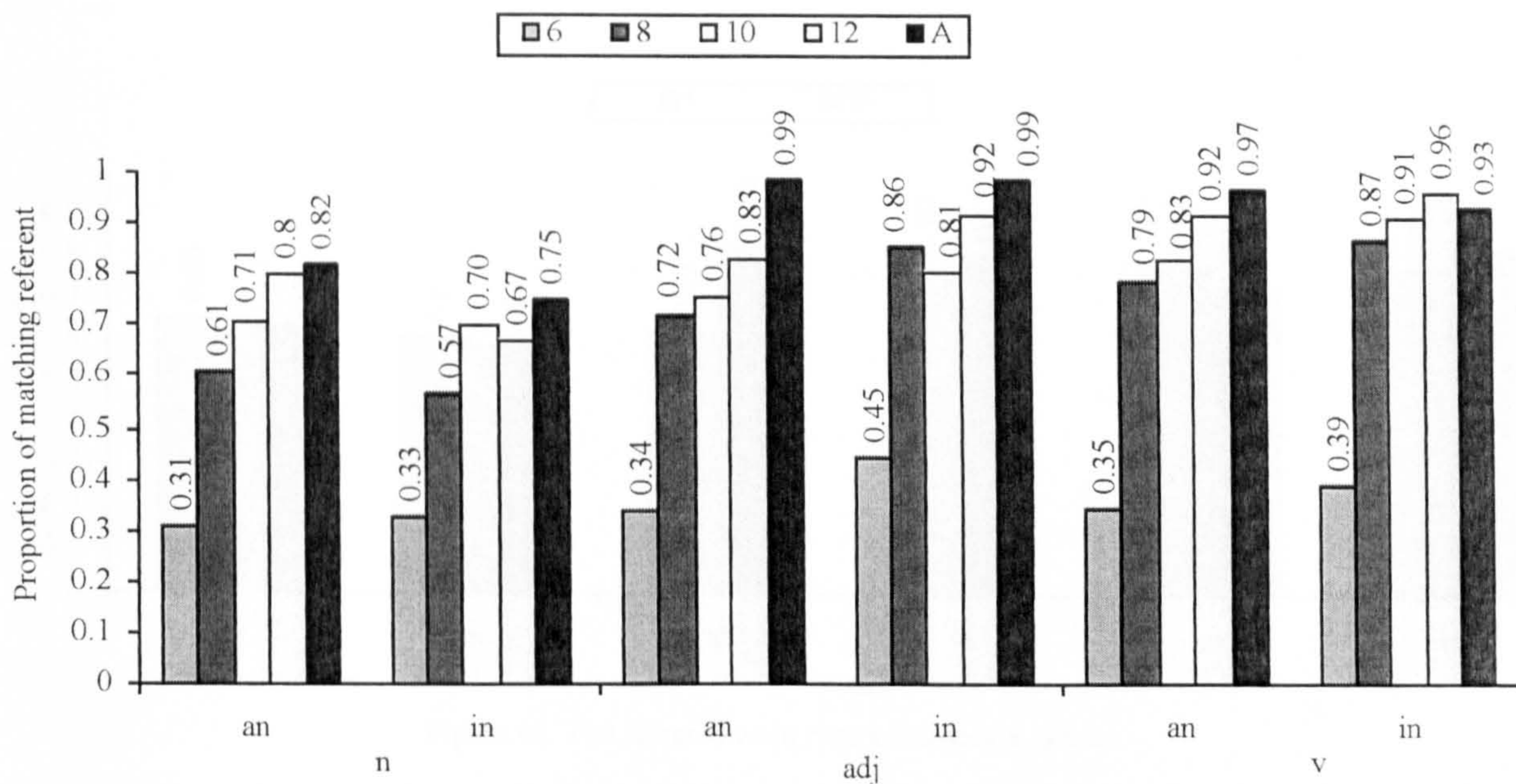


Figure 41. The effect of word type x animacy x age group--collective nouns

Performance by word type x animacy x noun gender is shown in Figure 42. These findings show that on both animacies on the noun and verb types, participants comprehend them equivalently; however, the pattern is different with adjectives in that the masculine (collective) form seems to be comprehended better than the feminine (unit) adjectives, all pairwise comparisons $ps < .001$.

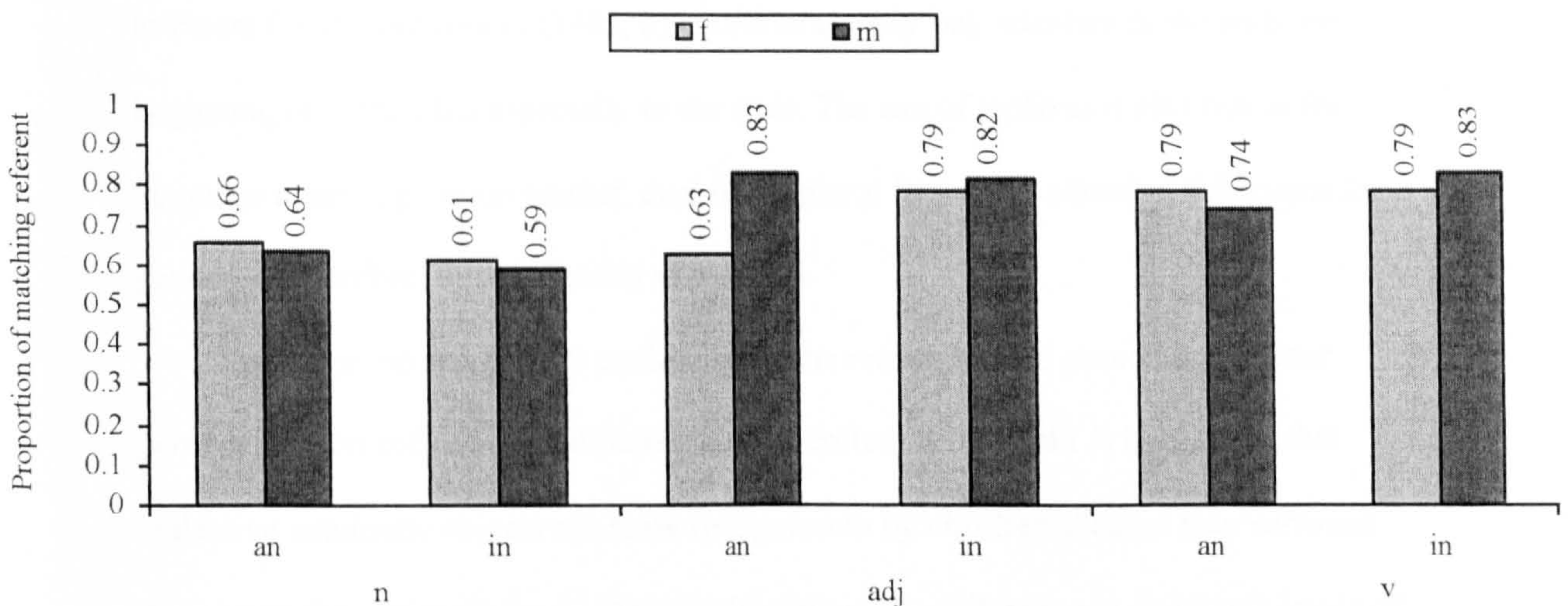


Figure 42. The effect of word type x animacy x gender

Summary: Collectives.

To summarize: the results regarding the comprehension of the collective category show that noun forms are comprehended better than adjective and verb forms. Inanimate forms are also comprehended better than animal forms. Our findings also indicate that the masculine form (which has a collective reference) is comprehended better than the feminine form (which has a unit reference). Overall, the collective category is comprehended at the adults' level by the age of ten.

Discussion: Collectives

Our findings regarding the collective category generally indicate that our participants perform better on nouns and adjectives referring to collectives than on verbs referring to collectives. This result could be due to the fact that verbs are marked for

gender by a prefix, while nouns and adjectives are marked for gender by suffixes. It seems that in this case, children did pay more attention to the end of the word. According to Peters (1985) and Slobin (1985, b), children usually pay attention to the ends and beginning of words, but especially to the ends. The use of suffixes is also rich in the language input (e.g., noun gender, dual form, plural form, and adjective inflections for gender and number) in comparison to prefixes.

Language input and CDS could also be the reason behind participants' better performance on collective inanimates than on collective animals. It is assumed that collective inanimate objects are more recognisable by children because they surround them more than animals do, and this could explain the difference in children's levels of performance on the two forms.

5.2.5 Inanimate feminine nouns with no overt gender referent

The fifth set of analyses examines the responses to stimuli involving feminine inanimate nouns with no feminine overt gender referent. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), word type (adjectives and verbs), and number (dual and plural).

The test reveals the main effects of word type ($F(1, 92) = 8.86, p < .004$), number ($F(1, 92) = 39.86, p < .001$), and age group ($F(4, 92) = 13.39, p < .001$). Means and Std. Errors (appendix 1.2.5).

In terms of the effect of word type, the test reveals that participants in general perform significantly better on adjectives referring to feminine nouns ($M = 1.21$) than on verbs ($M = 1.01$).

In terms of the effect of number, participants generally perform significantly better on dual forms ($M = 1.31$) than on the plural forms ($M = .91$).

The effect of age group is shown in Figure 43. Six-year-olds perform significantly worse than all other age groups. Eight- and ten-year-olds perform significantly worse than twelve-year-olds and adults. These results show that six-year-olds' performance, as usual, lags behind that of all other age groups. Between the ages of eight and ten, children's comprehension increases, but still lags behind adults; however, by the age of twelve children reach the adults' comprehension levels in this category.

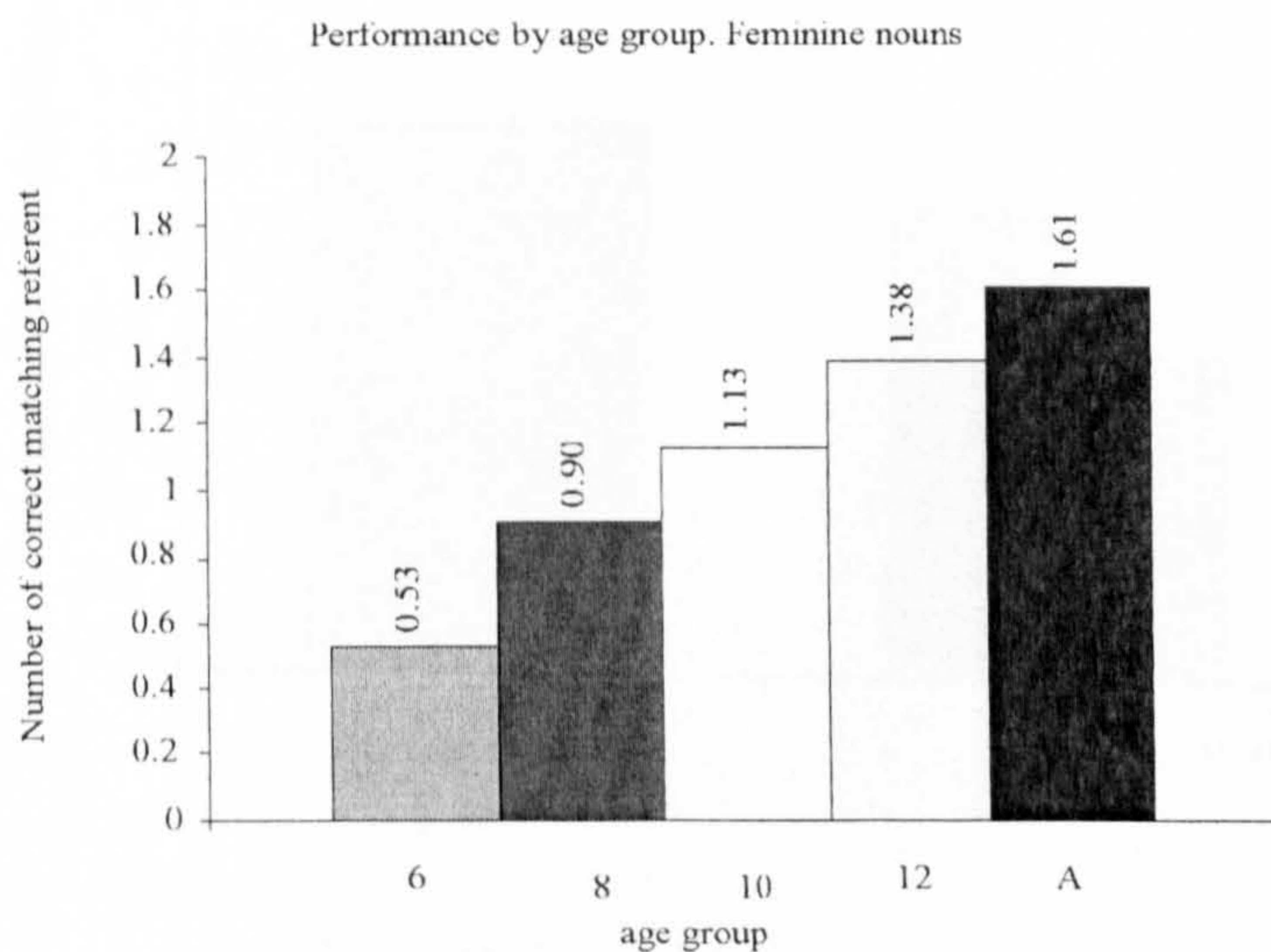


Figure 43. The effect of age group

The main effects are moderated by the significant interactions of word type x number ($F(1, 29) = 8.88, p < .004$).

Performance by word type x number is shown in Figure 44. Simple effects analysis for each word type reveals that on plural forms, participants perform significantly better on adjectives referring to feminine nouns than on verbs. These results, on the whole, show that the dual adjectives and verbs are easier to comprehend than plural forms are. These results also indicate that the plural adjective forms are easier to comprehend than the plural verb forms.

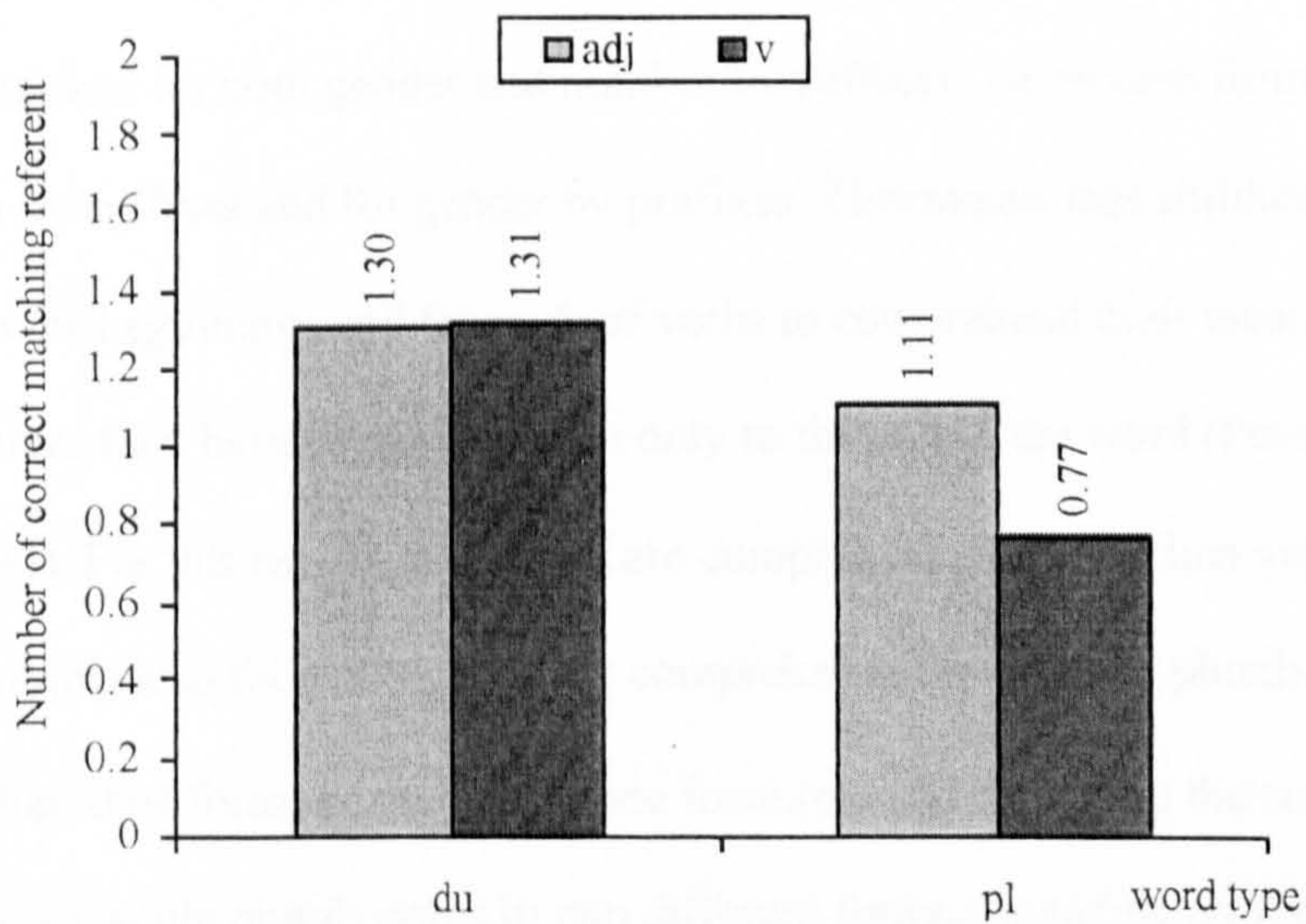


Figure 44 The effect of word type x number

Summary: Inanimate feminine nouns with no overt gender referent

The overall results regarding comprehension of inanimate feminine nouns with no overt gender referent reveal that the participants perform better on adjectives than on verbs, and on the dual forms better than on the plural forms. In general, by the age of twelve children reached the adults' comprehension level.

Discussion: Inanimate feminine nouns with no overt gender referent

The data regarding inanimate feminine nouns with no overt gender referent generally indicate that the participants perform better on subject-adjective forms than on subject-verb forms, which, as discussed earlier, could be due to the fact that adjective forms are marked for both gender and number by suffixes; while verb forms are marked for number by suffixes and for gender by prefixes. This means that children have to pay attention to the beginnings and the ends of verbs to comprehend their meaning, whereas with adjectives they have to pay attention only to the end of the word (Peters, 1985; Slobin, 1985). For this reason, adjectives are comprehended earlier than verbs.

Our results also show that duals are comprehended better than plurals and, as argued earlier, dual forms come in only one form (created by adding the suffix */-an/* to the word type), while plurals come in two different forms depending on the gender. Moreover, one of the plural forms (the plural feminine verb form) is not frequent in the input and CDS. For these reasons, dual forms are comprehended better than plural forms.

Overall, at around the age of twelve, children in this study reach adults' level in comprehending the inanimate feminine nouns with no overt gender referent category.

To conclude, our data indicate that the participants perform equivalently on both adjective and verbs in the dual forms; however, in the plural forms they perform better on adjectives, possibly, as argued earlier, due to the fact that the adjective forms are marked with suffixes while verbs are marked with both suffixes and prefixes.

5.3 Conclusion

This chapter has investigated the acquisition of nouns, numbers, subject-adjective agreement, and subjective-verb agreement within different animacy and word-type categories across the ages of six through twelve, in addition to adults. The data show that overall, children obtain a command of the gender system at around the age of eight; of feminine and masculine forms at around the same age depending on the subject's number; of singular and dual forms at around the age of eight; and of plural forms at around the age of ten for both sound and broken forms.

A different pattern of acquisition is seen for collective forms; the masculine form is comprehended earlier than the feminine form. This could suggest that comprehending unmarked forms is easier and therefore acquired earlier than marked forms.

Our results, in general, indicate that comprehension of number (sg, du, and pl) is affected by the transparency of the form; therefore, singular and dual forms are comprehended earlier than plural forms. Another aspect also revealed in regard to the earlier acquisition of singular and dual forms is that acquiring grammatical structures

with one form is usually earlier than acquiring structures with more than one form. This is seen in the case of plurals, which come in two different forms (sound and broken), while the singular and dual come in one.

The data also indicate that when a grammatical structure is transparent and carries clear grammatical information, that form will be acquired early. For this reason, the feminine plural adjective forms are acquired earlier than the masculine plural adjective forms because the feminine form embodies gender and number information, while the masculine represents only number.

Language input also plays a very important role in acquiring and obtaining a command of language, as discussed earlier. The language input has an effect on the earlier acquisition of masculine verb forms in comparison to feminine verb forms, and this can be attributed to the fact that the feminine verb form is not frequent in the input; therefore, the participants comprehend the masculine form prior to the feminine.

The data also reveal that children usually pay attention to the ends of words more than the beginning, which, as argued earlier, may be the reason behind participants' acquisition of adjectives referring to collectives and inanimate nouns with no overt gender referent earlier than of verbs referring to collectives and inanimate nouns with no overt gender referent.

Our results also show that animacy hierarchy affect the comprehension of gender and number, where in general our participants scored better on human nouns than on animals, and on animal nouns better than inanimates. However, on the collective category the effect of animacy shows a different pattern, where inanimate nouns score higher than animal nouns which as mentioned earlier (p. 126) could be due to language input and

CDS. These are the main factors that could affect the comprehension of gender and number systems in this study. In the next chapter, production data are investigated and discussed.

Chapter 6

Production

6.0 Introduction

In this chapter, methods applied in collecting data for the production research are presented. The tests and stimuli used, with some examples and the procedures applied, are explained. Following this, the results of the production tasks are presented, divided into real and novel words. The results are explained and discussed, followed by a general discussion.

6.1 Methods

6.1.1 Participants

All 105 participants (children and adults) participated in the production task. This included fifty-one girls and forty-seven boys, and also seven female adults. Participants were divided into five groups (6, 8, 10, 12, and A). All participants are Arabic monolinguals.

6.1.2 Stimuli

An elicited production task was designed to test Saudi children's ability to produce Arabic noun, adjective, and verb forms, with special focus on agreement for gender and

number. Both real and novel nouns were tested. An elicited production task was applied because it allowed the experimenter to control the meaning that was to be associated with the target utterance and eliminated many of the difficulties that otherwise might arise when attempting to interpret a child's intended meaning. This task also enabled the experimenter to explore grammatical structures that occur rarely in spontaneous speech (Thornton, 1996).

6.1.3 Picture stimuli:

In the elicited production task, participants were asked to describe the given picture depending on the category the picture was testing. The trials were designed to test gender (feminine (f) and masculine (m)) and number (singular (sg), dual (du), and plural (pl)). Each trial tested a category. For example, the picture in Figure 45 is a picture of six students (the participants were expected to say /tala:mi:ð/ ('students'-pl-br) تلاميذ); this picture tests the noun in the plural form noun-number agreement. A ribbon was used in the production task, as it was in the comprehension task, to distinguish between female and male animals. Similar stimuli were used to elicit adjectives, verbs, quantified nouns, and inanimate feminine nouns with no overt gender referent.

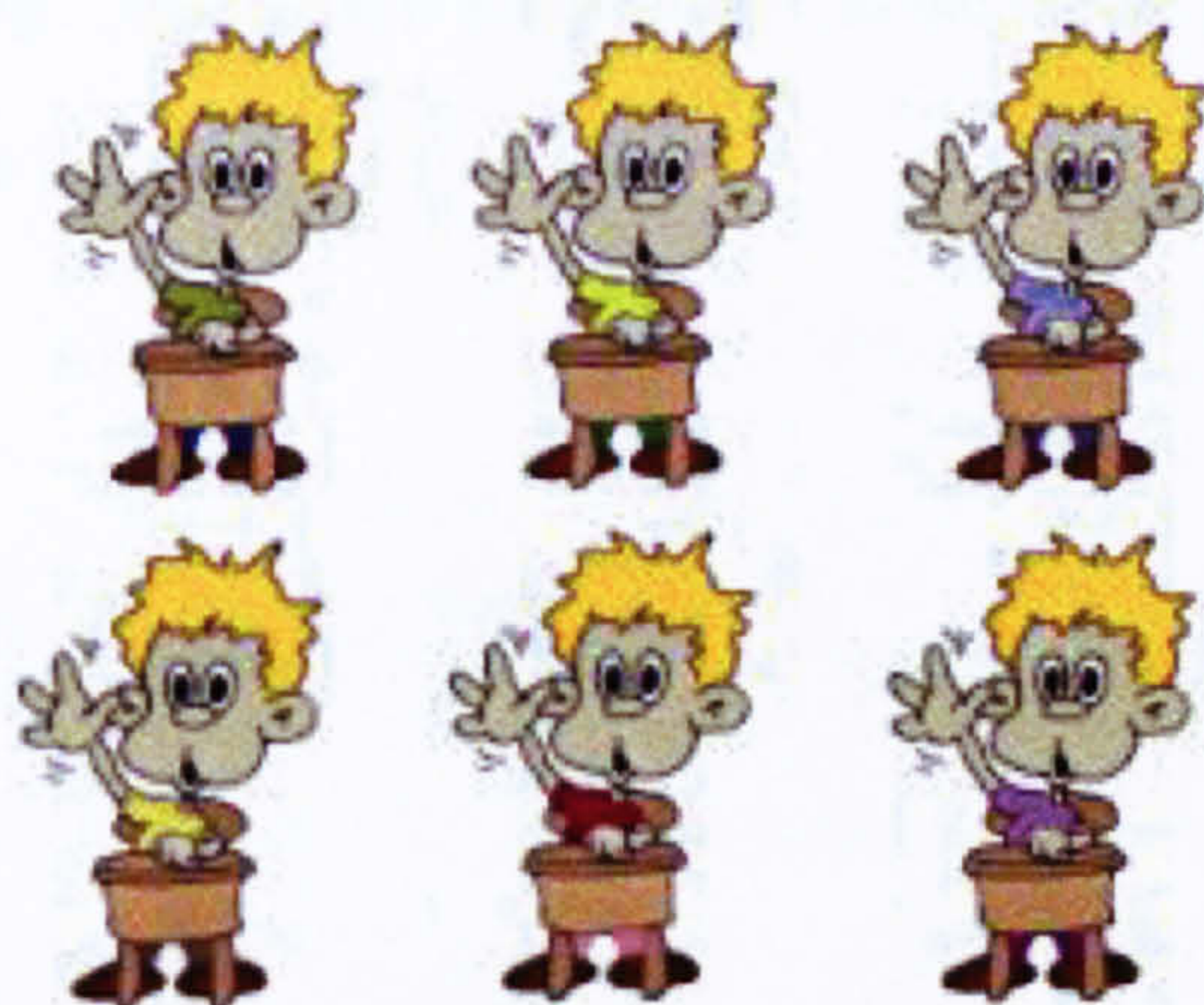


Figure 45. An example of nouns used in the production tasks

Novel nouns were tested by using a picture story embodying nouns that do not exist in Arabic (novel nouns). The story used began with a space shuttle leaving the earth to explore strange creatures living on other planets. After a long time in space, the astronaut saw a strange planet, so he landed on that planet and went down to explore. There he saw a very strange creature. . . and the story goes on.

6.1.4 Linguistic stimuli

Before we began the main test with each participant, we introduced ten practice items. The aim of the production practice items was simply to allow participants to realise that describing the picture was all that was expected of them. The participants were asked to describe the pictures, and were encouraged by the questions asked to do so.

For example, the experimenter would ask the question, "Who is in the picture?" to which the participant might reply, "A man" (see Figure 46) or the experimenter might ask, "What are they doing?" or "What is happening?" to which the participant might reply, "A horse is typing" (see Figure 47).



Figure 46. An example of noun practice items



Figure 47. An example of verb's practice items.

After the training session was completed, seven sets of constructs were tested, divided into two sections (real nouns and novel nouns). For these two sections the participants were not instructed to use a specific variety (vernacular or *al fushah*). Each participant used the form he or she was comfortable with, because we aimed to try and make the testing situation as naturalistic as possible, therefore, they were left to choose

the dialectal forms they felt comfortable using, bearing in mind that most of the forms investigated in this study had more similarities than differences between both varieties (see section 2.7 matrixes 1, 2 and 3).

6.1.4.1 Real nouns: These were divided into six sets of constructs.

- 1- **Human and animal nouns:** In this category, stimuli were used to elicit human and animal nouns. For example, the stimulus shown in Figure 48 represents */batríq-ah/* ('penguin'-f) بطريقه. Feminine nouns are marked for gender by the feminine */-ah/* suffix, while masculine nouns are unmarked for gender. Constructs of feminine and masculine nouns for humans and animals in singular, dual, and plural forms were elicited. For each construct there were five to six trials, for a total of seventy-one trials, see appendix 2.1.1 for stimuli used).

Throughout the task, with each picture the researcher asked the participants */man fi: al-surah/* ('Who is in the picture?').



Figure 48. An example of nouns used in the production tasks

2- Adjectives: In this category, stimuli were used to elicit adjectives. For example, the stimulus shown in Figure 49 represents */sajid-at-a:n yaqib-at-a:n/* ('women' -f-du 'angry' -f-du) 'two angry ladies'. Adjectives referring to humans, animals, and inanimates, both feminine and masculine, in the singular, dual, and plural forms were investigated. Adjectives referring to feminine nouns were marked for gender and number. Adjectives referring to masculine nouns were marked only for number. For each construction there were four to six trials, for a total of 104 trials, (appendix 2.1.2). Throughout this category the researcher asked the participants */maða bihim/* ("What is the matter with them?") or */bimaða ya-fʕur-u:n/* ("How do they feel?"), always in the masculine plural form.⁸



Figure 49. An example of adjectives used in the production tasks

⁸ Masculine plural forms are used in the Saudi vernacular dialect, even with feminine nouns. By using these forms the experimenter was not directing the participants to the correct form, because it is used with all constructs.

3- Verbs: In this category verbs were elicited. For example, the stimulus shown in Figure 50 represents */tabl-at-a:n tu-ʔabil-a:n/* ('drum'-f-du f-'drumming'-du) 'two drums drumming'. Verbs referring to feminine referents were marked for gender by a prefix */ta-/*, while verbs referring to masculine referents were marked for gender by the prefix */ja-/*. Verbs referring to humans, animals and inanimate objects were elicited in the singular, dual, and plural forms. For each form there were four to six trials, for a total of 103 trials, (appendix 2.1.3).

Throughout this category the researcher asked the participants */maða ya-ʔal-u:n/* ("What are they doing?"), always in the masculine plural form.

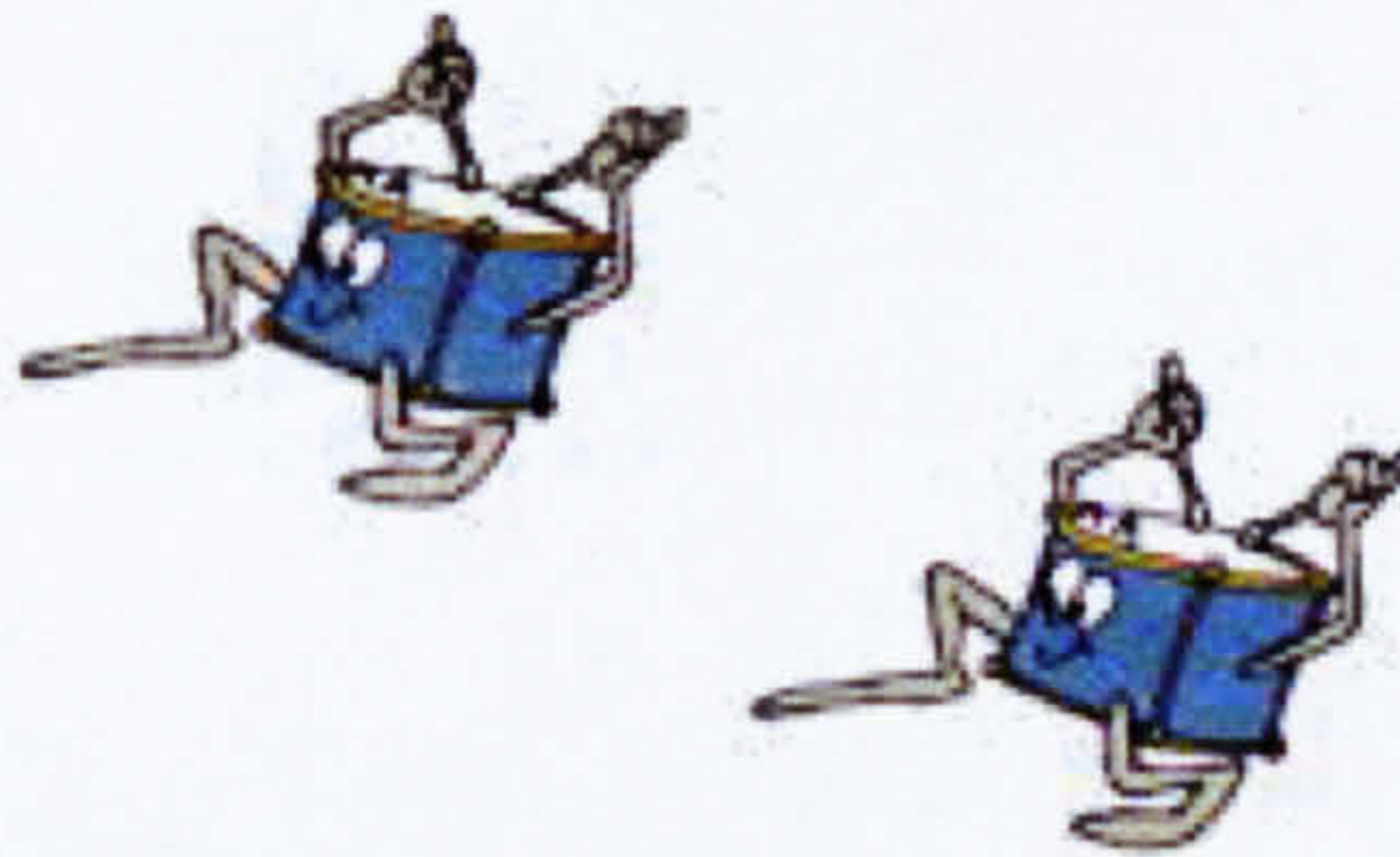


Figure 50. An example of verbs used in the production tasks

4- Collective nouns: In this category collective nouns were elicited. For example, the stimulus shown in Figure 51 represents */biq/* 'eggs'-m-pl بيض . Nouns marked with the feminine suffix */-ah/* have a unit reference,

while those in the masculine form have a collective reference. Feminine and masculine nouns, subject-adjectives and verbs agreement were elicited for this category. For each form there were four to six trials, for a total of sixty-nine trials, (appendix 2.1.4). Nouns, adjectives, and verbs were elicited in the same way as in the three previous categories.

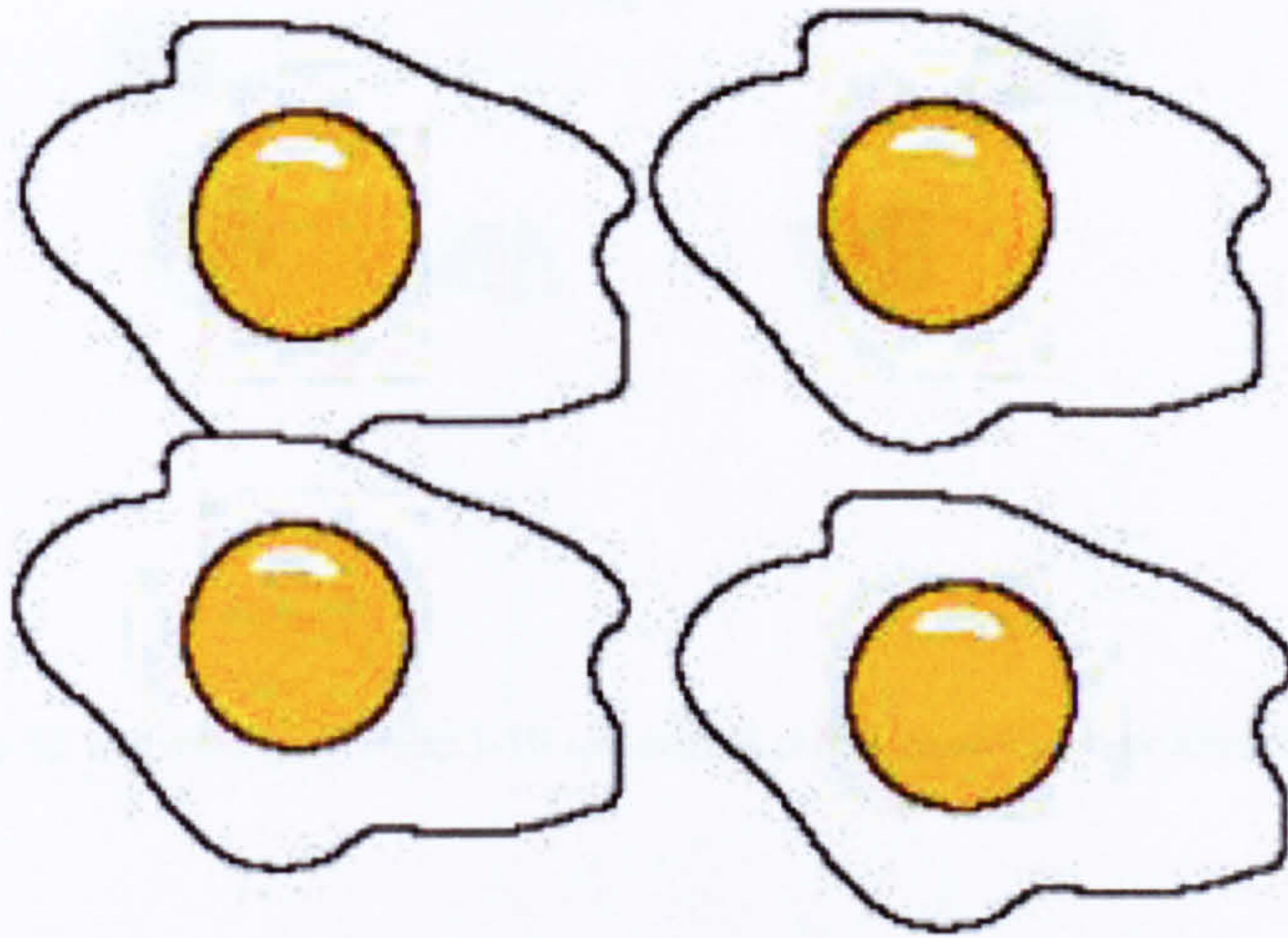


Figure 51. An example of collective forms used in the production tasks

- 5- Quantified nouns:** In this category quantified nouns were elicited. Here the experimenter stated a number and the participant elicited the noun after repeating the number provided by the experimenter. Numbers between three and ten (3-10) take the plural noun forms, while numbers eleven and higher (11+) take the singular noun form. Examples of stimuli used are shown in Figures 52 and 53. Figure 52 shows */θma:nijat kutub/*

(‘eight books’), and Figure 53 shows */θamanijat ʔasar-susan/* (‘eighteen chick’-sg). Feminine and masculine human, animal, and inanimate nouns in the 3-10 and 11+ construct were elicited. For each form there were one to five trials, for a total of forty one trials, (appendix 2.1.5)..

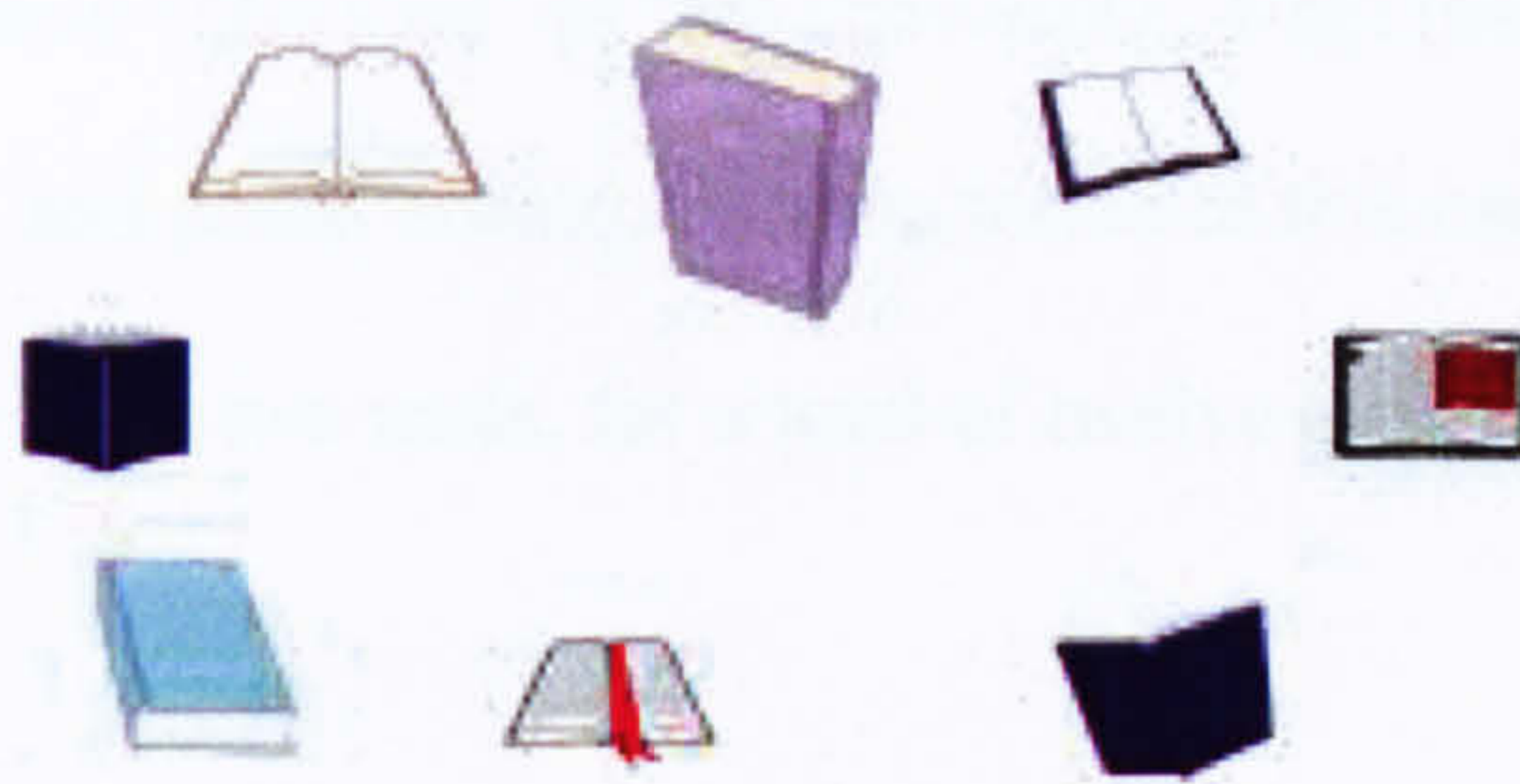


Figure 52. An example of the 3-10 quantified nouns used in the production tasks

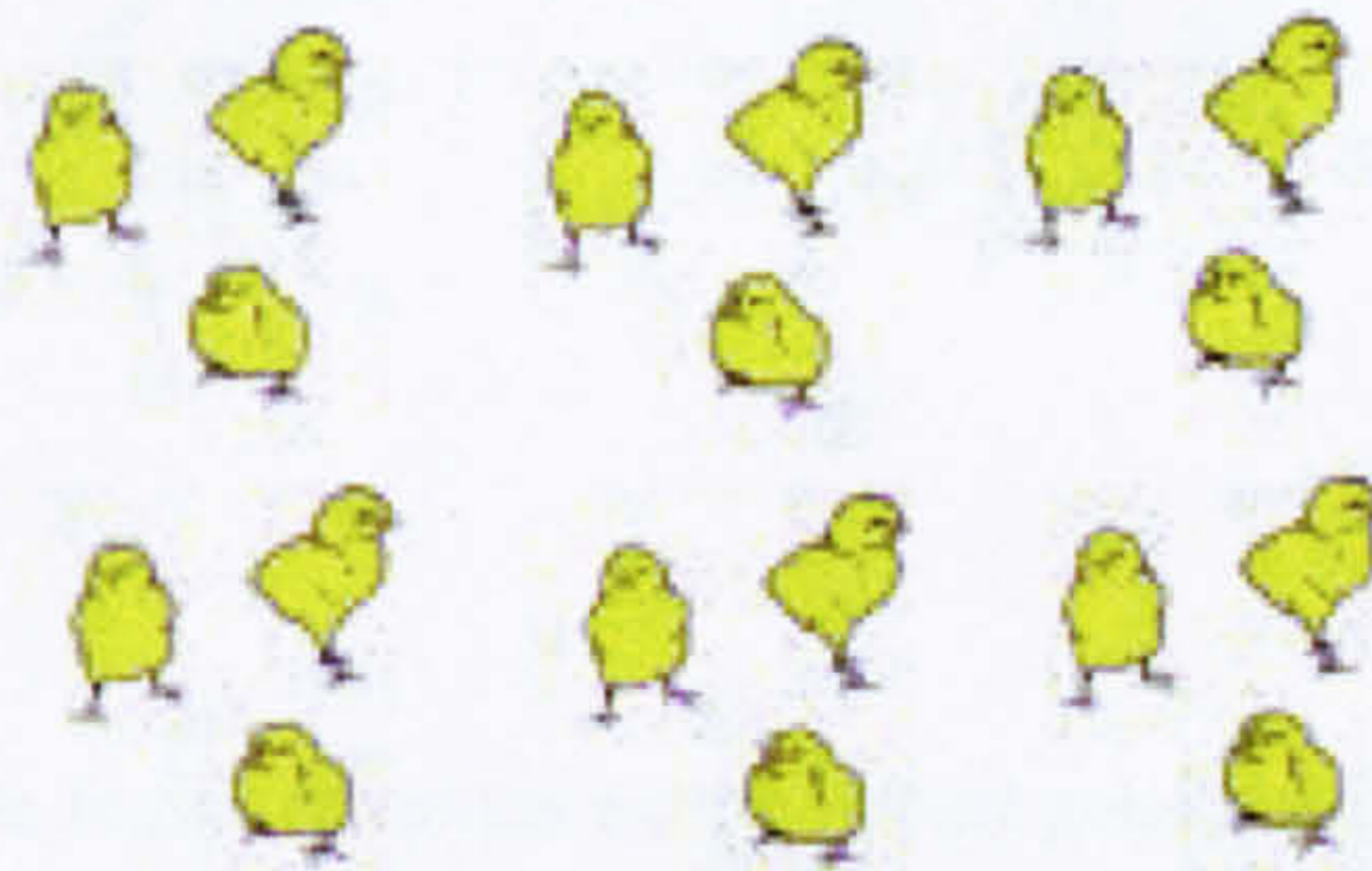


Figure 53. An example of the 11+ quantified nouns used in the production tasks

6- Inanimate feminine nouns with no overt gender referent: In this category, adjectives and verbs referring to inanimate feminine nouns with no overt gender referent were elicited. An example is */al jumusu ta-stahimu/* ('the suns'-pl 'are showering'-f-sg) (see Figure 54). Singular, dual, and plural constructs were tested in this category. For each construct there were two trials, for a total of twelve trials, (appendix 2.1.6).

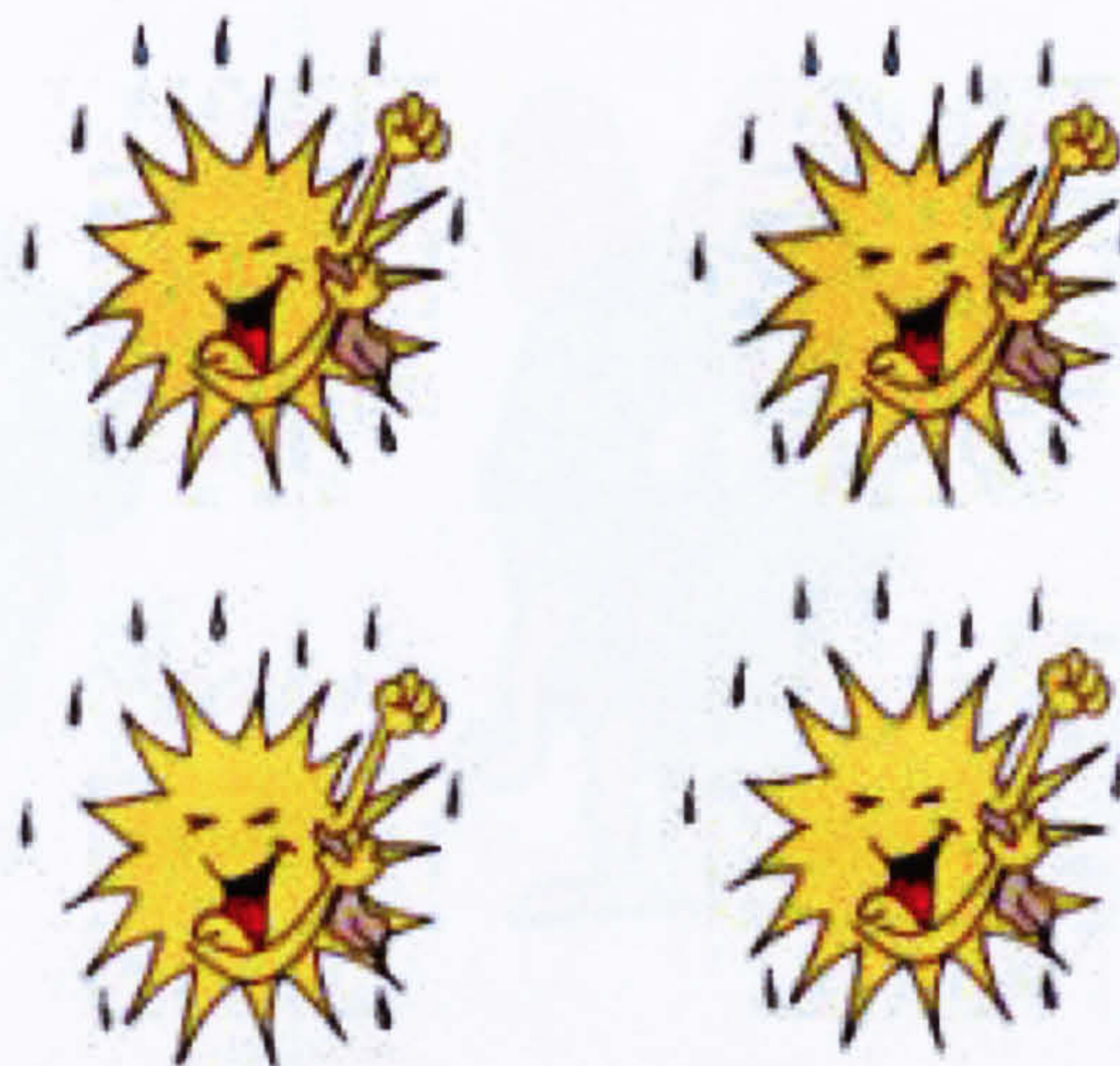


Figure 54. An example of inanimate feminine nouns with no overt gender referent used in the production tasks

6.1.4.2 Novel nouns: Novel nouns were included in this task. Participants' ability to apply grammatical gender and number with novel words was tested. For example, in

Figure 55 a strange creature was presented by the name of /*daħfur*/ دحشور (m). Each participant was prompted to give the feminine form /*daħfur-ah*/ دحشوره. In this task, the experimenter produced the singular form of a feminine or a masculine noun, and participants were encouraged to give the other grammatical gender form. Nouns and verbs, including both feminine and masculine singular, dual, and plural forms were tested. Twenty-four novel noun trials and twenty-three verb trials were conducted; a total of forty-seven constructs were elicited, (appendix 2.1.7).

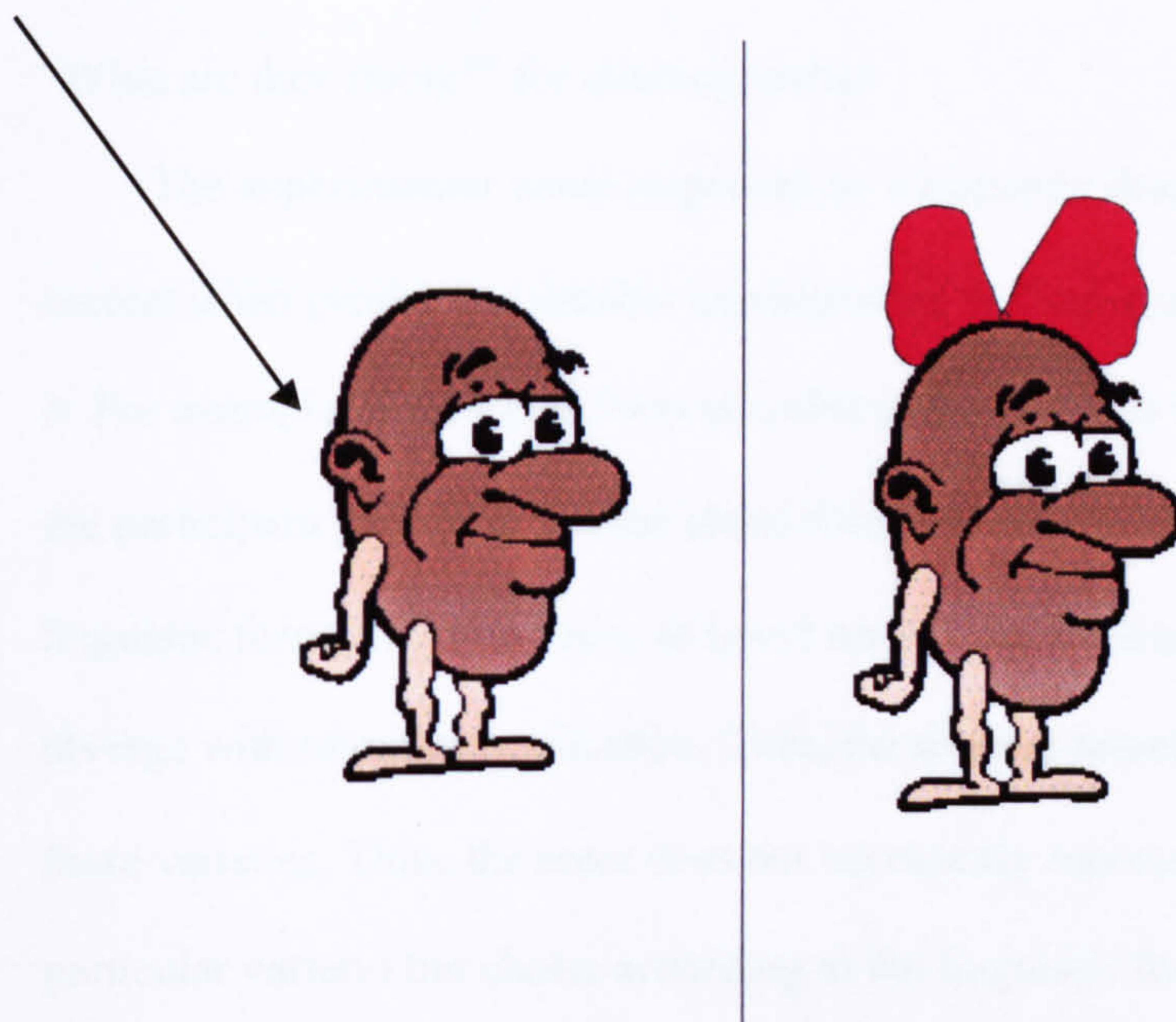


Figure 55. An Example of a novel noun in the production tasks

6.1.5 Procedure

As noted in Chapter 5, the order in which comprehension and production tasks were applied was balanced across participants. As in the case of the comprehension task, trials for the tested construct types were completely randomised and grouped into three folders. Again the order of testing across those three folders was balanced across participants. Participants were tested individually at school, in a quiet room, and were instructed to explain what they saw in the picture according to the experimenter's questions ("Who is in the picture?" for eliciting nouns; "How do they feel?" for eliciting adjectives; and "What are they doing?" for eliciting verbs).

The experimenter wrote responses on a response sheet. Responses were considered correct when gender and number corresponded to the picture and form that is encoded in it. For example, if the target form encoded in the stimulus was a verb in the dual form and the participant produced it in the plural form this was scored as a non-match with the linguistic form. In some cases, as noted earlier, the classical and vernacular forms diverge with regard to application. Thus, the scoring sometimes diverged from one of these varieties. Thus, the score does not necessarily represent a correct choice (for the particular variety) but choice according to the linguistic form. This scoring method was chosen as a means to be able to compare children and adults' performance. The adults' performance would be taken as the 'norm' for comparison. In the following section, the results regarding real and novel words will be explained and discussed, starting with real words.

6.2 Results

The participants in this study were tested on six sets of constructs. Each construct is analysed separately. Raw numbers for constructs one to five are transformed into proportions, because the trials across constructs were not equally balanced, with between four and six trials for each construct. However, construct analysis six was balanced, with two trials for each category; therefore in this case raw numbers are statistically analysed.

6.2.1 Production real words

6.2.1.1 Human and animal nouns

The first set of analyses examines the responses for stimuli involving human and animal nouns. A multivariate test was conducted in which the variables tested were age groups (6, 8, 10, 12, and A), animacy (human and animal), noun gender (feminine and masculine), and number (singular, dual, and plural).

The tests reveal main effects of animacy ($F(1, 96) = 14.73, p < .001$), noun gender ($F(1, 96) = 48.60, p < .001$), number ($F(2, 19) = 75.28, p < .001$), and age group ($F(4, 96) = 19.4, p < .001$). (See appendix 2.2.1 for Means and Std. Errors of human and animal nouns results)

In terms of the effect of animacy, the tests reveal that the participants in general perform significantly better on human nouns ($M = .7$) than on animal nouns ($M = .48$).

In terms of the effect of noun gender, the tests reveal that the participants perform significantly better on masculine nouns ($M = .65$) than on feminine nouns ($M = .53$).

Performance on all three numbers is significantly different ($sg = .71 > du = .60 > pl = .45$), all pairwise comparisons $p < .001$.

Main effect of age is shown in Figure 56. The results reveal that six-year-old participants perform significantly worse than all other age groups, with eight-year-olds performing significantly worse than twelve-year-olds and adults, all pairwise comparisons $ps < .002$. These results in general show that six-year-olds lag behind all other age groups. However, children's noun production increases by the age of eight and by the age of ten their performance is equivalent to adults'.

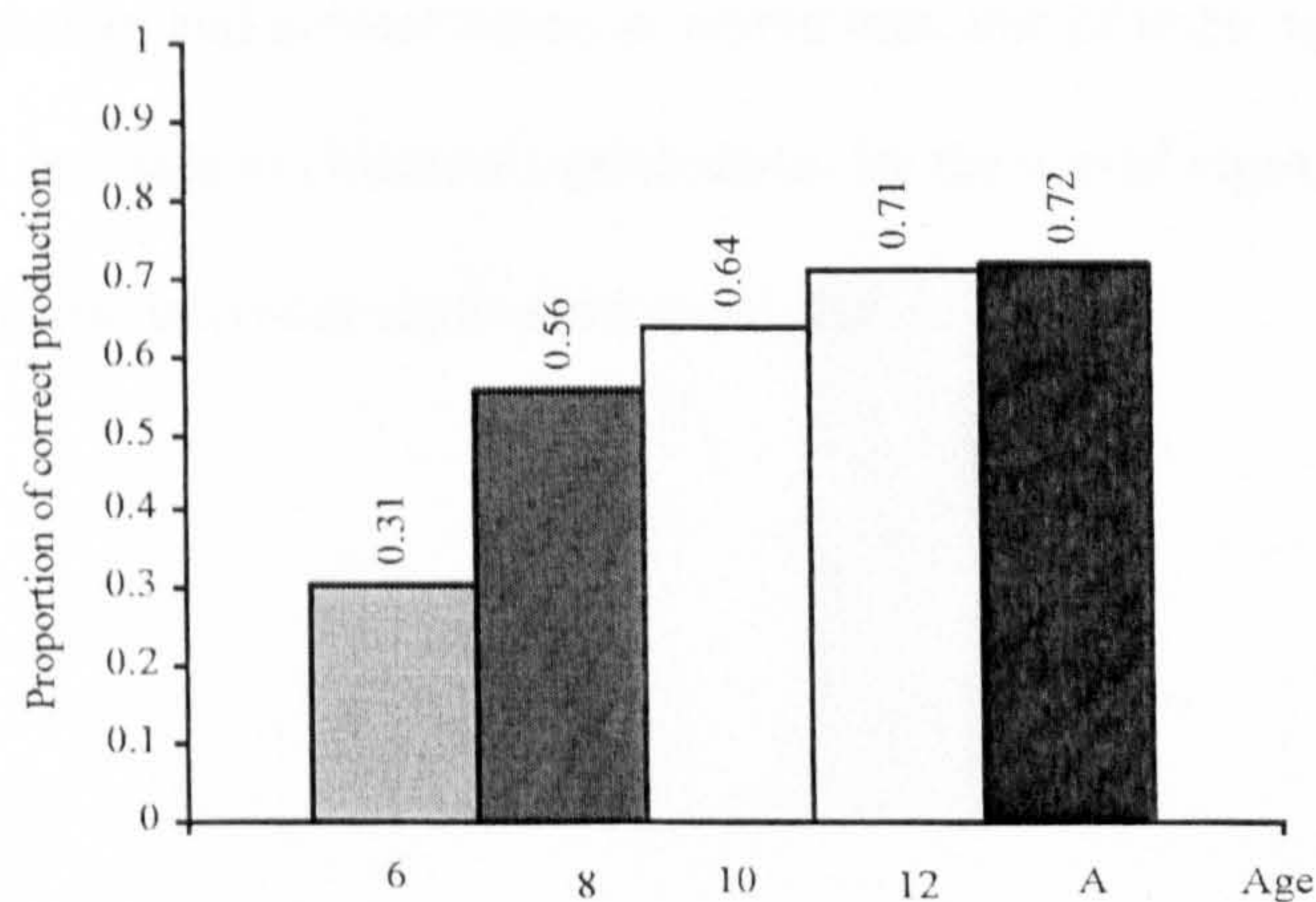


Figure 56: The effect of age group--nouns

The main effects are moderated by significant interactions of animacy x age group ($F(4, 96) = 3.45, p < .01$), noun gender x age group ($F(4, 96) = 3.04, p < .02$), number x age group ($F(8, 19) = 1.97, p < .05$), animacy x noun gender ($F(1, 96) = 19.97, p < .001$), animacy x number ($F(2, 19) = 11.35, p < .001$), noun gender x number ($F(2, 19) = 24.29, p < .001$), animacy x number x age group ($F(8, 19) = 2.52, p < .01$), and animacy x noun gender x number ($F(2, 19) = 21.56, p < .001$).

Performance by animacy x age group is shown in Figure 57. Simple effects analysis for each animacy reveals that six-year-old participants perform worse than all other age groups on both human and animal nouns. On human nouns, eight-year-old participants perform significantly worse than twelve-year-olds and adults, and on animal nouns their performance was significantly worse than that of twelve-year-olds, all pairwise comparisons $p < .02$. These results in general show that 6-year-old children's production of both human and animal nouns is worse than that of older age groups. These results also show an increase in children's production by the age of eight; by the age of ten children's production becomes equivalent to adults'.

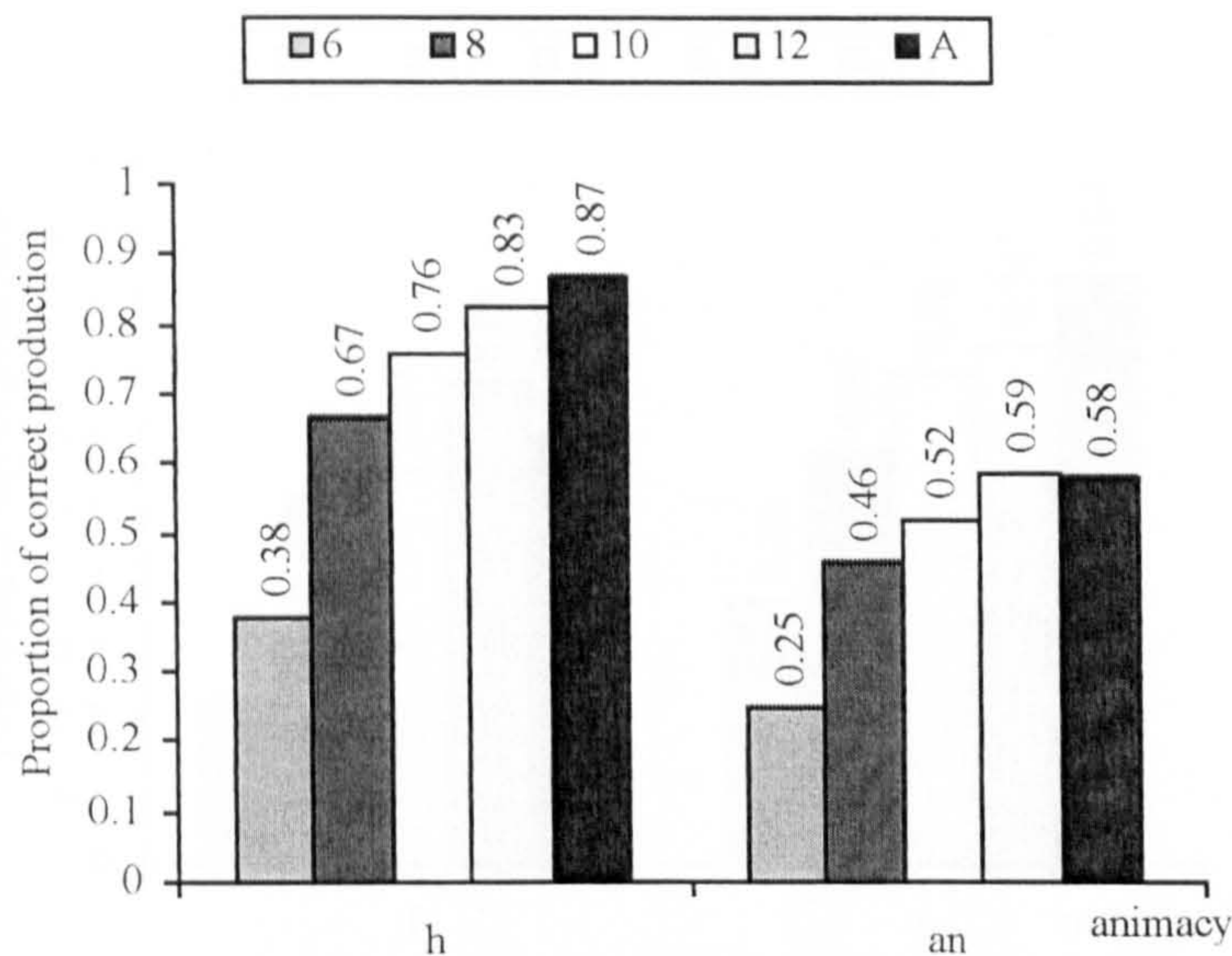


Figure 57. The effect of animacy x age group--nouns

Performance by noun gender x age group is shown in Figure 58. Simple effects analysis for each noun gender reveals that six-year-old children perform significantly worse than all other age groups on both feminine and masculine nouns. The eight-year-olds perform significantly worse on feminine nouns than do twelve-year-olds, and their performance on masculine nouns is significantly worse than that of ten and twelve-year-olds and adults. Ten-year-olds perform significantly worse on feminine nouns than twelve-year-olds do, and they perform significantly worse on masculine nouns than adults do, all pairwise comparisons $ps < .04$. These results in general show that performance on masculine nouns reaches the adults' level at around the age of ten; however, the performance twelve-year-olds and adults was similar.

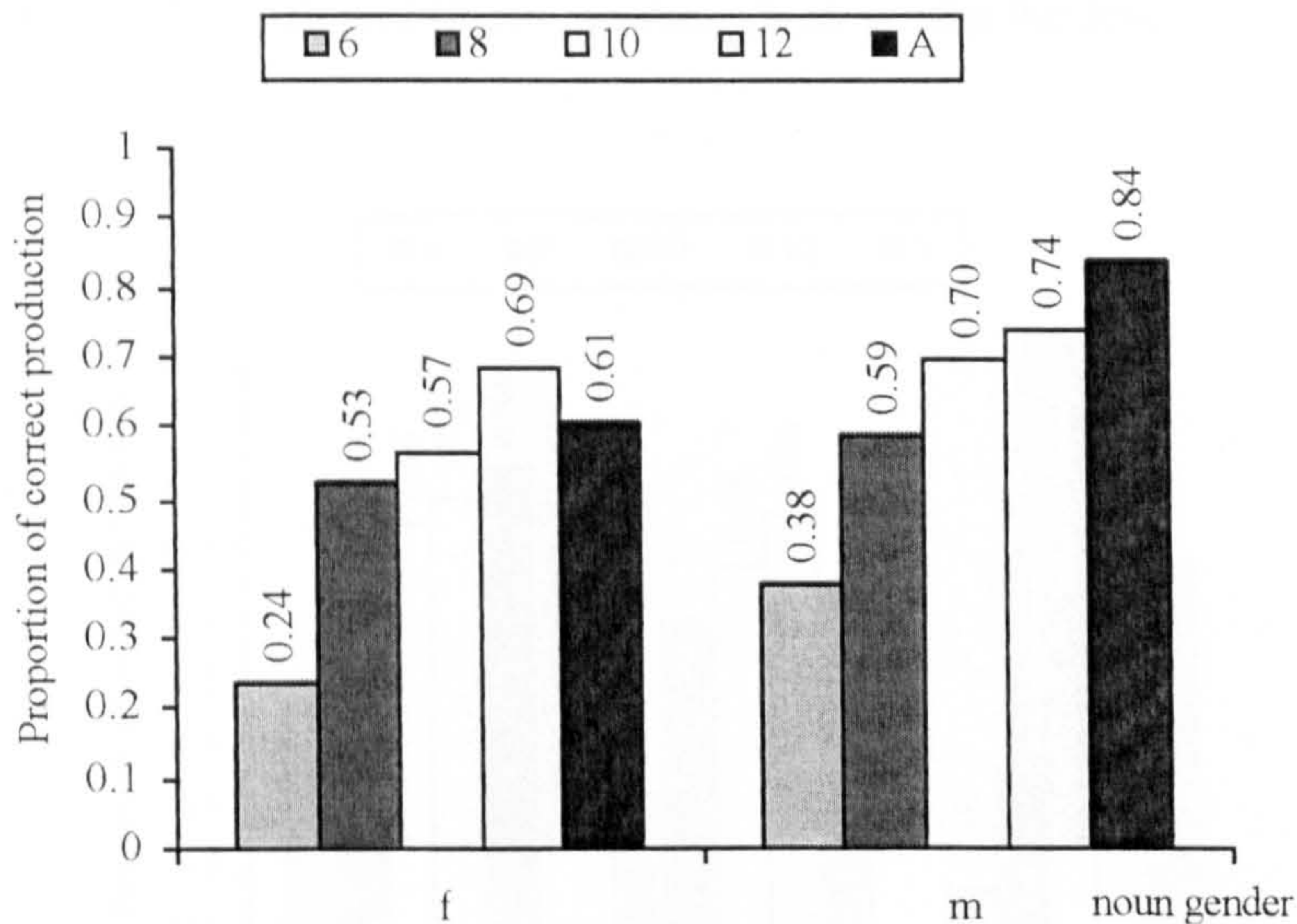


Figure 58. The effect of noun gender x age group--nouns

Performance by number x age group is shown in Figure 59. Simple effects analysis for each number reveals that six-year-olds perform significantly worse on singular, dual, and plural forms than the other age groups do. Eight-year-olds perform significantly worse than twelve-year-olds on the dual forms. On the plural forms, eight-year-olds perform significantly worse than ten and twelve-year-olds and adults, and ten-year-olds perform significantly worse than twelve-year-olds and adults, all pairwise comparisons $p < .03$. These results in general show that six-year-old children's production of all number categories is worse than that of the older age groups. However, by the age of eight children produce singular forms equivalently to the older age groups, and on the dual forms ten-year-olds' production is equivalent to that of age group twelve and adults. On the other hand, age group twelve is the only group that has reached adults' level on

the plural form. Overall, these results indicate that singular nouns are the easiest to produce, followed by dual, and finally plural, which are the hardest.

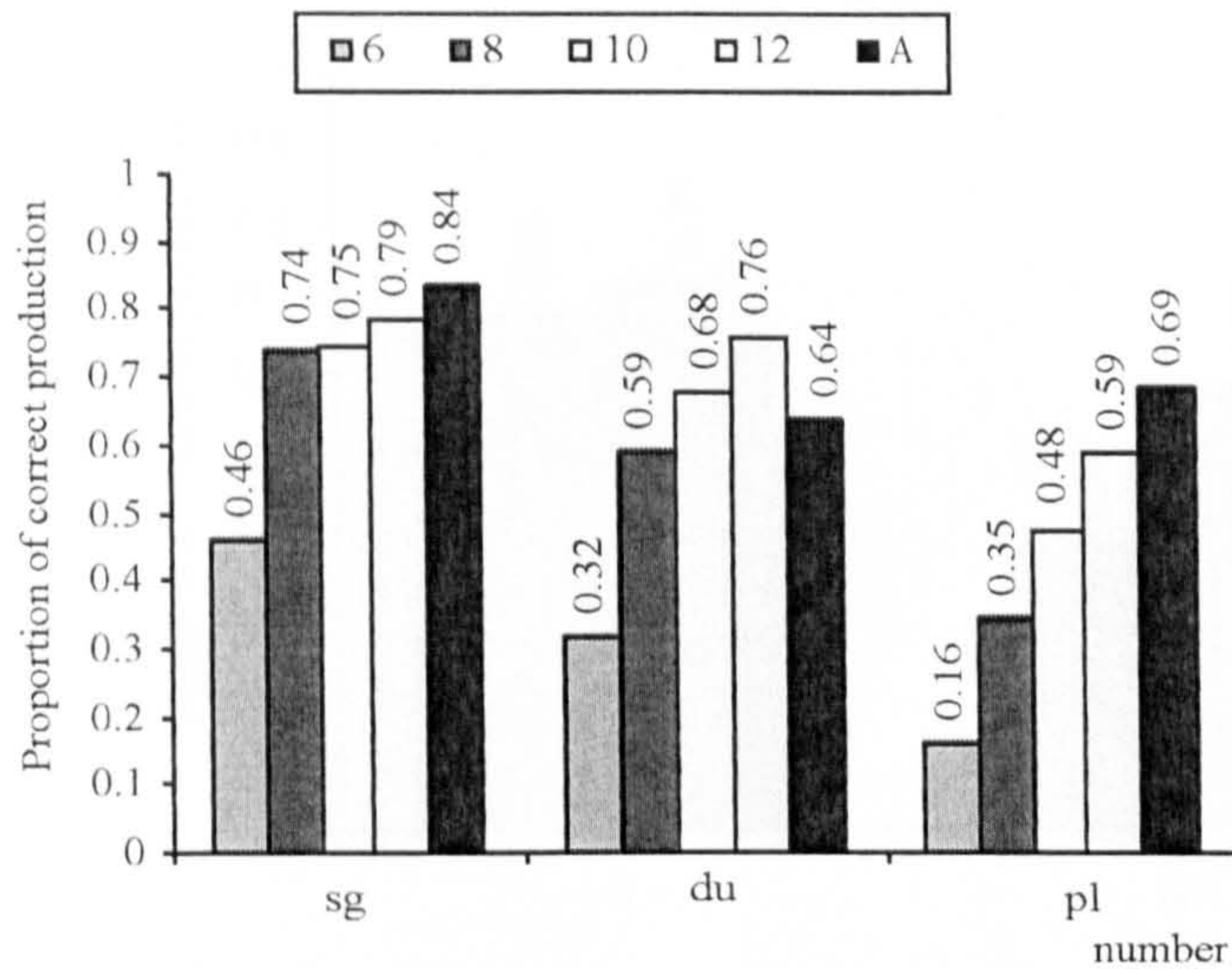


Figure 59. The effect of number x age group--nouns

Performance by animacy x noun gender is shown in Figure 60. Simple effects analysis for each animacy reveals that on human and animal nouns, participants perform significantly better on the masculine than on the feminine forms, all pairwise comparisons $ps < .04$.

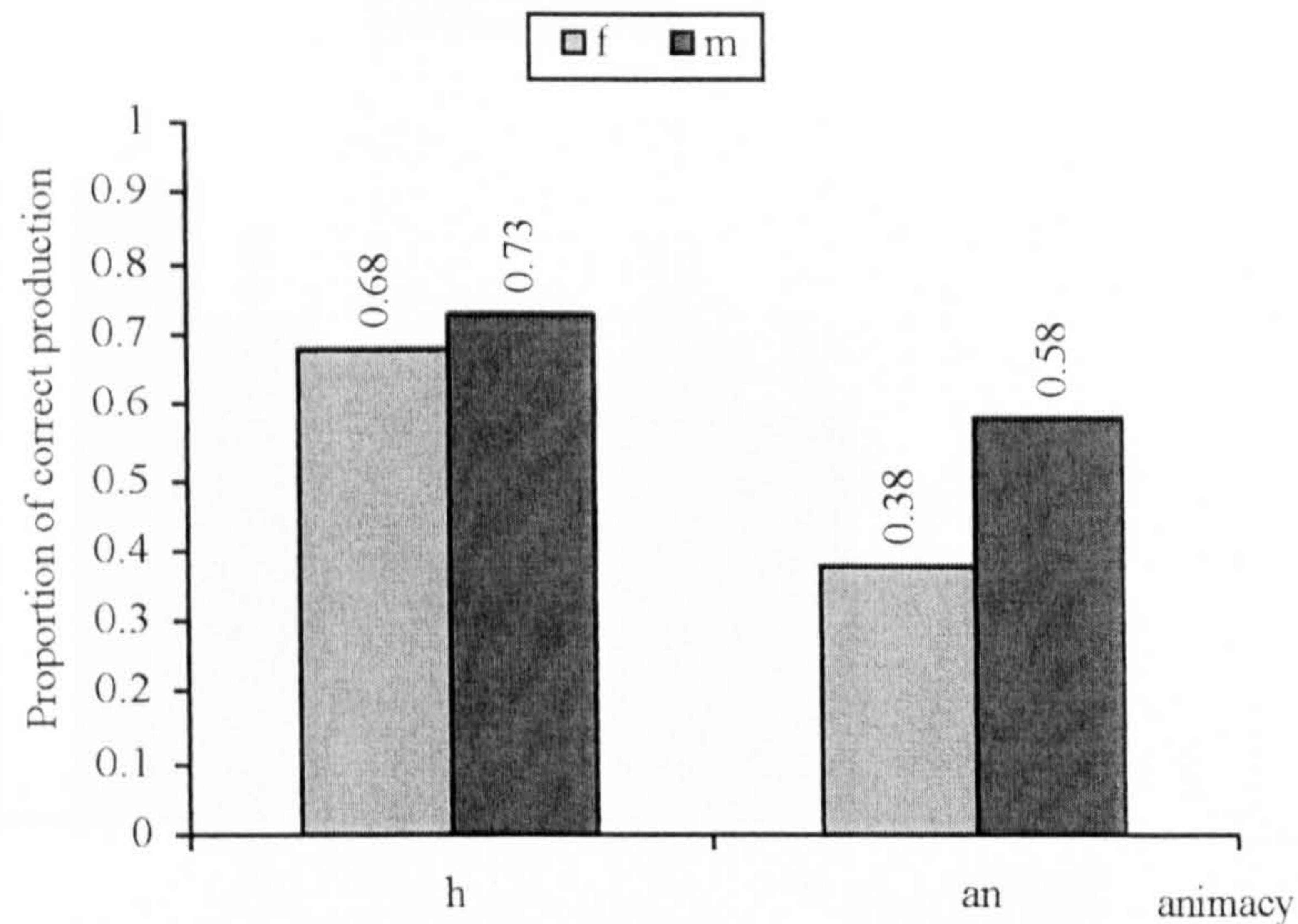


Figure 60. The effect of animacy x noun gender--nouns

Performance by animacy x number is shown in Figure 61. Simple effects analysis for each animacy reveals that on human nouns, the participants perform significantly better on singular than on dual and plural forms, and better on dual than on plural forms. On animal nouns, they perform significantly better on singular and dual forms than on plural forms, all pairwise comparisons $ps < .008$. All in all, these results reveal that the participants' performance on human nouns is $sg > du > pl$, while their performance on the animal nouns is $sg = du < pl$. This indicates the late acquisition of plural forms.

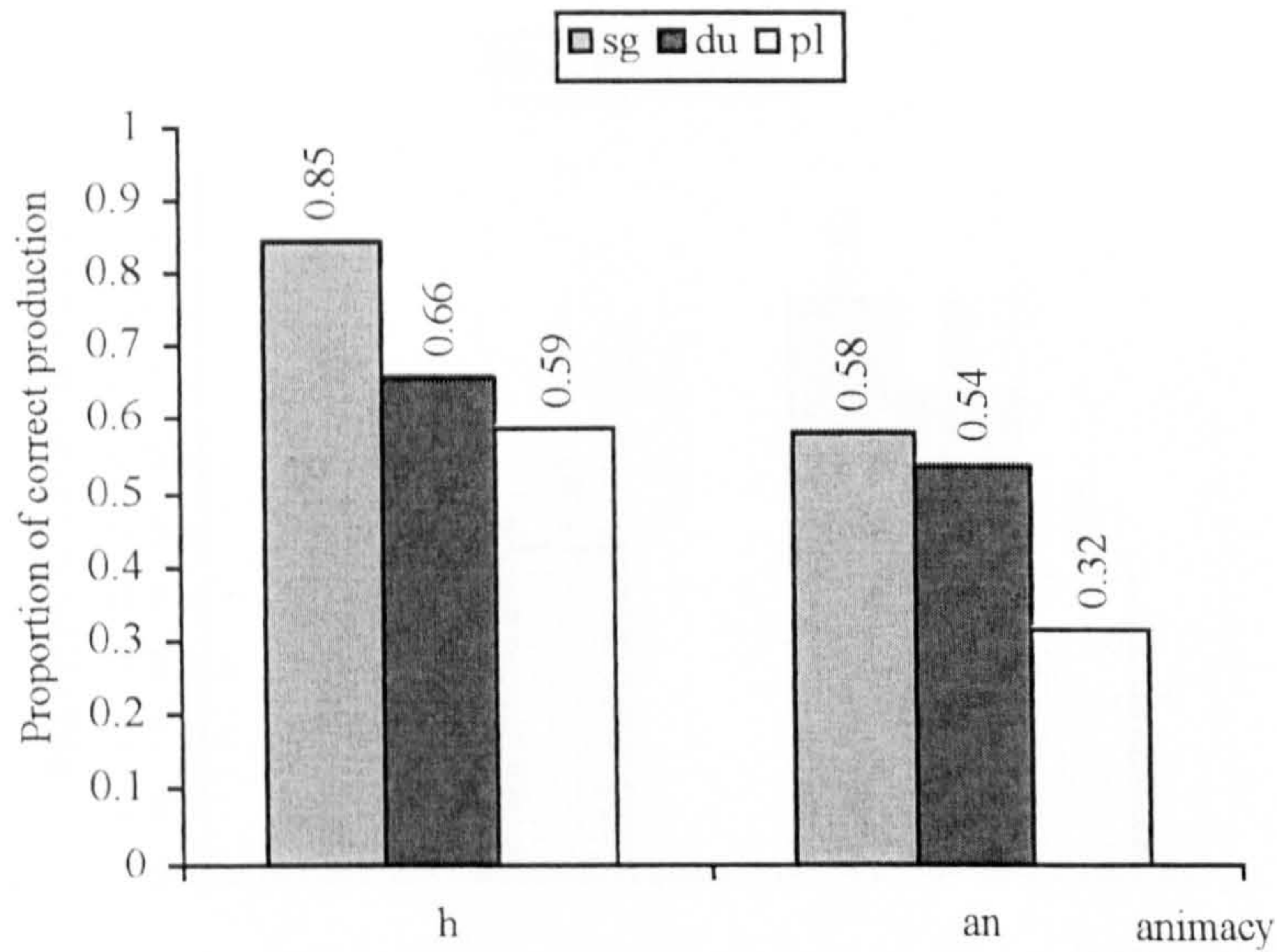


Figure 61. The effect of animacy x number--nouns

Performance by noun gender x number is shown in Figure 62. Simple effects analysis for each noun gender reveals that, for both feminine and masculine nouns, participants perform significantly better on singular noun forms than on dual and plural forms. On masculine nouns they perform better on dual than on plural forms, all pairwise comparisons $p < .001$. These results in general indicate that the participants perform better on the singular forms than plural forms on both feminine and masculine forms.

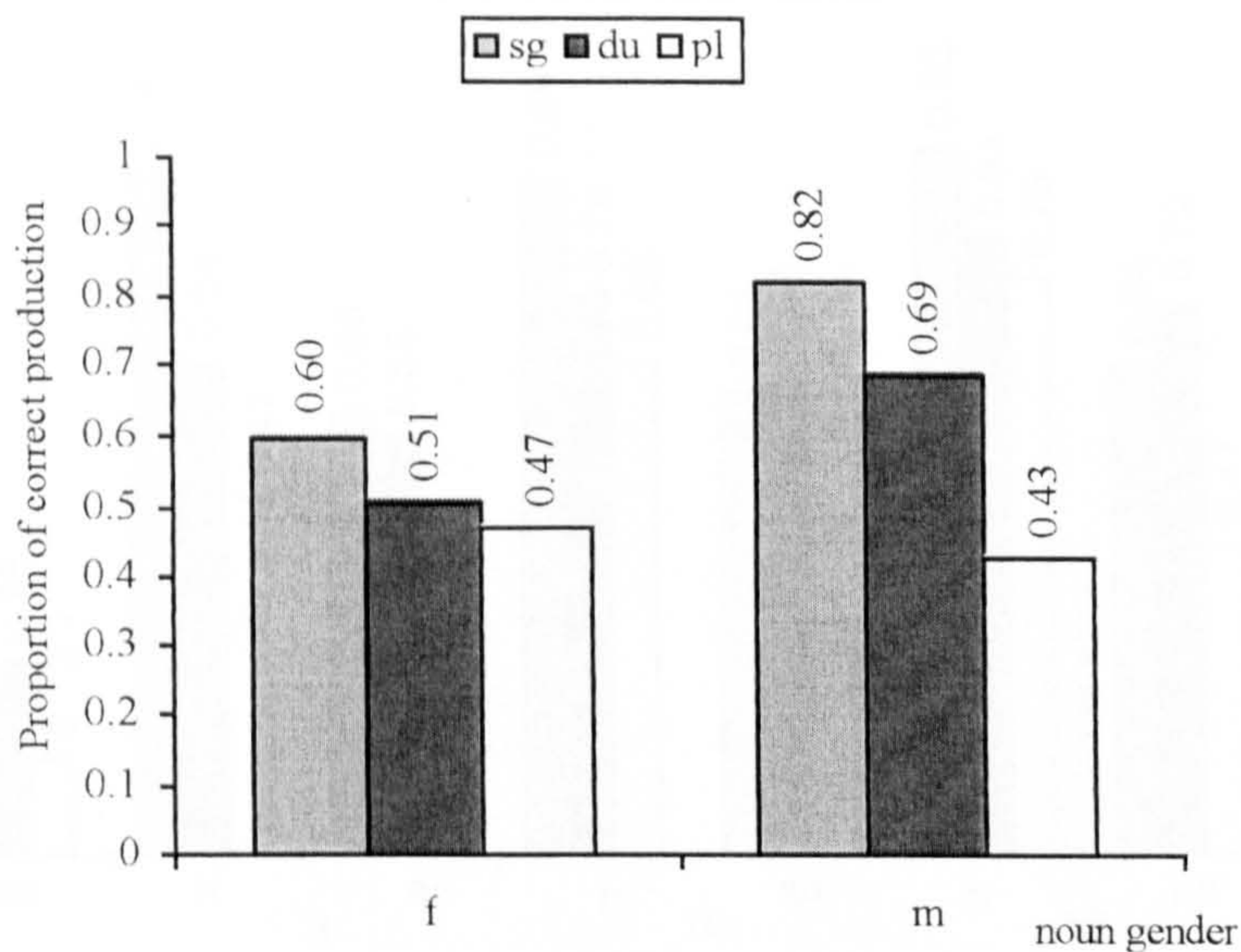


Figure 62 A The effect of noun gender x number--nouns

Performance by animacy x number x age group is shown in Figure 63. The data of this interaction show in general that on animacies and numbers across ages, the participants perform better on singular forms than on duals and plurals, and they perform better on both singulars and duals than on plurals. The only notable exception detected is the adults' performance on human nouns; they performed worse on the dual form. Generally, these results show that singular noun forms are acquired earlier than dual noun forms, while dual noun forms are on the whole acquired earlier than plural forms.

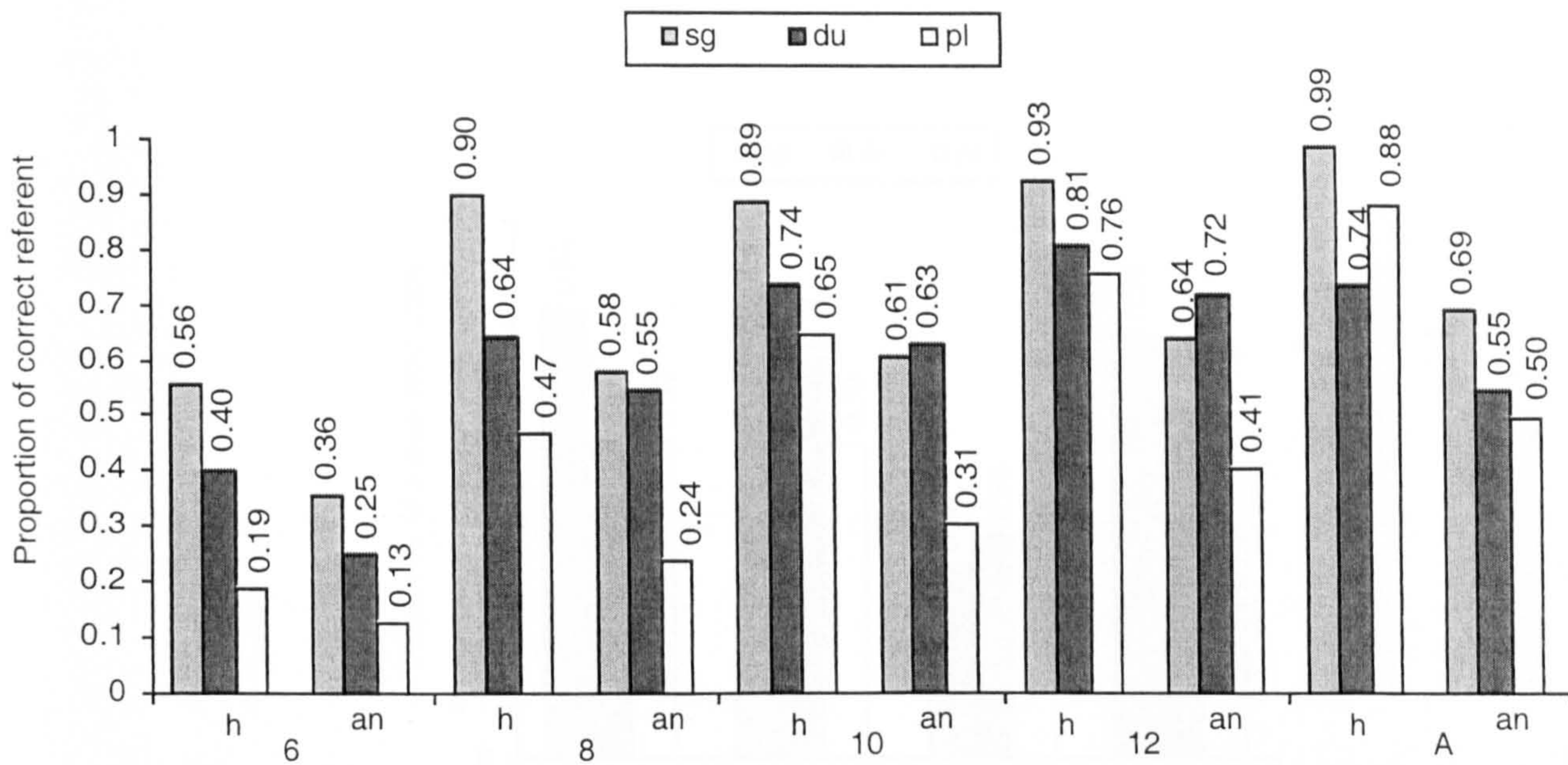


Figure 63. The effect of animacy x number, age group--nouns

Performance by animacy x noun gender x number is shown in Figure 64. These effects demonstrate that in general it makes no difference whether the subject is human or animal, masculine or feminine. Singular forms are always produced better than duals and plurals in the study.

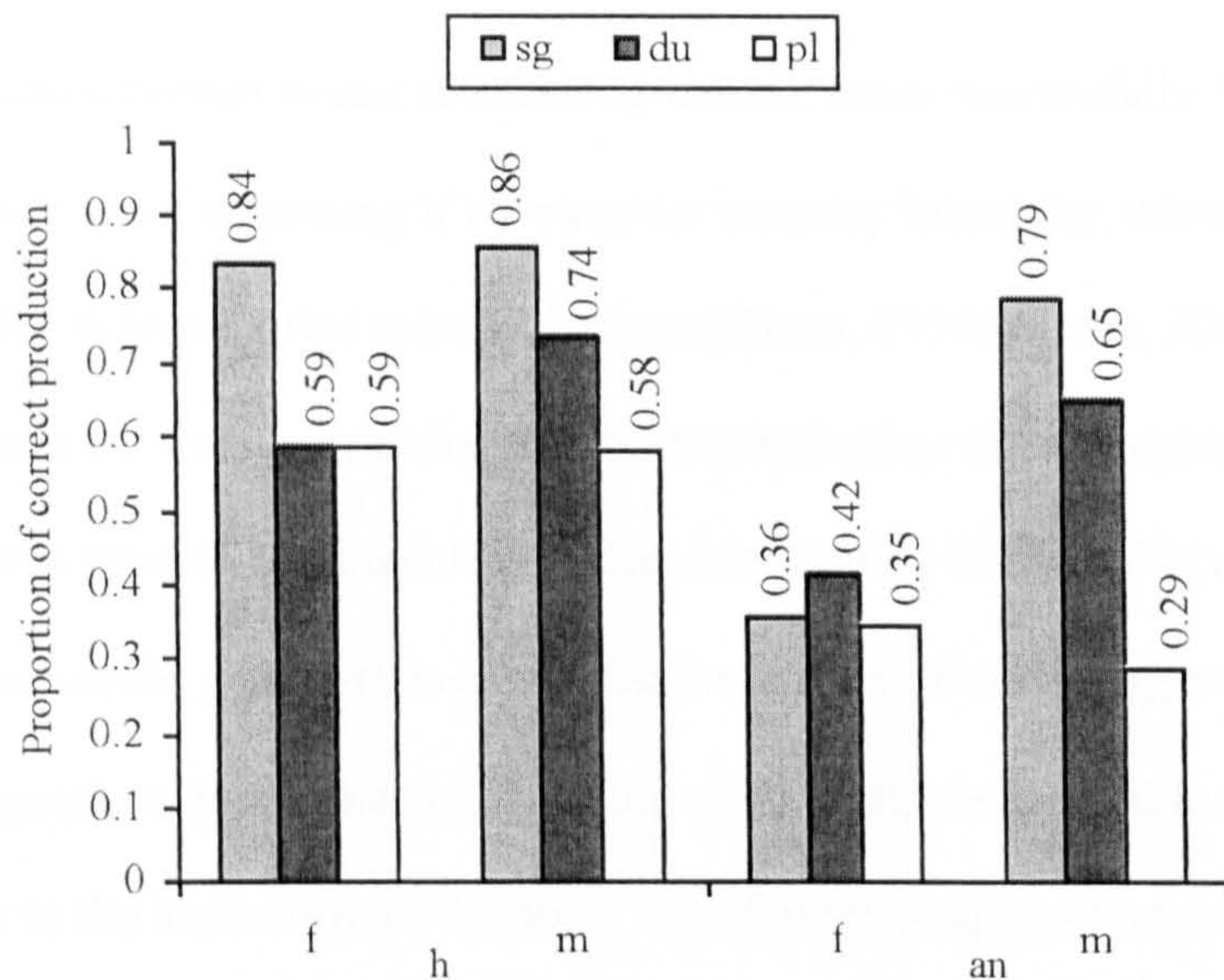


Figure 64. The effect of animacy x noun gender x number--nouns

Summary: Nouns

In terms of the human and animal noun production category examined in this study, the results demonstrate overall that the participants perform better on human than on animal nouns. The data presented also reveal that these participants perform better on masculine forms than on feminine forms. Number effects show that participants score higher on singular forms than on duals and higher on duals than on plurals. On the whole, children reach adults' performance at around the age of ten.

Discussion: Nouns

Data regarding the production of human and animal nouns reveal that animacy, noun gender, number, and age group have a significant effect. The results reveal that the participants produce human nouns and their agreement more successfully than animal nouns. This result is not surprising if we consider animacy hierarchy, whereby human nouns are usually acquired prior to animal nouns (Dixon, 1994; Aissen, 2001).

Performance on noun gender suggests better production of masculine nouns than of feminine nouns in general. This result is predictable, bearing in mind that masculine nouns are unmarked for gender (considered the basic form of the noun), making it easier to acquire and produce. Feminine nouns, on the other hand, are marked for gender by adding a suffix to the basic form of the noun. This finding suggests that producing the basic unmarked forms of the nouns is easier than producing marked forms.

Significant differences can be detected among all three numbers. Participants perform better on singular than on dual forms, and better on dual forms than on plural forms. This result may be due to the facts that the singular form is unmarked for number and that it occurs more frequently than the dual form. The dual form seems to be acquired both prior to and better than plural forms, possibly attributable to the fact that the dual form is marked for number and comes in only one form whereas plurals come in two different forms (sound and broken, as explained in chapter 2), making them the hardest to produce and more complicated than the singular and dual to acquire.

Looking at the main effect of age, we can see that by the age of ten, children overall produce human and animal nouns as well as adults. This result could be due to the complexity of subject–number agreement; for plural forms the participants had to choose

between three possibilities depending on the gender (one sound feminine and a sound masculine or a broken plural form).

The results also show significant interactions between animacy x age group; noun gender x age group; number x age group; animacy x noun gender; animacy x number; noun gender x number; animacy x number x age group; and animacy x noun gender x number.

Performance by animacy x age group demonstrates an increase in production of human and animal nouns by the age of eight, and by the age of ten this performance becomes equivalent to that of adults. This finding could point to a similar developmental order and a different rate between human and animal nouns, because of the animacy hierarchy, wherein human nouns are usually acquired earlier than animals, as argued earlier (p. 156).

The interaction detected between noun gender x age group reveals that, generally, the order of acquiring gender is alike between feminine and masculine nouns. However, acquisition of feminine nouns occurs later than acquisition of masculine nouns. The fact that children acquire a command of masculine nouns earlier than they acquire a command of the feminine form is consistent with the acquisition of the Spanish gender system, in which, according to Pérez-Pereira (1991), the early acquisition of masculine forms might be due to the fact that unmarked forms are easier to acquire. In Arabic, the feminine form is marked for gender, while the masculine form is unmarked for gender and therefore acquired earlier.

Testing of the significant interaction between number and age group has revealed a distinct rate and order between the three numbers. For the singular form, the performance

of eight-year-olds is equivalent to that of adults. For the dual form, ten-year-olds perform equivalently to adults. For the plural forms twelve-year-olds perform equivalently to adults. Looking at these results, it appears that in comparison with the singular and dual forms, the plural form is the last to be mastered. This may result from the fact that the plural, as explained earlier (p. 156), comes in two forms. Broken forms have many different possibilities depending on the word root. The masculine plural sound form is restricted to human nouns, while the feminine plural form is unrestricted to animacy and takes only one form. These findings could indicate that sound and regular forms are more easily acquired than broken and irregular forms are, and this result is consistent with findings related to other languages such as Hungarian (MacWhinny, 1985) and Georgian (Imedadze & Tuite, 1992), in which regular forms are acquired early while irregular and oblique forms are acquired later, as argued by Dasinger (1997).

Animacy x noun gender results on the whole show that on human and animal nouns, the participants perform better on masculine than on feminine nouns. This could be because feminine nouns (on both animacies) are formed by a suffix attachment, while in contrast masculine forms are unmarked for gender. This result indicates that unmarked forms are easier to produce than marked forms, as argued earlier (p. 156). However, Figure 60 show that the participants performed on the human feminine forms better than the animal feminine forms, which could be attributed to the fact that in a normal conversation the animal masculine default form is the form usually used and not a feminine one.

The significant interaction between animacy x number shows that participants' performance on human nouns is sg > du > pl, while their performance on animal nouns is

sg = du > pl, indicating the late acquisition of plural forms. Overall, these indications might suggest that singular and dual forms are easier to produce because each comes in one form, while the plural comes in two different forms.

The gender x number results reveal that the participants perform better on both feminine and masculine singular forms than on plurals. This relates to the complexity of plural forms--particularly the masculine, because most of the masculine nouns are pluralized in broken forms while feminine nouns are pluralized in the sound form more than masculine nouns are. The result could also be attributed to the fact that feminine plural forms are less complicated because they are less semantically constrained, while the masculine sound plural is semantically constrained (used only with some human nouns).

6.2.1.2 Adjectives

The second set of analyses examines the responses to stimuli involving adjectives. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (human, animal, and inanimate), gender (feminine and masculine), and number (singular, dual, and plural).

The tests reveal main effects of animacy ($F(2, 19) = 63.19, p < .001$), gender ($F(1, 96) = 76.20, p < .001$); number ($F(2, 19) = 36.03, p < .001$) and age group ($F(4, 96) = 15.29, p < .001$). (Means and Std. Errors in Appendix 2.2.2).

In terms of the effect of animacy, the tests reveal that the participants generally perform significantly better on adjectives referring to humans ($M = .51$) and inanimates ($M = .5$) than on those referring to animals ($M = .39$).

In terms of the effect of gender, the participants in general perform significantly better on masculine adjectives ($M = .52$) than on feminine adjectives ($M = .42$).

In terms of the effect of number, the participants generally perform significantly better on singular adjectives ($M = .83$) than on duals ($M = .25$) and plurals ($M = .33$), and better on plural forms than on duals, all pairwise comparisons $ps < .004$.

Performance by age group is shown in Figure 65. The results reveal that the performance of six-year-old participants is significantly worse than that of all the other age groups, and eight- and ten-year-olds' performance is significantly worse than that of twelve-year-olds and adults, all pairwise comparisons $ps < .05$. These results, in general, show that by the age of twelve children have reached the adults' level in adjective production.

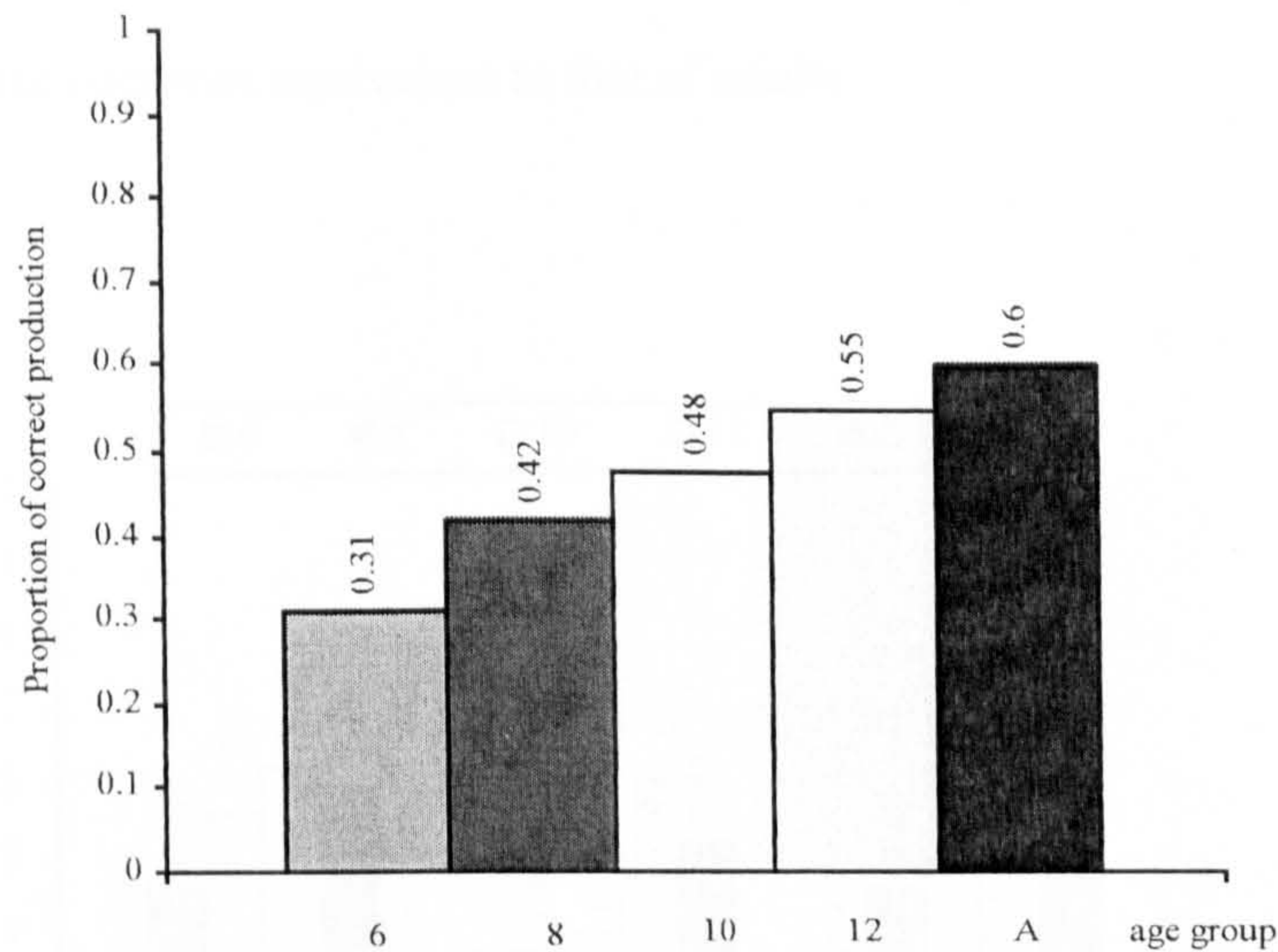


Figure 65. The effect of age group--adjective

The main effects are moderated by the significant interactions of animacy x age group ($F(8, 19) = 2.67, p < .008$), number x age group ($F(8, 19) = 3.42, p < .001$), animacy x gender ($F(2, 19) = 6.42, p < .002$), animacy x number ($F(4, 38) = 14.44, p < .001$), animacy x number x age group ($F(16, 38) = 1.68, p < .05$), and animacy x gender x number ($F(4, 38) = 15.18, p < .001$).

Performance by animacy x age group is shown in Figure 66. Simple effects analysis for each animacy reveals that on human adjectives 6-year-olds perform worse than all other age groups. Eight-year-olds perform worse than twelve-year-olds. On animal adjectives, six-year-olds perform significantly worse than all other age groups. On

inanimates, six-year-olds perform significantly worse than all other age groups. Eight- and ten-year-olds' performance is worse than that of twelve-year-olds and adults, all pairwise comparisons $p < .05$. These results overall indicate that by the age of twelve, children's performance becomes equivalent to that of adults.

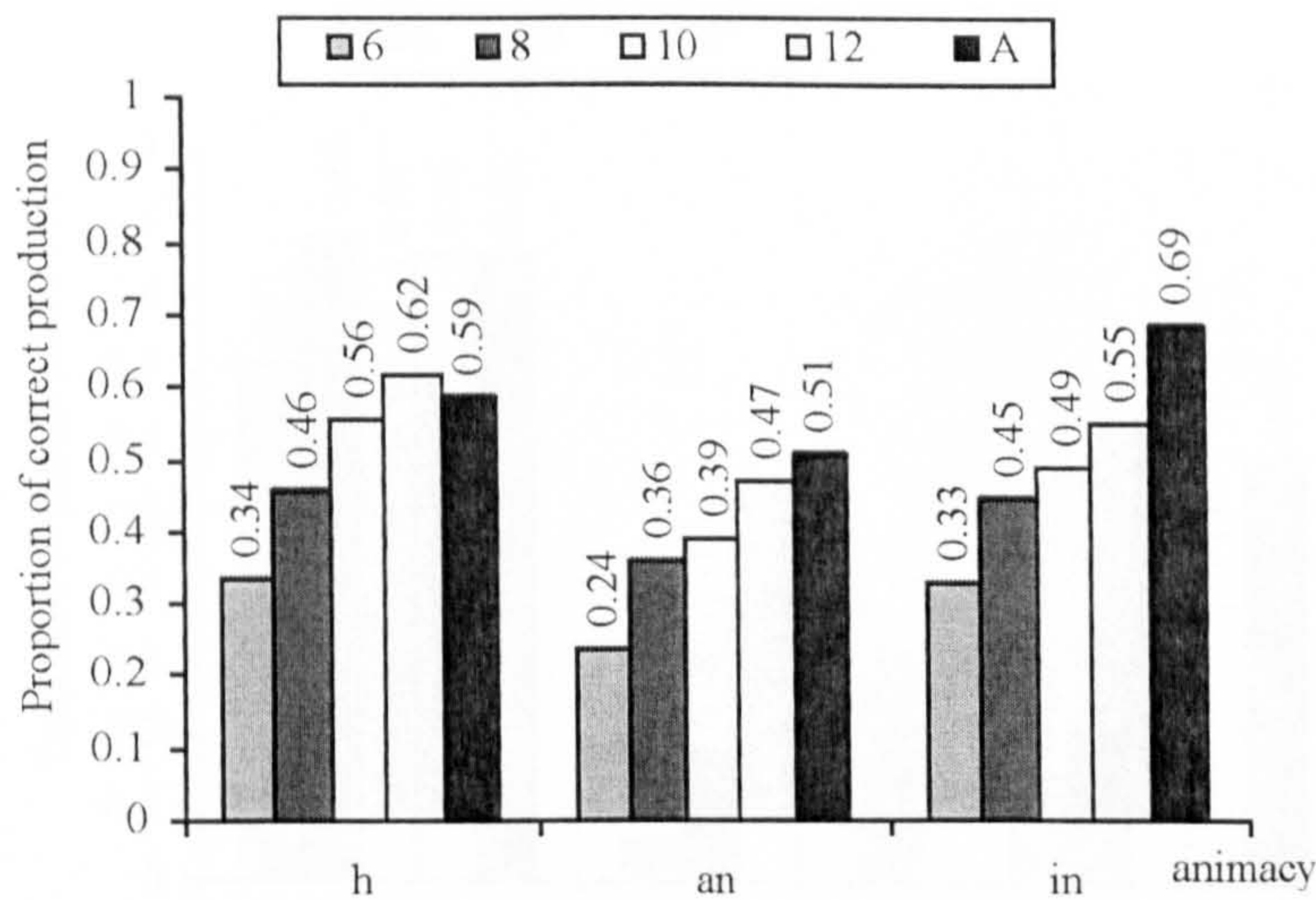


Figure 66. The effect of animacy x age group--adjective

Performance by number x age group is shown in Figure 67. Simple effects analysis for each number reveals that, on the singular forms, six-year-olds perform significantly worse than all other age groups. On the dual forms, six-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Eight-year-olds perform significantly worse than twelve-year-olds on the dual form. On plural forms, six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults, and ten and

twelve-year-olds perform significantly worse than adults, all pairwise comparisons $p < .04$. These results, overall, show that the singular form is the easiest to acquire, and children reach adults' performance level by the age of eight. They reach adults' performance level on dual forms around the age of twelve. However, the performance of all non-adult age groups on plural adjective forms lags behind that of adults.

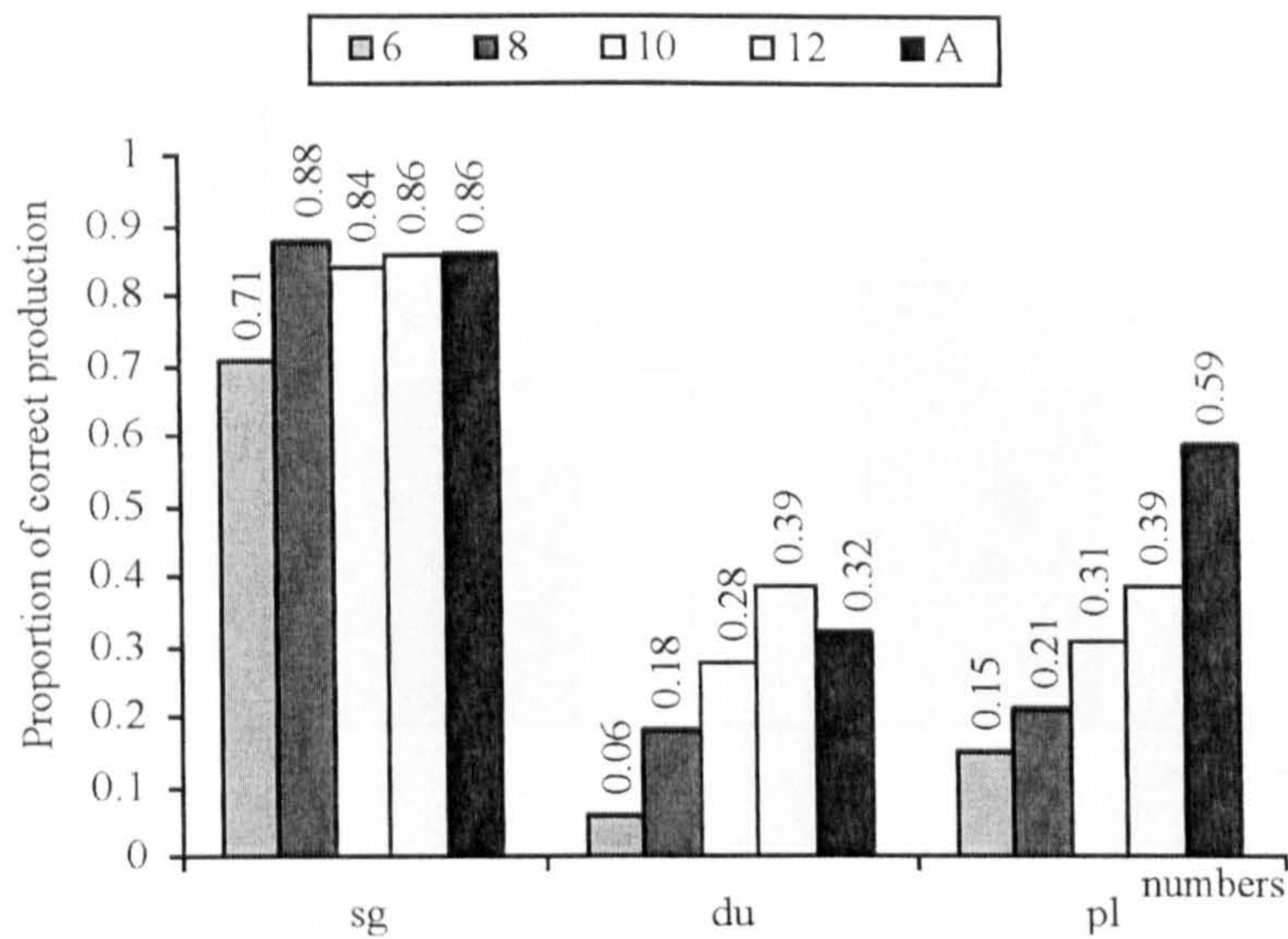


Figure 67. The effect of number x age group--adjectives

Performance by animacy x gender is shown in Figure 68. Simple effects analysis for each gender reveals that on feminine forms, participants perform significantly better on adjectives referring to human and inanimate subjects than on adjectives referring to animal subjects. On masculine forms, participants perform significantly better on adjectives referring to human subjects than on those referring to inanimates and animal subjects, and they perform similarly on inanimates than on animals, pairwise

comparisons $ps < .005$. These results reveal that adjectives referring to human masculine and feminine subjects are the easiest to acquire and produce, followed by adjectives referring to inanimates, while those referring to animal subjects are the hardest to acquire.

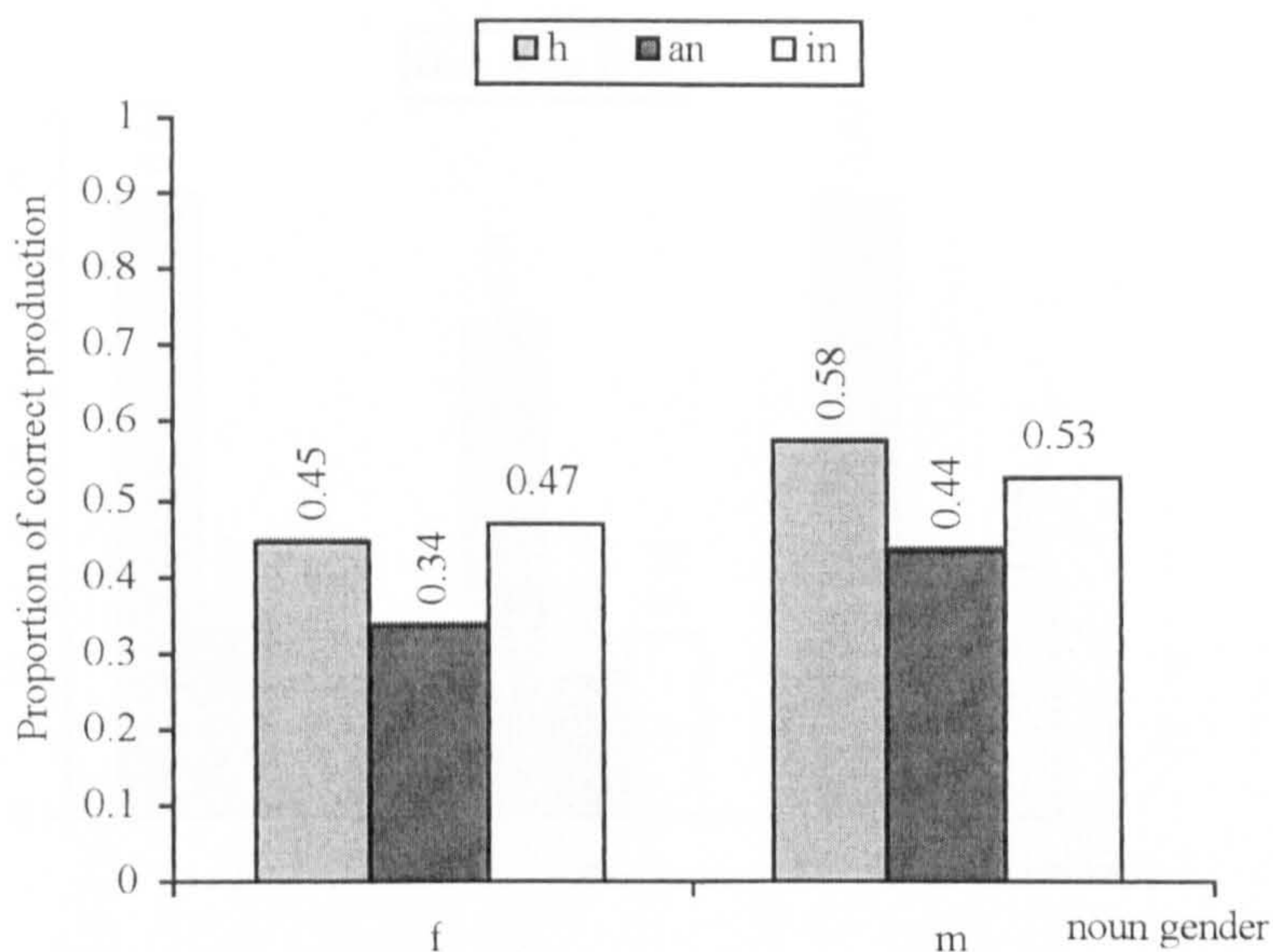


Figure 68. The effect of animacy x gender--adjective

Performance by animacy x number is shown in Figure 69. Simple effects analysis for each animacy reveals that on all animacy categories, the participants perform better on the singular forms. The data on adjectives referring to human and inanimate subjects reveal that participants' performance can be described as $sg > du < pl$. On adjectives referring to animal subjects, performance is $sg > du \leq pl$, all pairwise comparisons $ps < .01$. These results show that the singular and plural forms are usually easier to produce than dual forms, because they are usually frequent in the input and CDS. Adjective dual

forms are not used in the vernacular dialects, and therefore do not appear in the language input and CDS frequently.

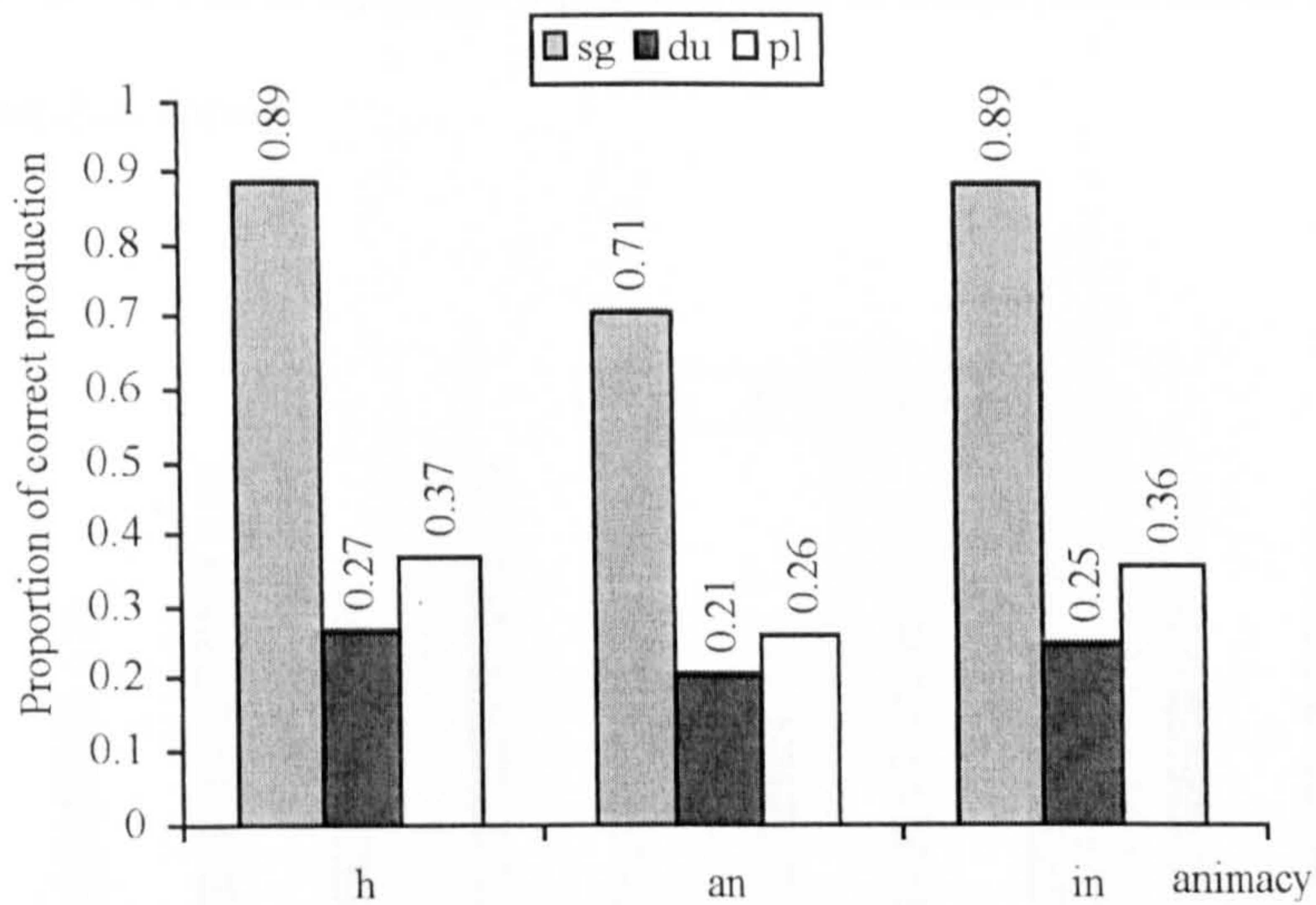


Figure 69. The effect of animacy x number--adjectives

Performance by animacy x number x age group is shown in Figure 70. The results of this multiple interaction show different patterns. One such pattern is that the dual form is produced better than the plural, and another is that the plural is produced better than the dual. However, in all patterns the singular is produced better than both the dual and the plural. The most striking result is that children of age group six score the lowest mark on plural animal adjectives. This result could be due to the fact that at this young age, children do not usually hear in the input the correct form of animal nouns as often as they do other animacies, even though adjectives referring to inanimate subjects have similar

forms to those of animal subjects, for example children might hear adjective forms in association with inanimate objects more than animals, which could be because inanimate objects surround them more than animals. The results also show that, on the whole, on the three animacy types, our participants perform better on plural forms than on dual forms, which may be due to language input and CDS in which plural forms are used more frequently than dual forms.

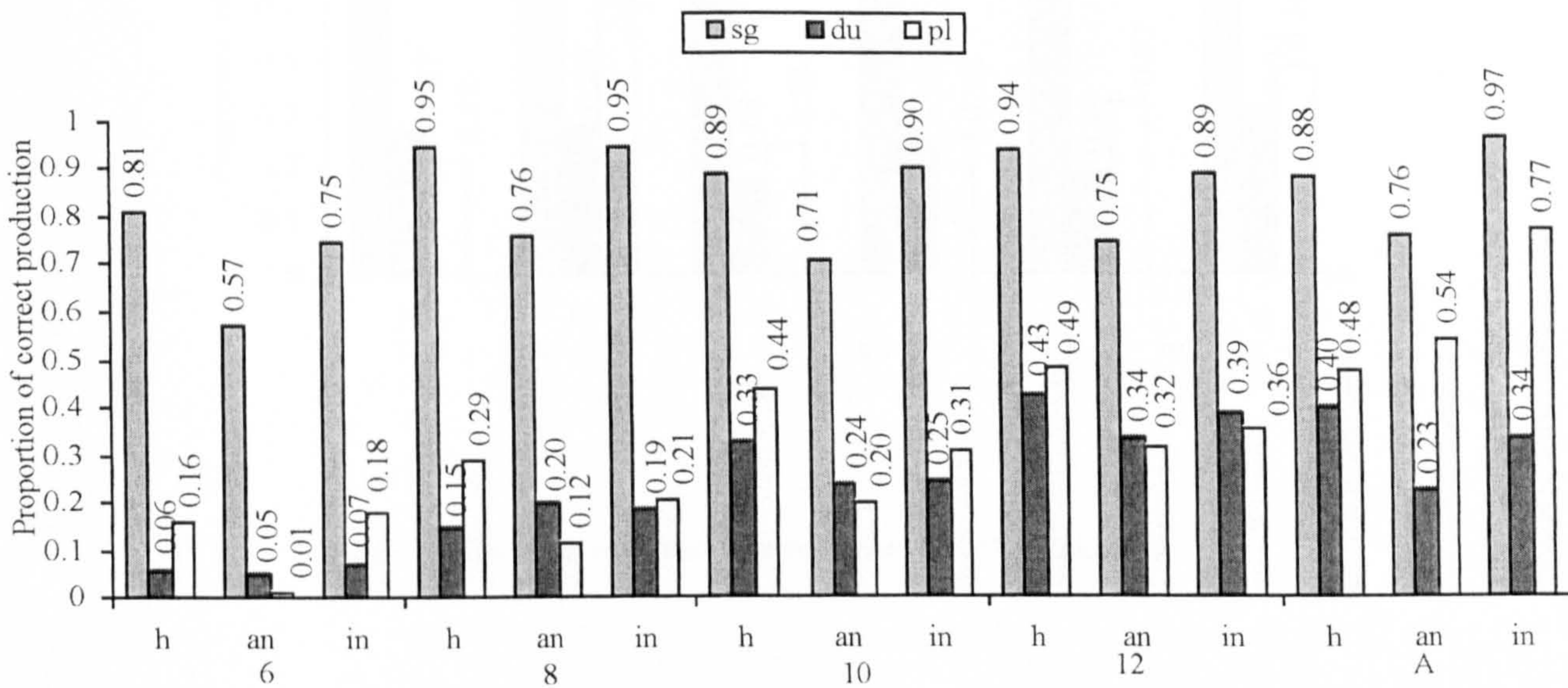


Figure 70. The effect of animacy x number x age group--adjective

Performance by animacy x noun gender x number is shown in Figure 71. The effects show diverse interactions. These effects in general indicate that on the animal noun types, participants score closely on both feminine and masculine forms; however, on human and inanimate noun types our participants seem to score higher on plurals than

on duals. These differences might be attributed to the language input and CDS as discussed in relation to the previous interaction.

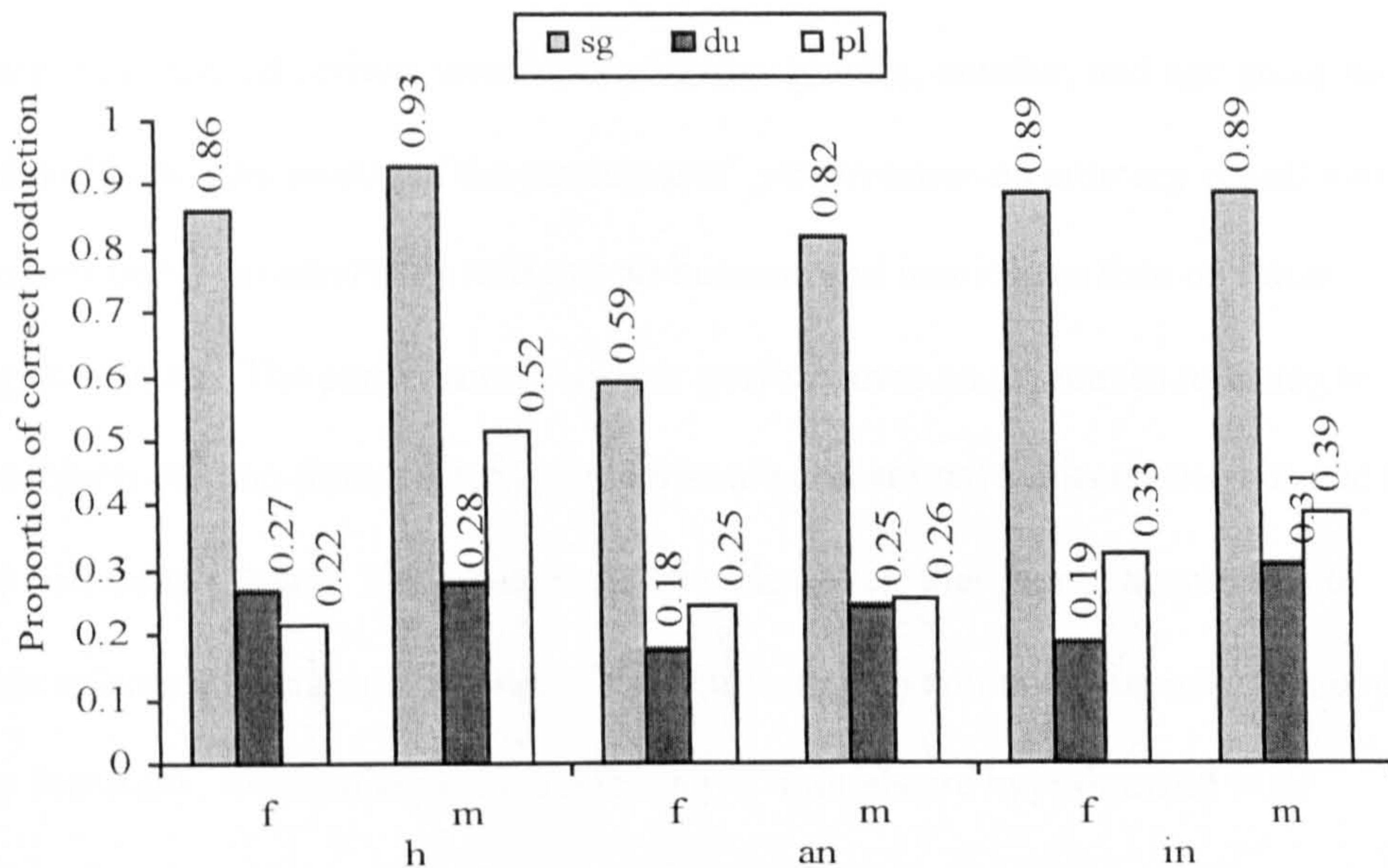


Figure 71. The effect of animacy x noun gender x number--adjective

Summary: Adjectives

In terms of the adjective production category examined in this study, we can say that overall the results indicate that participants score higher on adjectives referring to human and inanimate subjects than on adjectives referring to animal subjects. The data also demonstrate that masculine adjective forms are produced better than feminine forms, and it seems that singular forms are acquired better than dual and plural adjective forms,

while plural forms are acquired better than dual forms. On the whole, children reach adults' production level in the adjective category at around the age of twelve.

Discussion: Adjectives

Data regarding adjectives reveal that animacy, gender, number, and age group have significant effects. The results of the participants' performance on animacy reveal that they perform better on adjectives referring to humans and inanimates than on those referring to animals. The participants' superior performance on adjectives referring to human subjects than on those referring to inanimate and animal subjects could be due to animacy hierarchy (Dixon, 1994; Aissen, 2001). However, their better acquisition of adjectives referring to inanimates than of those referring to animals is inconsistent with animacy hierarchy, wherein adjectives referring to animals are hypothesized to be acquired earlier than inanimates. This result could be due to the children perhaps being surrounded by inanimate objects, and therefore able to produce adjectives which refer to inanimates better than those referring to animals.

The results also indicate that the participants generally perform better on adjectives in the masculine form than on adjectives in the feminine form. This finding could be due to the fact that adjectives in the masculine form are unmarked for gender (they are considered the basic form of the adjective), while adjectives in the feminine form are marked for gender by adding a suffix to the basic form of the adjective. This suggests that producing the basic unmarked forms of adjectives is easier than producing marked forms (Pérez-Pereira, 1991).

The participants' performance on numbers reveals that $sg > pl > du$. This result could be attributed to language input and CDS. Dual adjectives in the Saudi vernacular dialect are rarely produced; singular and plural adjective forms, on the other hand, are produced more frequently in the language input and CDS. The result could also be due to the fact that the singular form is unmarked for number (making it easier to produce), while the plural is marked for number and comes in two forms: sound and broken (see chapter 2). These results indicate that the language input and CDS helps our participants to produce plural forms better than dual forms, even though dual forms are more transparent than plural forms. This finding may be in agreement with the findings of Moerk (1992), who suggested that high input frequency helps speakers produce complex forms more easily in comparison to infrequent forms.

The results also reveal significant interactions between animacy x age group, number x age group, animacy x noun gender, animacy x number, animacy x number x age group, and animacy x noun gender x number.

The data concerning the significant interaction of animacy x age group show that by the age of ten, children's performance is equivalent to adults' on adjectives referring to human and inanimate subjects. However, on adjectives referring to animal subjects, eight-year-olds perform equivalently to adults. The result could be attributed to more than one factor. First, although adjectives referring to animals and inanimates take the same forms (see chapter 2), the adjectives introduced in the test used to collect the data for this research are not words associated with inanimates in a real conversation. For example, in the case of 'a sad notebook', 'sad' is not an adjective associated with notebooks in real life. Nevertheless, to test participants' knowledge of the gender system, this phrase was

introduced. Second, the late acquisition of adjectives referring to humans could be explained by the fact that the adjective might take either of two forms--the sound or the broken in the case of plurals (see chapter 2).

The results of the interaction between number x age group reveal that on singular forms, eight-year-olds perform equivalently to adults. On dual forms, ten-year-olds perform equivalently to adults, while on plurals, none of the non-adult age groups reach the adults' level. These results might be explained by the fact that the singular form is the easiest to produce because it is an unmarked form. The dual form is also easier to acquire and produce than the plural, as explained earlier. The late acquisition of plurals could be due to the fact that plurals come in two forms--sound and broken, and broken irregular forms are usually mastered after regular forms, as reported elsewhere in reference to the acquisition of Portuguese (Simoes & Stoel-Gammon, 1979).

The interaction between animacy x gender generally shows that adjectives referring to masculine and feminine human subjects are the easiest to produce, followed by adjectives referring to inanimate subjects, and then adjectives referring to animal subjects. These results could be due to animacy hierarchy, or to the fact that feminine and masculine human adjectives are in agreement with both gender and number, while adjectives referring to animal and inanimate subjects are not in agreement with the subject number (see chapter 2).

Performance by animacy x number generally reveals that on all animacy categories the singular and plural forms are easier to produce than the dual forms. These results could be due to the fact that the singular and plural forms for the animacy category occur in the language input and CDS more frequently than the dual forms do.

6.2.1.3 Verbs

The third set of analyses examines the responses to stimuli involving verbs. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (human, animal, and inanimate), gender (feminine and masculine), and number (singular, dual, and plural).

The test reveals main effects of animacy ($F(2, 19) = 86.69, p < .001$), gender ($F(1, 96) = 21.72, p < .001$), number ($F(2, 19) = 49.98, p < .001$), and age group ($F(4, 96) = 17.08, p < .001$). (Means and Std. Errors in Appendix 2.2.3).

In terms of the effects of animacy, the test reveals that the participants generally perform significantly better on verbs referring to humans ($M = .51$) than on verbs referring to inanimate subjects ($M = .48$) and to animals ($M = .35$). The results also reveal that the participants perform better on verbs referring to inanimates than on those referring to animals.

In terms of the effects of gender, participants in general perform significantly better on masculine verb forms ($M = .52$) than on feminine forms ($M = .38$).

In terms of the effects of number, participants generally perform significantly better on singular verb forms ($M = .85$) than on plural verb forms ($M = .3$), and better on plurals than on duals ($M = .19$).

Performance by age group is shown in Figure 72. This effect reveals that six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. Eight-year-olds perform significantly worse than twelve-year-olds and adults. In addition, ten- and twelve-year-olds perform significantly worse than adults, all pairwise comparisons $p < .005$. These results clearly show that all age groups investigated lag behind adults in verb production.

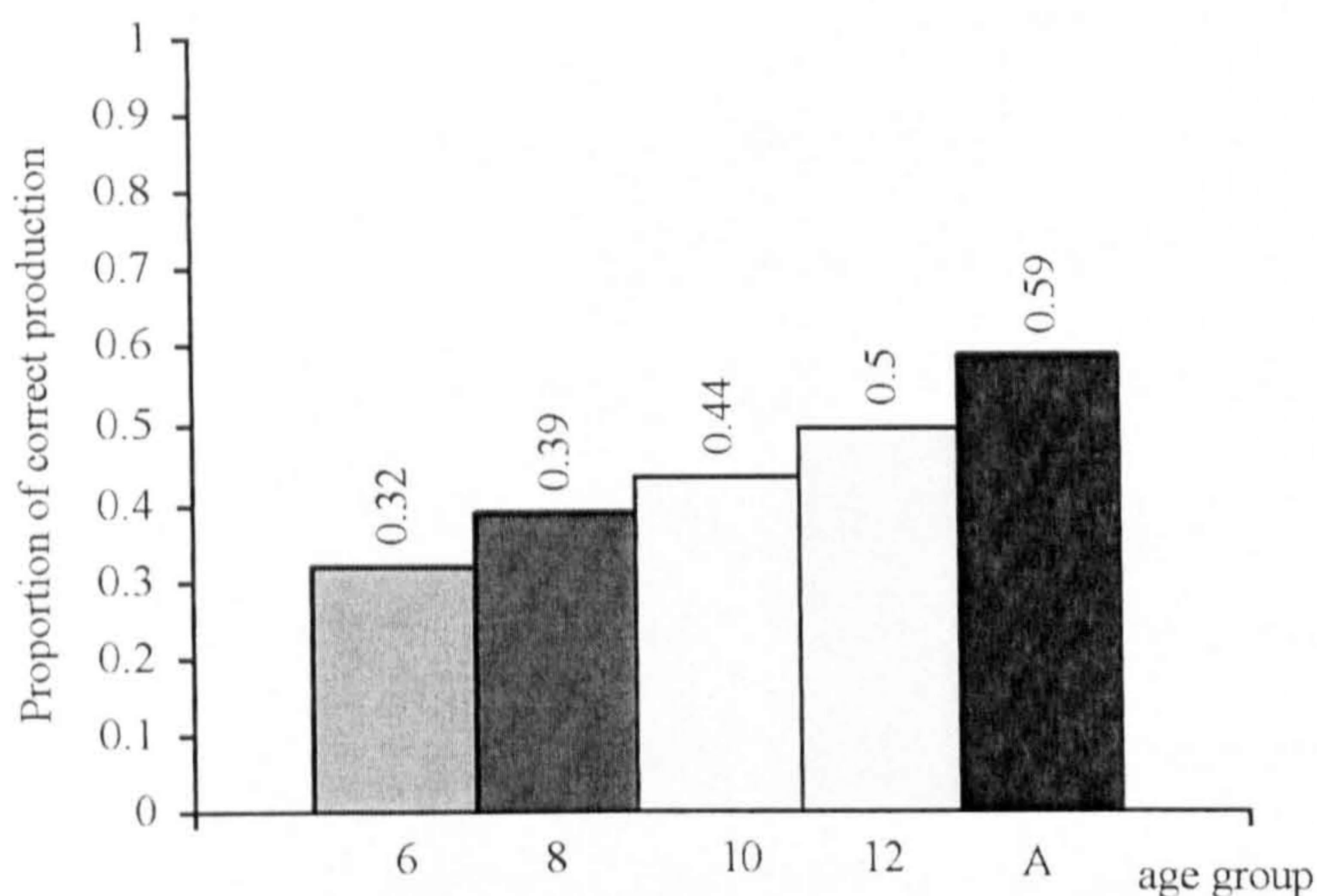


Figure 72. The effect of age group--verb

The main effects are moderated by the significant interactions of animacy x age group ($F(8, 19) = 2.78, p < .006$); gender x age group ($F(4, 96) = 3.46, p < .01$); number x age group ($F(8, 19) = 2.86, p < .005$); animacy x gender ($F(2, 19) = 54.48, p < .001$);

animacy x number ($F(4, 38) = 11.19, p < .001$); gender x number ($F(2, 19) = 14.6, p < .001$); gender x number x age group ($F(8, 19) = 4.49, p < .001$); and animacy x gender x number ($F(4, 38) = 88.23, p < .001$).

Performance by animacy x age group is shown in Figure 73. Simple effects analysis for each animacy reveals that on verbs referring to human subjects, six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. Eight-year-olds perform significantly worse than twelve-year-olds and adults. Ten-year-olds perform significantly worse than adults on verbs referring to humans. On verbs referring to animals, the effects reveal that six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. Eight- and ten-year-olds perform significantly worse than twelve-year-olds and adults on verbs referring to animal subjects. On verbs referring to inanimate subjects, the effects reveal that six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten- and twelve-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .03$. On the one hand, these results show that by the age of twelve children's performance on verbs referring to humans and animals is equivalent to that of adults; on the other hand, the performance of all age groups on verbs referring to inanimates lags behind that of adults.

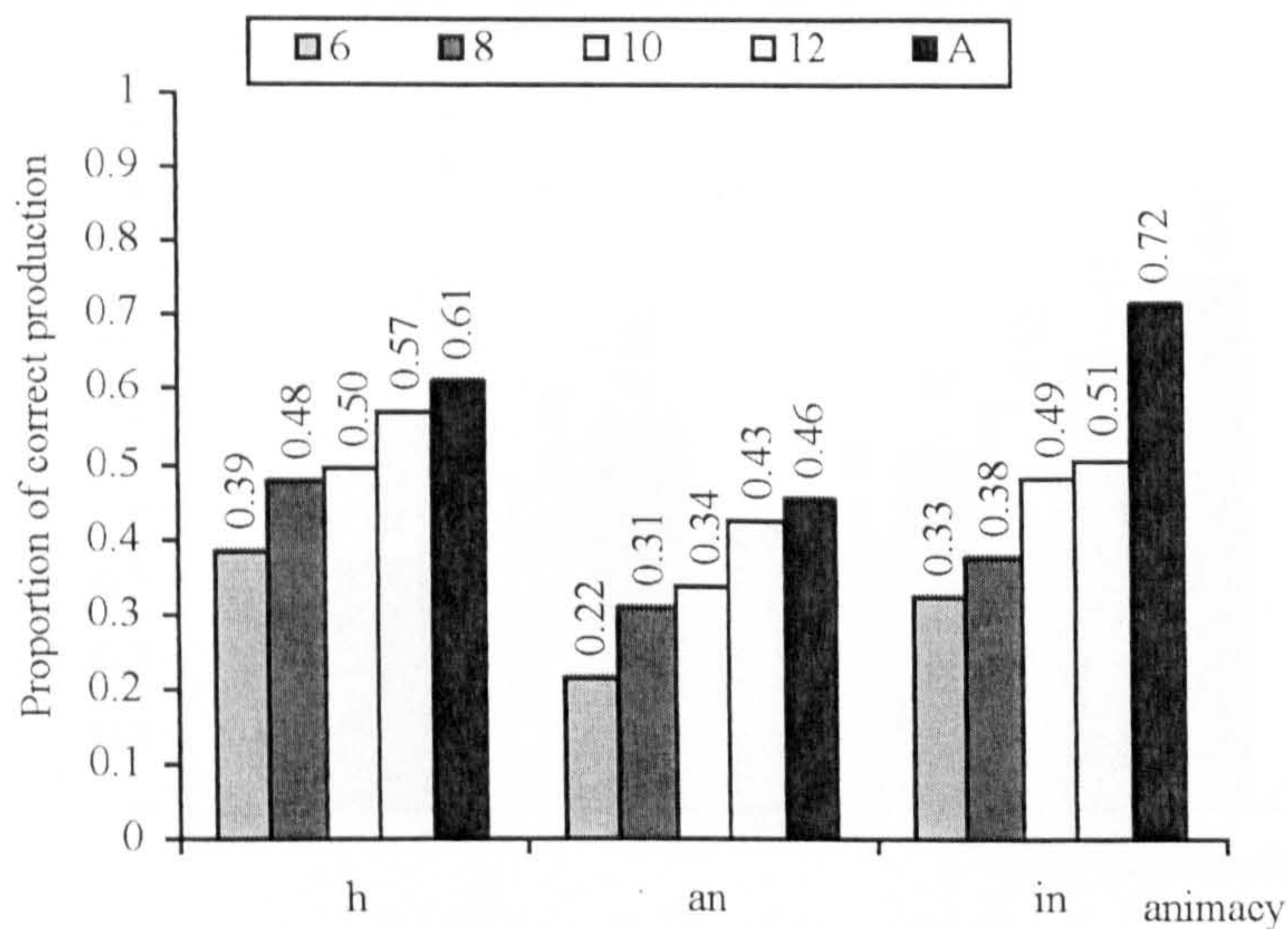


Figure 73. The effect of animacy x age group--verb

Performance by gender x age group is shown in Figure 74. Simple effects analysis for each gender reveals that, on both feminine and masculine verb forms, six-year-olds perform worse than eight-, ten-, and twelve-year-olds and adults. Eight-year-olds perform worse than twelve-year-olds and adults. Ten- and twelve-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .01$. These results show that on both verb gender forms, all non-adult age groups lag behind adults.

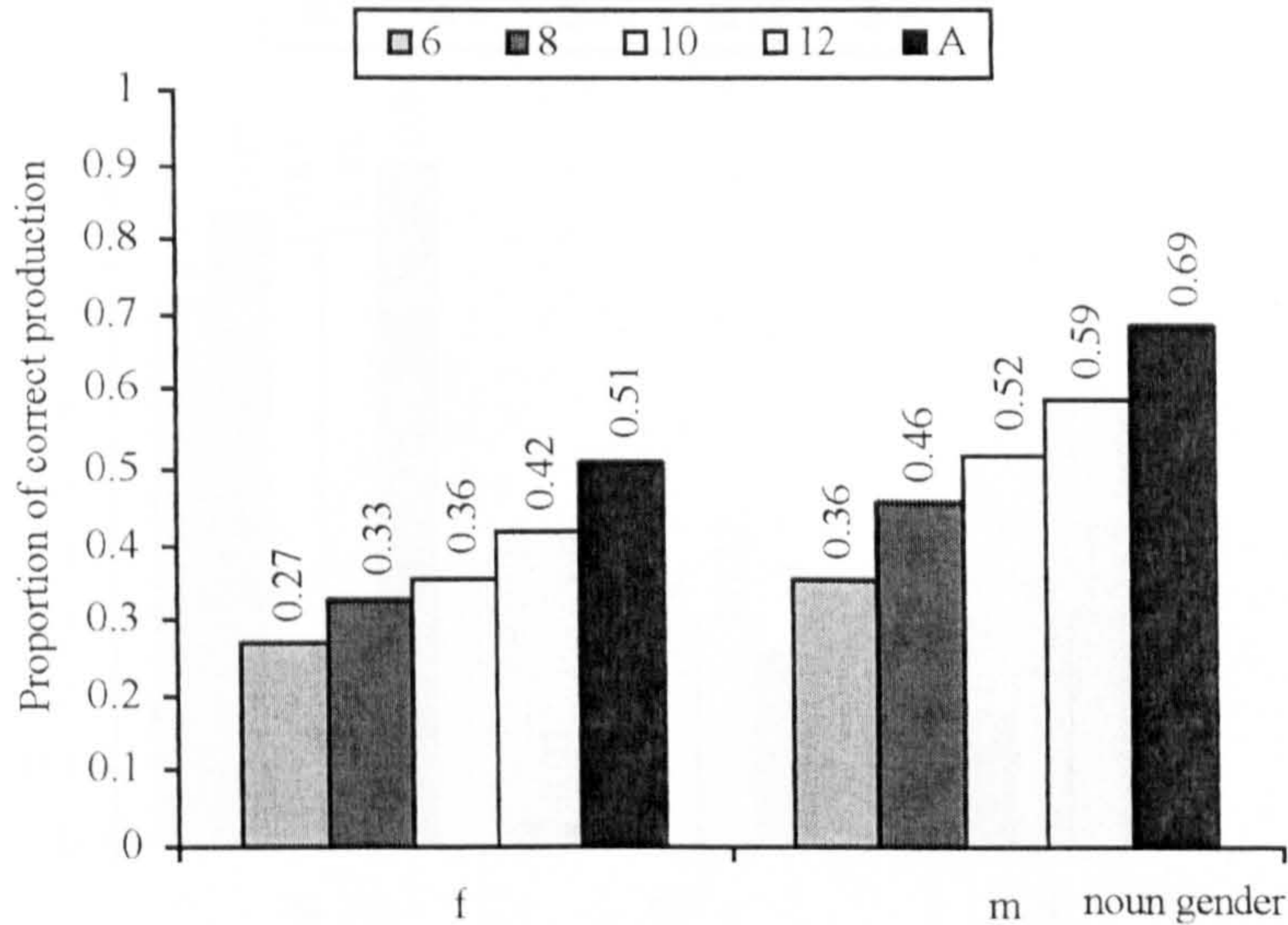


Figure 74. The effect of gender x age group--verb

Performance by number x age group is shown in Figure 75. Simple effects analysis for each number reveals that, on the singular verb forms, six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. On the dual verb forms, six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. On the plural verb forms, six-year-olds perform worse than ten- and twelve-year-olds and adults, and eight- and ten-year-olds perform significantly worse than twelve-year-olds and adults. Twelve-year-olds perform significantly worse than adults on the plural forms, all pairwise comparison $ps < .02$. It appears that on singular verbs, children perform equivalently to adults by the age of eight, while on dual forms, they perform equivalently to adults by the age of ten. However, on plural forms, all children's age groups lag behind adults.

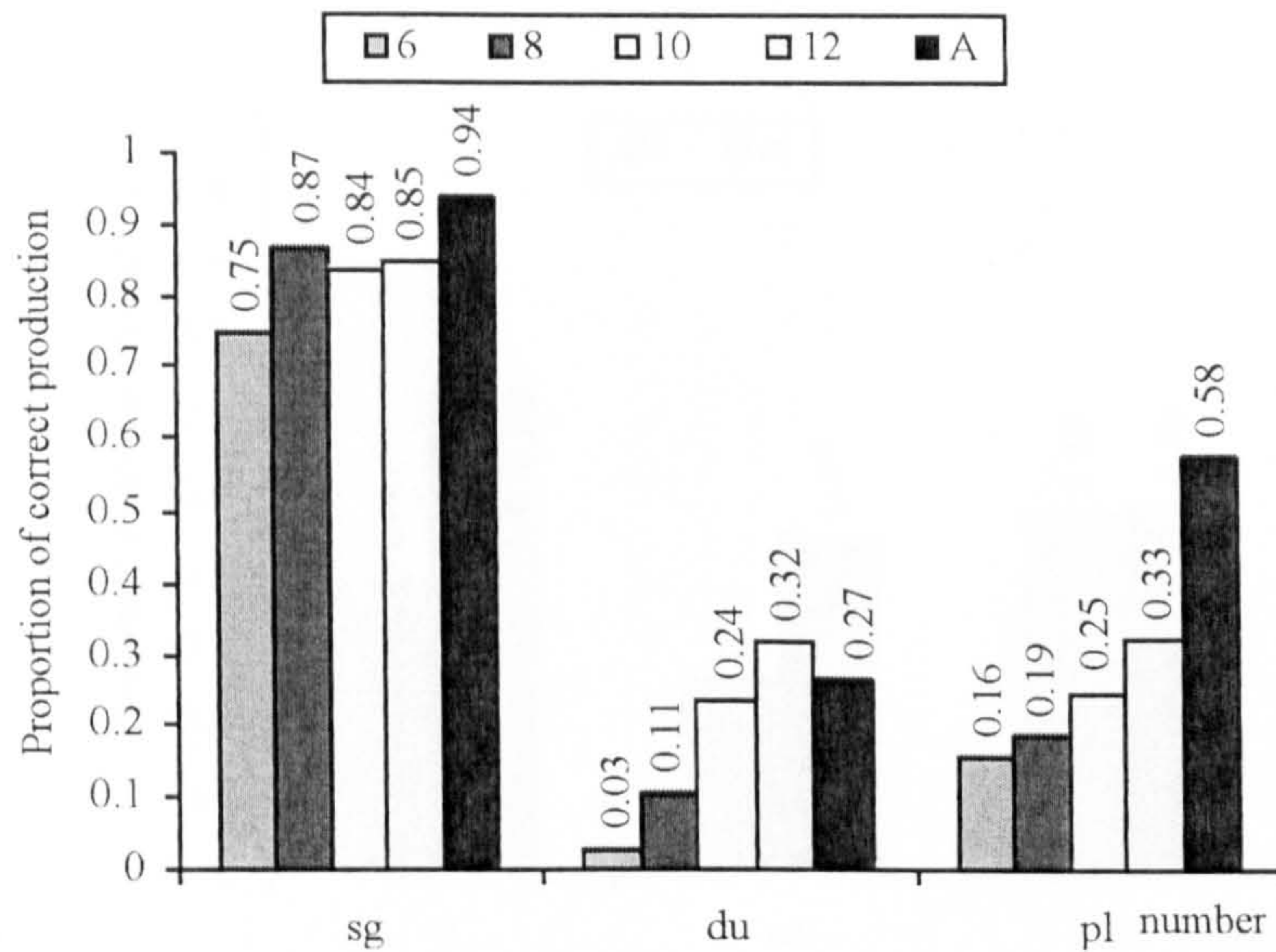


Figure 75. The effect of number x age group--verb

Performance by animacy x gender is shown in Figure 76. Simple effects analysis for each of the animacy types reveals that, on verbs referring to human and animal subjects, the participants perform significantly better on masculine forms than on feminine forms, pairwise comparison $p < .001$. These results show that, for verbs referring to humans and animals, masculine forms are easier to produce than feminine forms, while for verbs referring to inanimates, both the feminine and masculine forms are produced equivalently.

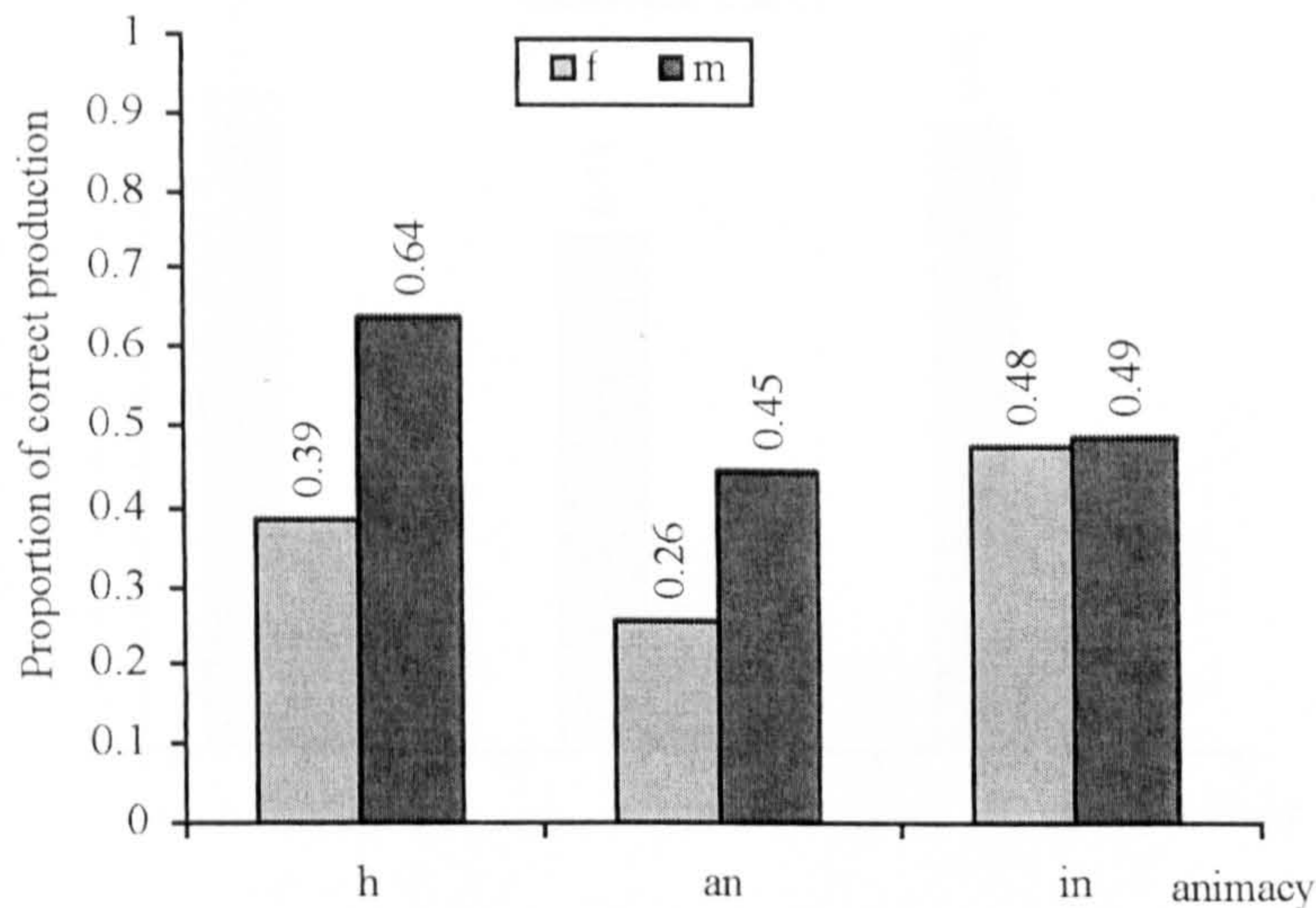


Figure 76. The effect of animacy x gender--verbs

Performance by animacy x number is shown in Figure 77. Simple effects analysis for each animacy reveals that, on verbs referring to humans, animals, and inanimates, the participants perform significantly better on singulars than on duals and plurals. On verbs referring to humans and inanimates, they perform significantly better on plural forms than on duals, all pairwise comparisons $p < .02$. These results generally show that dual verb forms are more difficult to produce than singular and plural forms on all animacy types.

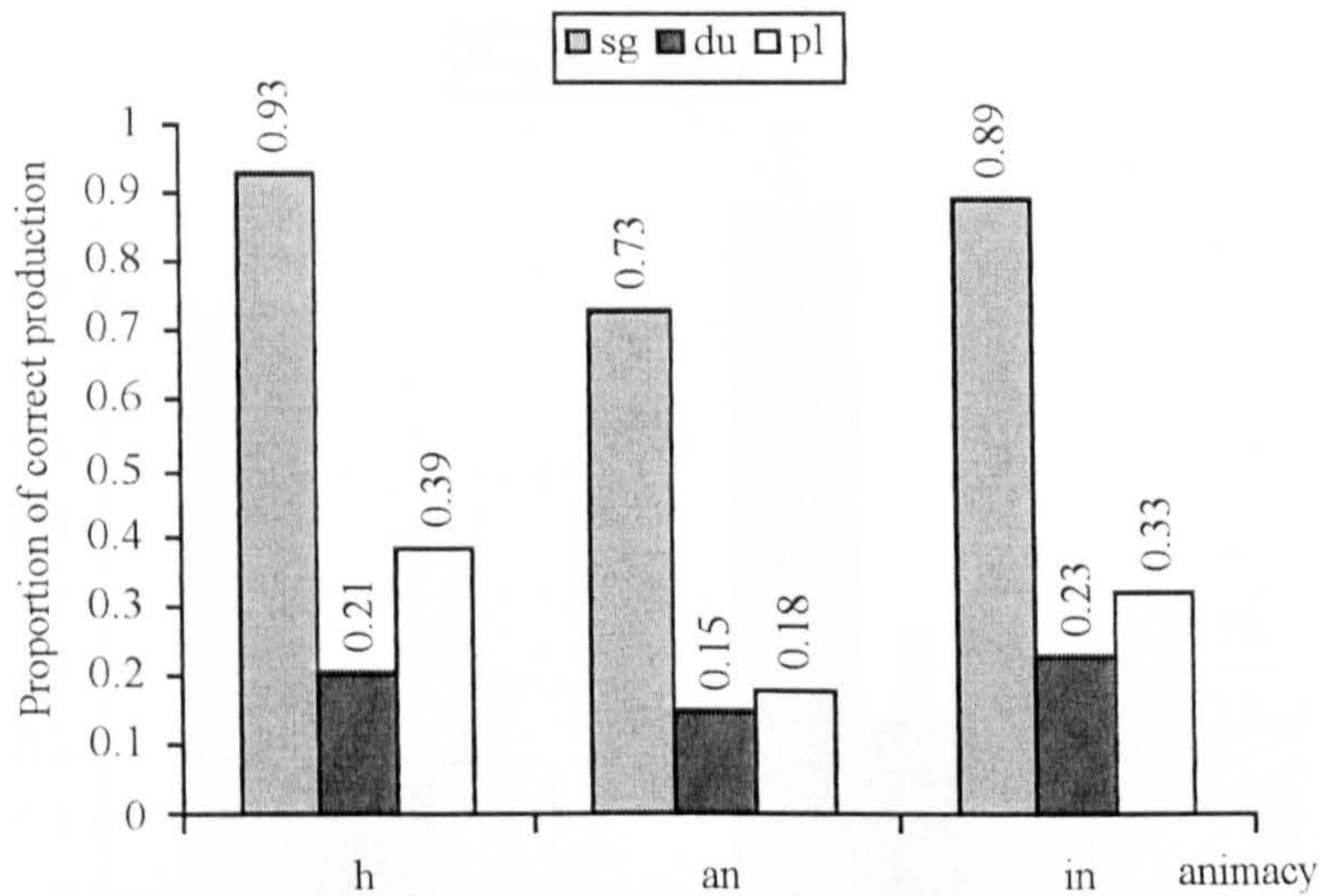


Figure 77. The effect of animacy x number--verb

Performance by gender x number is shown in Figure 78. Simple effects analysis for each gender reveals that, on verbs referring to feminine and masculine subjects, the participants perform better on singular forms than on dual and plural forms. On masculine forms the participants perform significantly better on the plural than on the dual forms, all pairwise comparisons $ps < .001$. In general, these results show that singular feminine and masculine forms are, as usual, easier to produce than dual and plural forms.

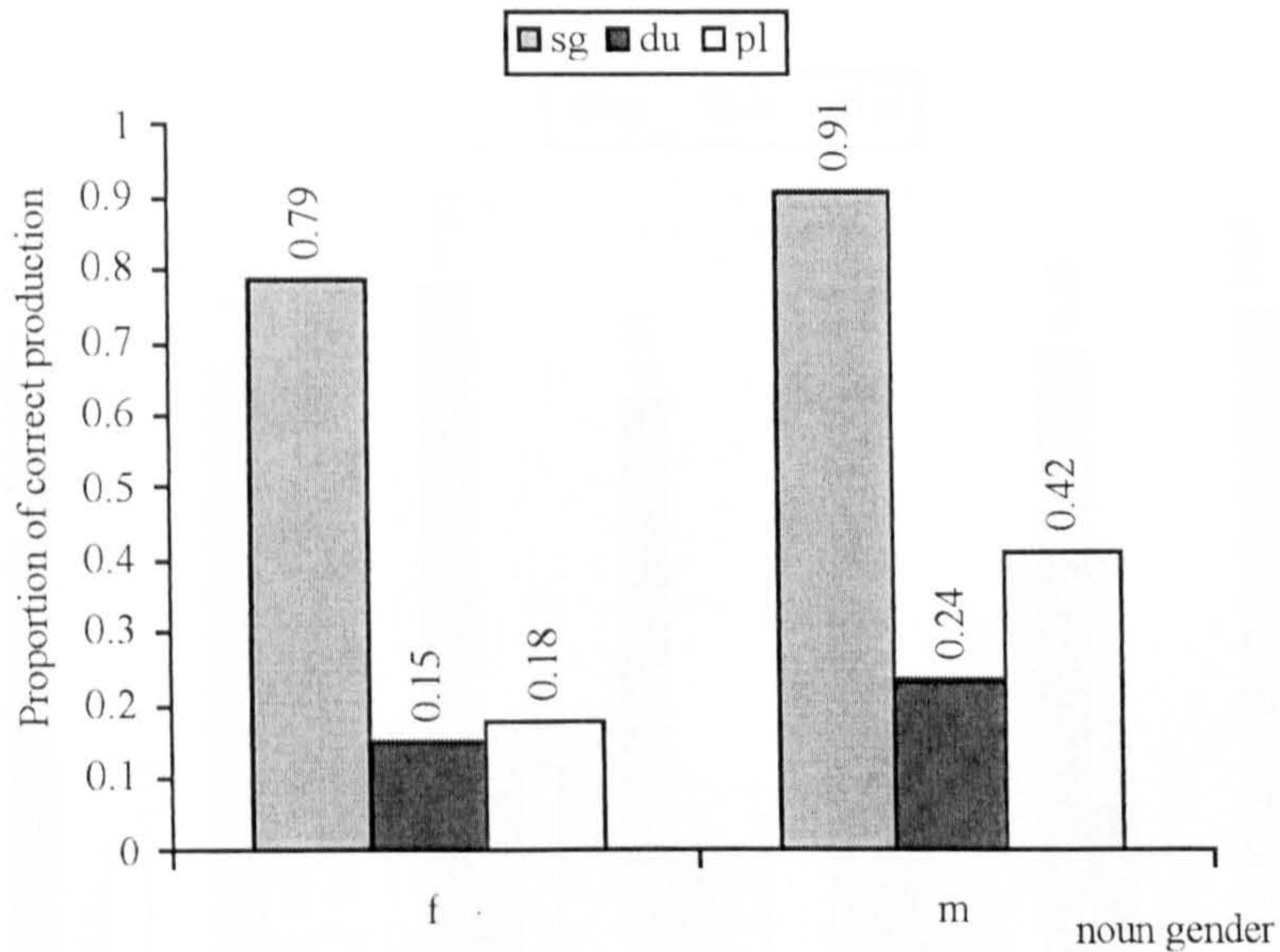


Figure 78. The effect of gender x number--verb

Performance by gender x number x age group is shown in Figure 79. These interactions overall show that production of dual and plural forms increases with age, especially with masculine forms in favour of plural forms. These results may suggest that the children do not apply the feminine plural form, just as they do not apply the dual form. Both dual and feminine plural forms are not produced frequently in the language input and CDS, and this may indicate that input and CDS has an effect on the children's production in these cases. In all age groups, masculine plural forms were produced better than feminine plural and dual forms.

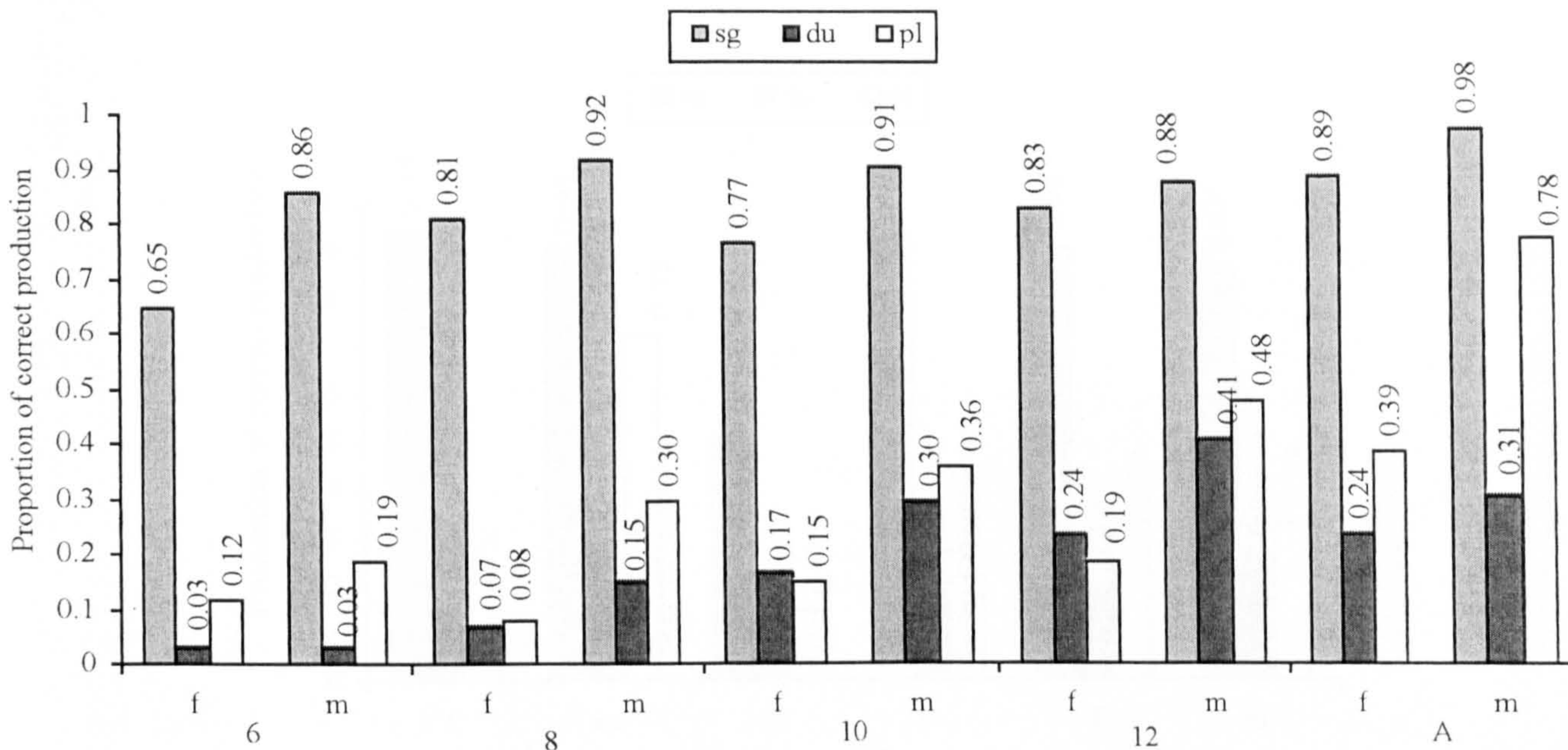


Figure 79. The effect of gender x number x age group--verb

Performance by animacy x gender x number is shown in Figure 80. This interaction reveals that participants score higher on human masculine plural verbs than on all other plural categories. This main result could be attributed to the clear-cut form of the human masculine plural. Infrequent language input and CDS could be one of the reasons behind the participants' low score on human feminine plural forms, because in the vernacular dialects masculine plural verb forms are used in place of the feminine plural form. The low scores on animal and inanimate plural forms may be attributed to the fact that, with animal and inanimate nouns, verbs do not take the plural form, but instead take the feminine singular (see chapter 2). This could be the reason behind children substituting

the incorrect masculine plural form for the correct feminine singular form (these errors are discussed in Chapter 7).

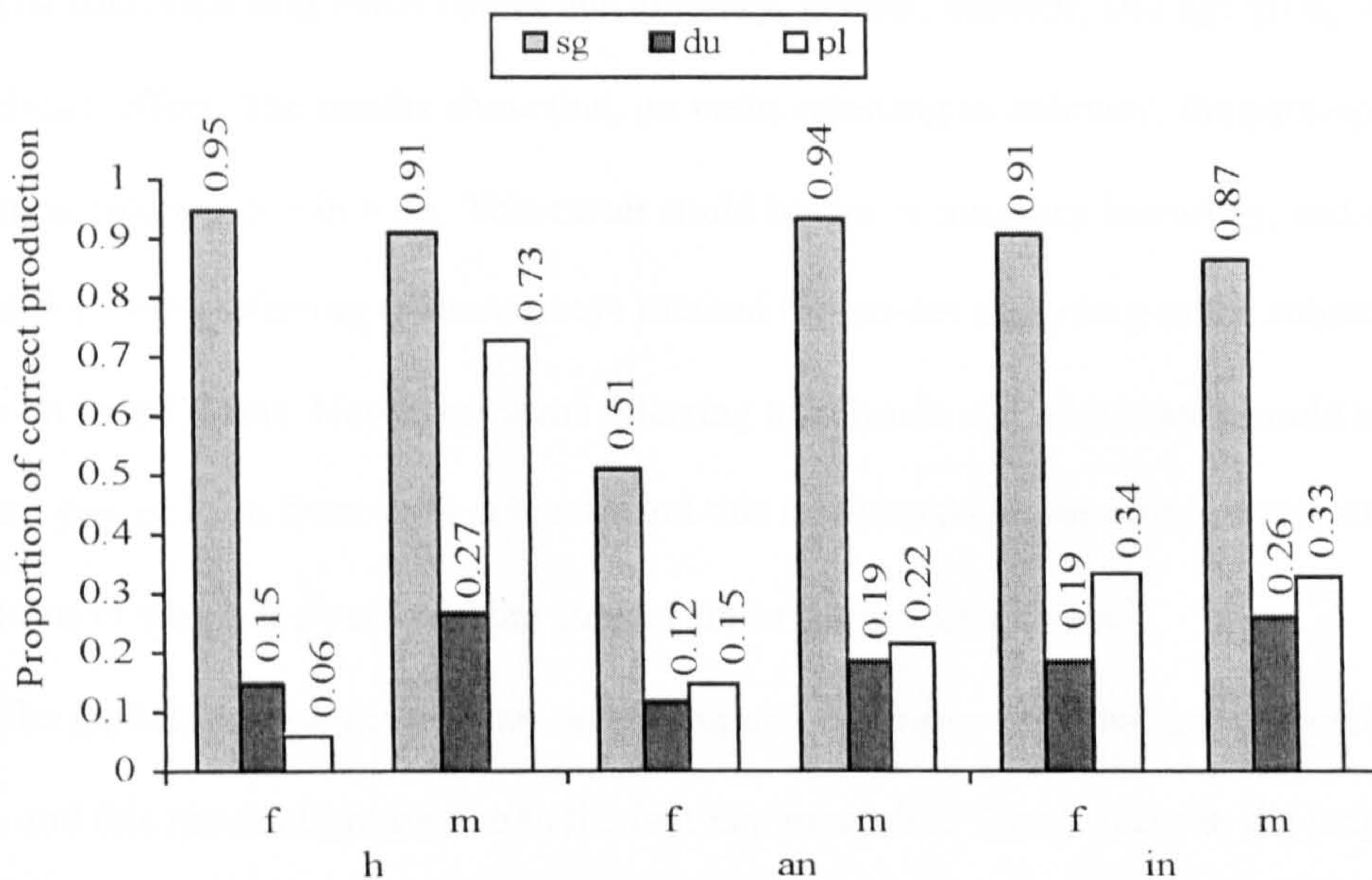


Figure 80. The effect of animacy x gender x number--verb

Summary: Verbs

In terms of the verb production category investigated in this research, the results on the whole indicate that verbs referring to human and inanimate subjects are produced better than verbs referring to animal subjects. The research also shows that masculine verb forms are produced better than feminine verb forms. The data demonstrate that singular verb forms are acquired better than plural and dual verb forms, while plural verb forms were acquired better than the dual forms. Overall, the verb category shows that the children still make mistakes and lag behind adults.

Discussion: Verbs

The data regarding verbs reveal that animacy, gender, number, and age group have a significant effect. The results show that, on verbs referring to animacy, the participants perform as follows: $h > in > an$. This result could be due to animacy hierarchy, and/or to the fact that verbs referring to humans are marked for gender according to the subject's gender under all forms. However, verbs referring to animals and inanimates would take a different gender form from their subjects, and this might make them more complicated than forms in which the verb and the subject are in gender agreement.

The participants perform better on masculine verb forms than on feminine verb forms, and this result might be due to the fact that masculine forms occur in the language input and CDS more frequently than feminine forms. This finding is in agreement with those of Aljenaie (2000) who detected that masculine verbs in the Kuwaiti Arabic dialect were productive earlier than feminine verbs.

The results of this study indicate that the participants' performance on number was $sg > pl > du$. The simplicity of the forms could explain the participants' better performance on the singular. Their better performance on plural forms in comparison to duals could be attributed to the language input and CDS. Dual verb forms are not usually produced in the language input and CDS; in fact, plural verb forms are used in place of duals. According to Moerk (1992), slow improvement in acquiring a grammatical form could be a result of low input and CDS frequency.

Analysing participants' performance by age reveals an improvement in performance between the ages of eight and twelve. Still, none of the children's age groups reach the adults level on verbs. This result seems to suggest that acquiring verb forms is not an easy task in comparison with acquiring nouns and adjectives.

The results of the study also show significant interactions between animacy x age group, gender x age group, number x age group, animacy x gender, animacy x number, gender x number, gender x number x age group, and animacy x gender x number.

Performance by animacy x age group demonstrates that children's production of verbs referring to humans and animals increases up until the age of twelve, at which time it reaches the adults' level. However, it seems that none of the children's groups tested reach the adults' level in producing verbs referring to inanimates. This result could be due to animacy hierarchy.

Performance by gender x age group also shows that, on both genders, none of the children's age groups seem to reach the adults' level on producing verbs. This result could also point to the complexity of acquiring Arabic verb forms, and this complexity could be due to the language input and CDS; some of the verb forms do not occur in the Saudi dialect, and verbs are not always in agreement with their subjects (as explained in Chapter 2).

Performance by number x age group reveals that, on the singular forms, eight-year-olds reach the adults' level, and on the dual forms, ten-year-olds reach the adults' level. On the plural verb forms, however, none of the children's age groups reach the adults' level. These results could be explained in the light of the simplicity of the singular forms,

which facilitates their early acquisition. Simplicity could explain the fact that the performance of children reach adults performance on the dual verb forms earlier than the plural verb forms, even though the dual do not occur in the Saudi dialect as frequently as the plural forms, if ever. The late acquisition of the plural verb forms could be attributed to the complexity of the plural form, since the verb is not always in agreement with the subject gender.

Performance by animacy x gender reveals that, on verbs referring to human and animal nouns, the participants achieve higher performance on the masculine than on the feminine forms. This result could be due to the language input and CDS; in the Saudi dialect, the masculine form is sometimes substituted for the feminine form. However, on verbs referring to inanimates, the participants' performances are equivalent on both genders.

Performance by animacy x number shows that the singular is still the easiest to produce; on all three animacy categories, participants achieve higher on singulars than on duals and plurals. They also show higher achievement on plural verbs referring to human and inanimate subjects, than on the corresponding dual forms, and this result could be attributed to the language input and CDS as explained earlier.

Performance by gender x number demonstrates that on both genders, performance was better on the singular forms, possibly attributable to the simplicity of the singular form. On the feminine verb forms, the participants perform equivalently on duals and plurals, while on the masculine forms they perform better on the plural than on the dual. These results could be due to the fact that the feminine dual and plural and the masculine

dual forms do not appear as frequently in the language input and CDS as the masculine plural forms do.

6.2.1.4 Collective nouns

The fourth set of analyses examines the responses to stimuli involving collective nouns. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (animal and inanimate), gender (feminine form with a unit referent and masculine form with collective referents), and word type (noun, adjective, and verb).

The test reveals main effects of animacy ($F(1, 96) = 5.45, p < .02$), noun gender ($F(1, 96) = 68.11, p < .001$), and age group ($F(4, 96) = 7.59, p < .001$). (Means and Std. Errors in Appendix 2.2.4).

In terms of the effect of animacy, the test reveals that the participants, on the whole, perform significantly better on collective inanimates ($M = .55$) than on collective animals ($M = .5$).

In terms of the effect of gender, the participants generally perform better on feminine with unit referent ($M = .85$) than on masculine with collective referents ($M = .2$).

Performance by age is shown in Figure 81. The main effect of age group is that six-year-old children perform significantly worse on collective nouns than eight-, ten-, and

twelve-year-olds and adults, all pairwise comparisons $p < .04$. This result indicates that, by the age of eight, children perform equally to adults on the collective categories.

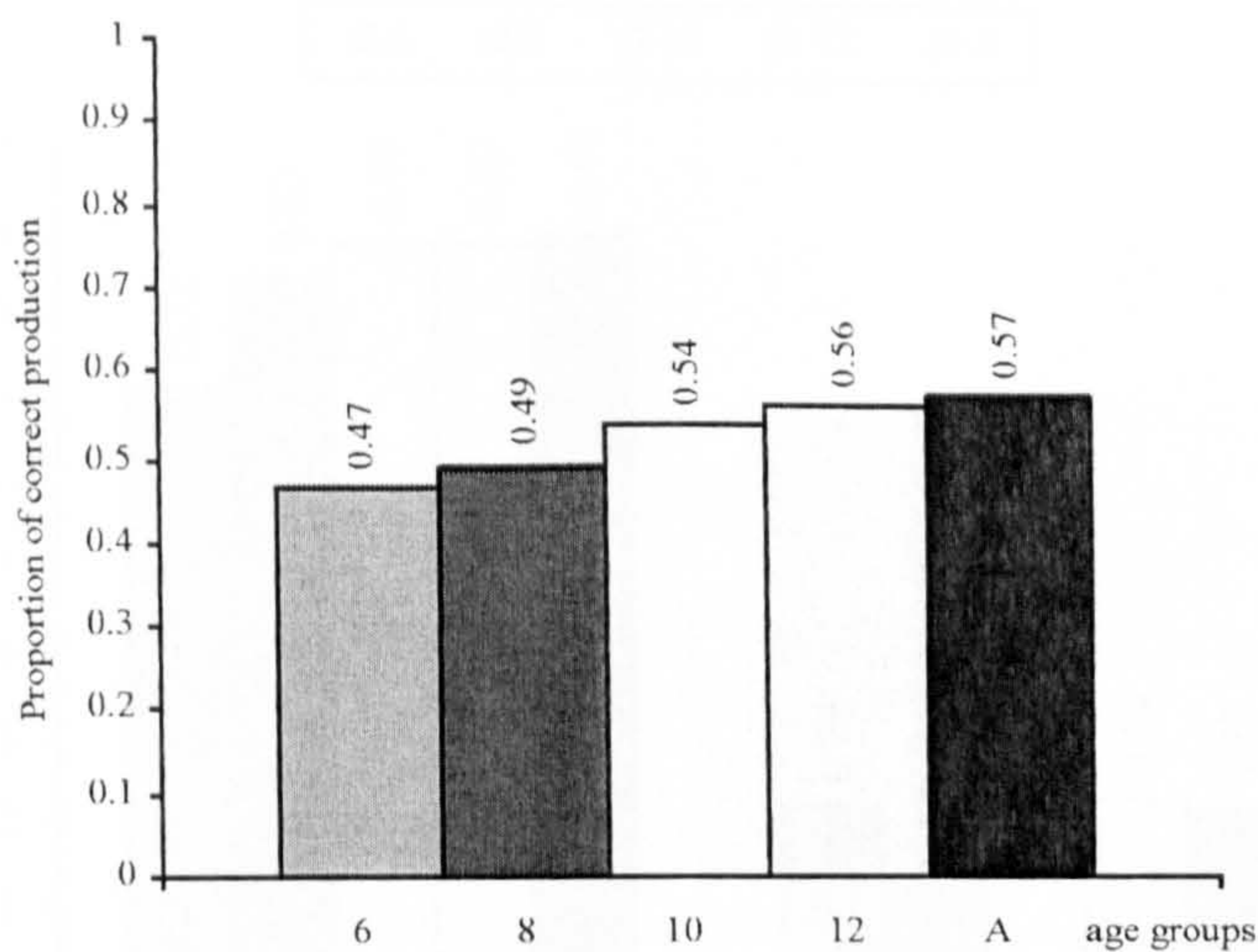


Figure 81. The effect of age group--collectives

The main effects are moderated by the significant interactions of gender x age group ($F(4, 96) = 5.42, p < .001$), word type x animacy ($F(2, 192) = 7.27, p < .001$), word type x gender ($F(2, 192) = 64.69, p < .001$), animacy x gender ($F(1, 69) = 12.07, p < .001$), and word type x animacy x gender ($F(2, 192) = 25.94, p < .001$).

Performance by gender x age group is shown in Figure 82. Simple effects analysis for each noun gender reveals that on feminine form, six-year-olds perform significantly worse than all other age groups. On the masculine form, eight-year-olds perform significantly worse than twelve-year-olds, all pairwise comparisons $p < .02$. These results

indicate that the feminine form is acquired and produced at an earlier age than the masculine form.

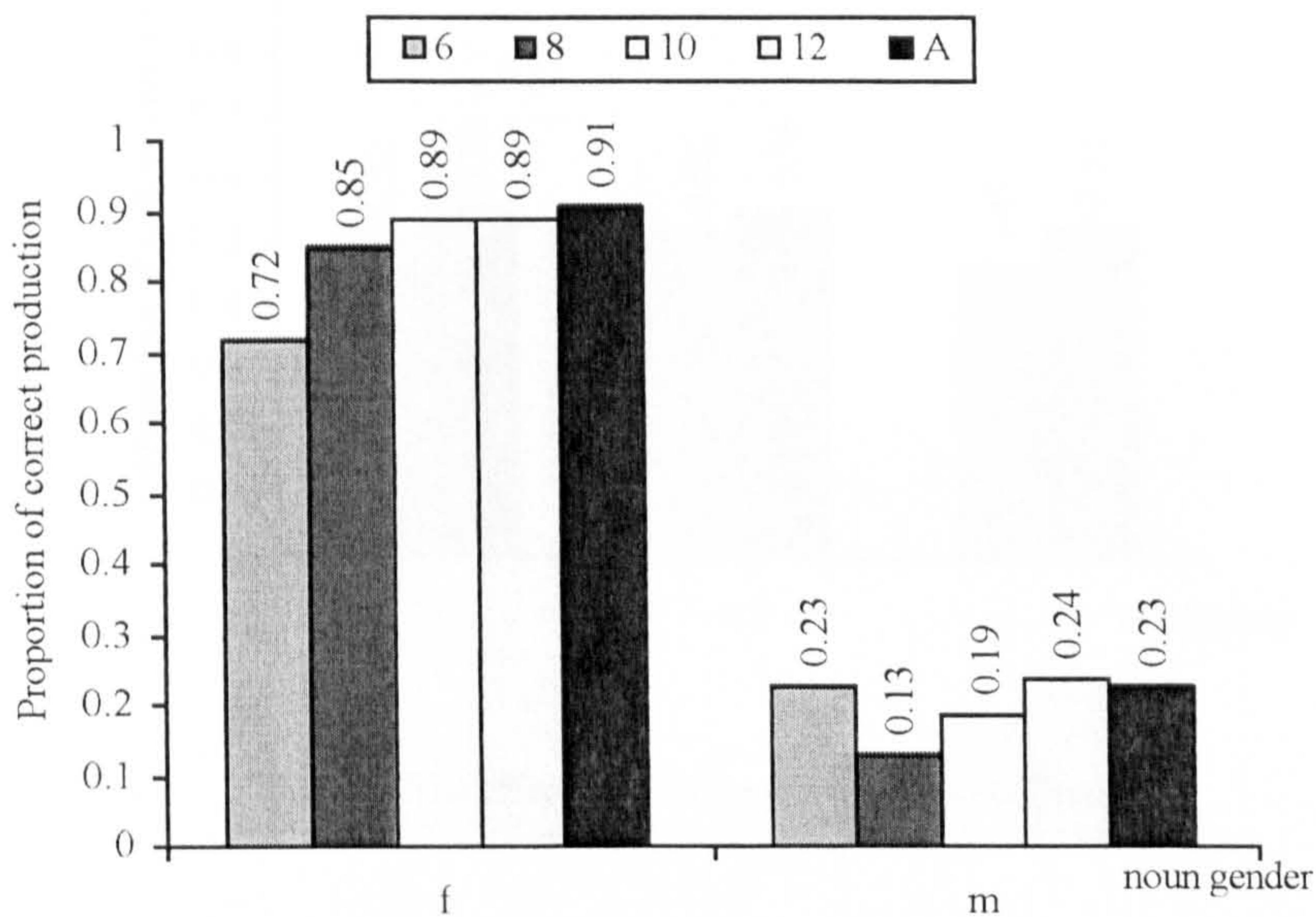


Figure 82. The effect of gender x age group--collectives

Performance by word type x animacy is shown in Figure 83. Simple effects analysis for each word type reveals that the participants perform significantly worse on verbs referring to animals than on those referring to inanimates, all pairwise comparisons $p < .001$. This result indicates that acquiring and producing verbs referring to animals were generally harder than acquiring nouns and adjectives referring to animals. It also shows equivalent performance on nouns, adjectives, and verbs referring to inanimates.

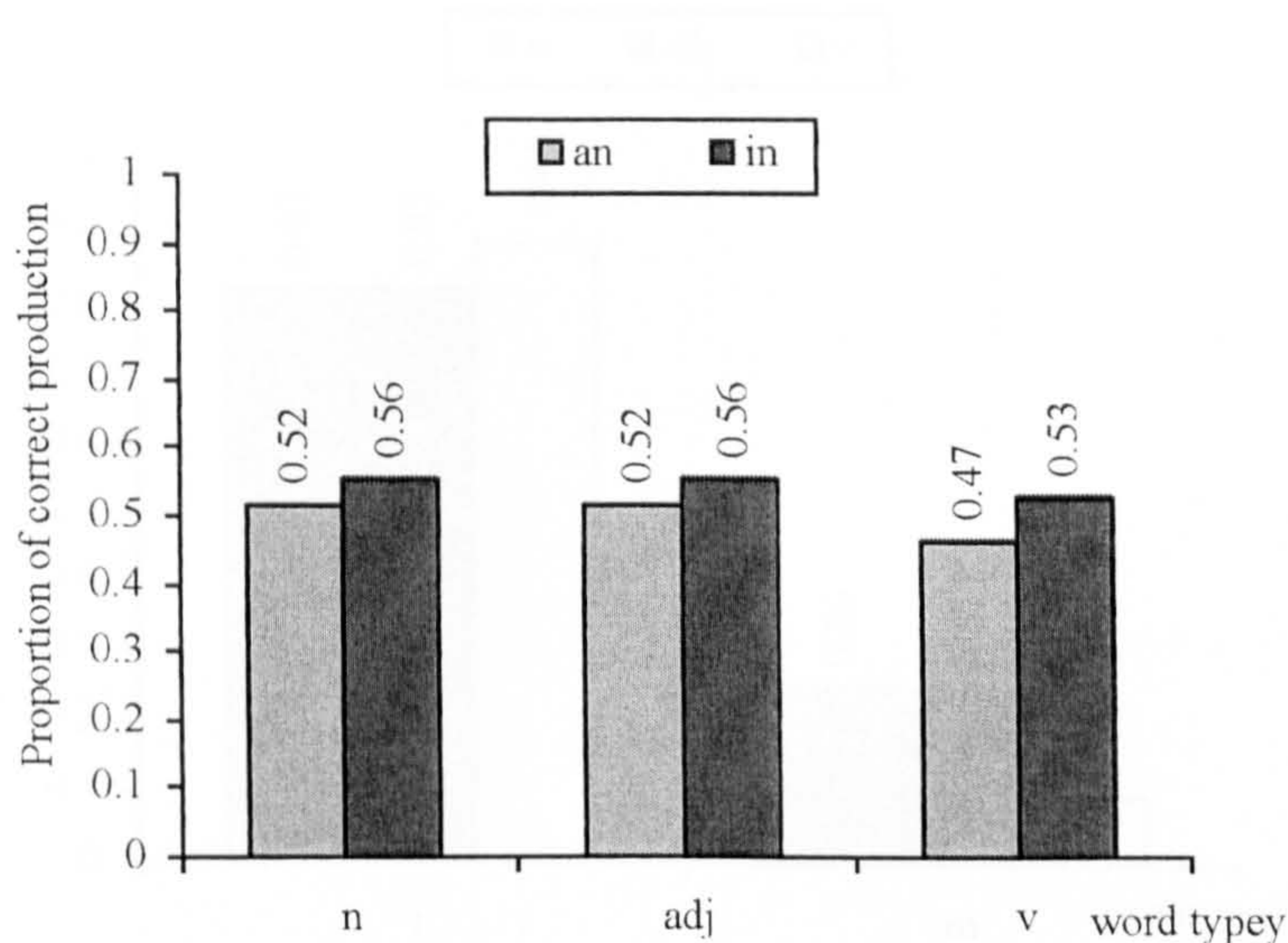


Figure 83. The effect of word type x animacy--collectives

Performance by word type x gender is shown in Figure 84. Simple effects analysis for each gender reveals that, on the feminine category, the participants perform better on verbs than on nouns and adjectives. On the masculine category they perform significantly better on nouns and adjectives than on verbs, all pairwise comparisons $p < .001$. These results overall show that feminine verb forms are acquired and produced earlier than nouns and adjectives; however, masculine verb forms are acquired and produced later than nouns and adjectives.

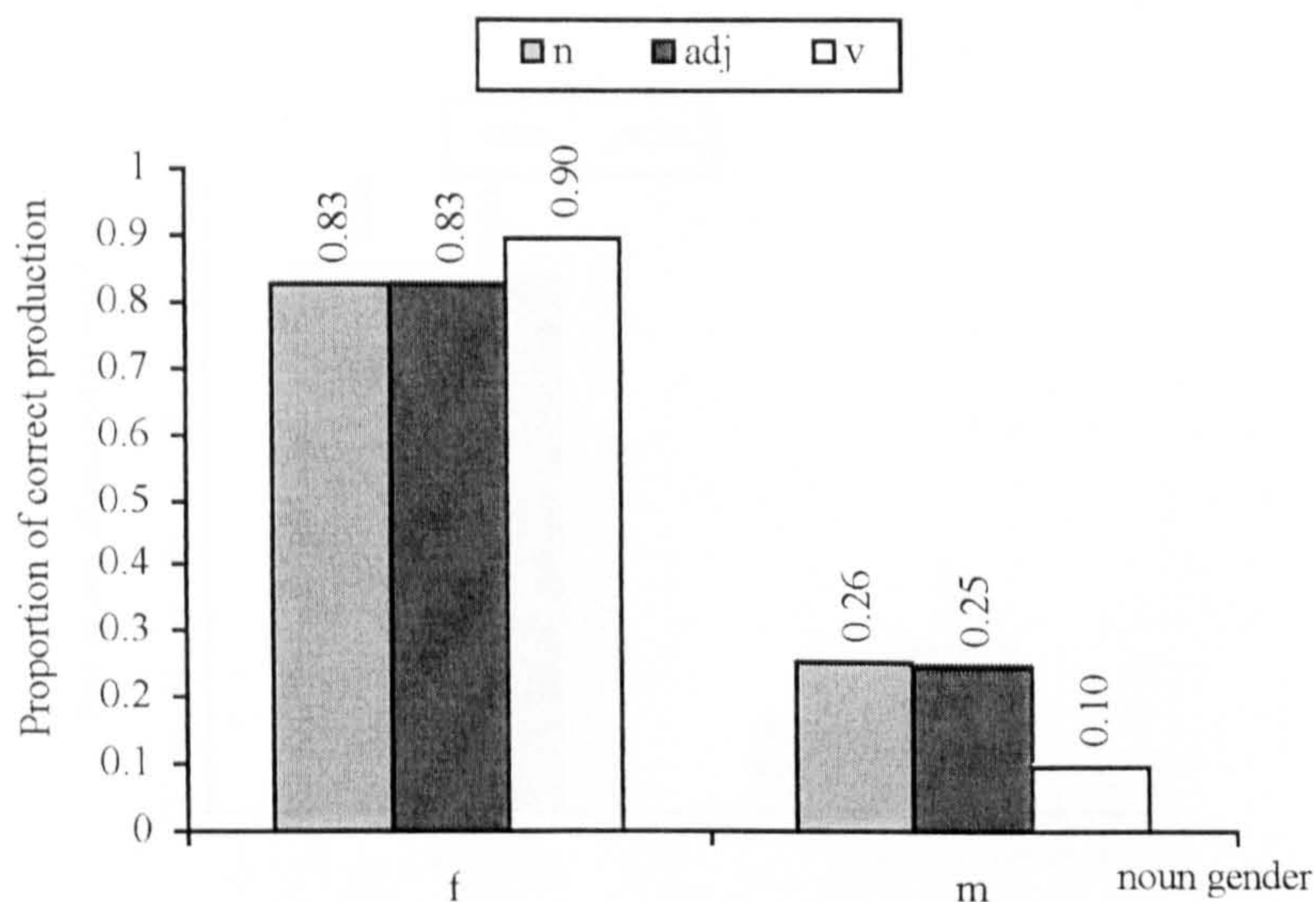


Figure 84. The effect of word type x gender--collectives

Performance by animacy x gender is shown in Figure 85. Simple effects analysis for each gender reveals that, on feminine forms, the participants perform better on animals than on inanimates, but they perform better on masculine form inanimates than on animals, all pairwise comparisons $ps < .04$. These results indicate in general that animals in the feminine form are acquired earlier than inanimates in the feminine form, while masculine inanimates are acquired earlier than masculine animals.

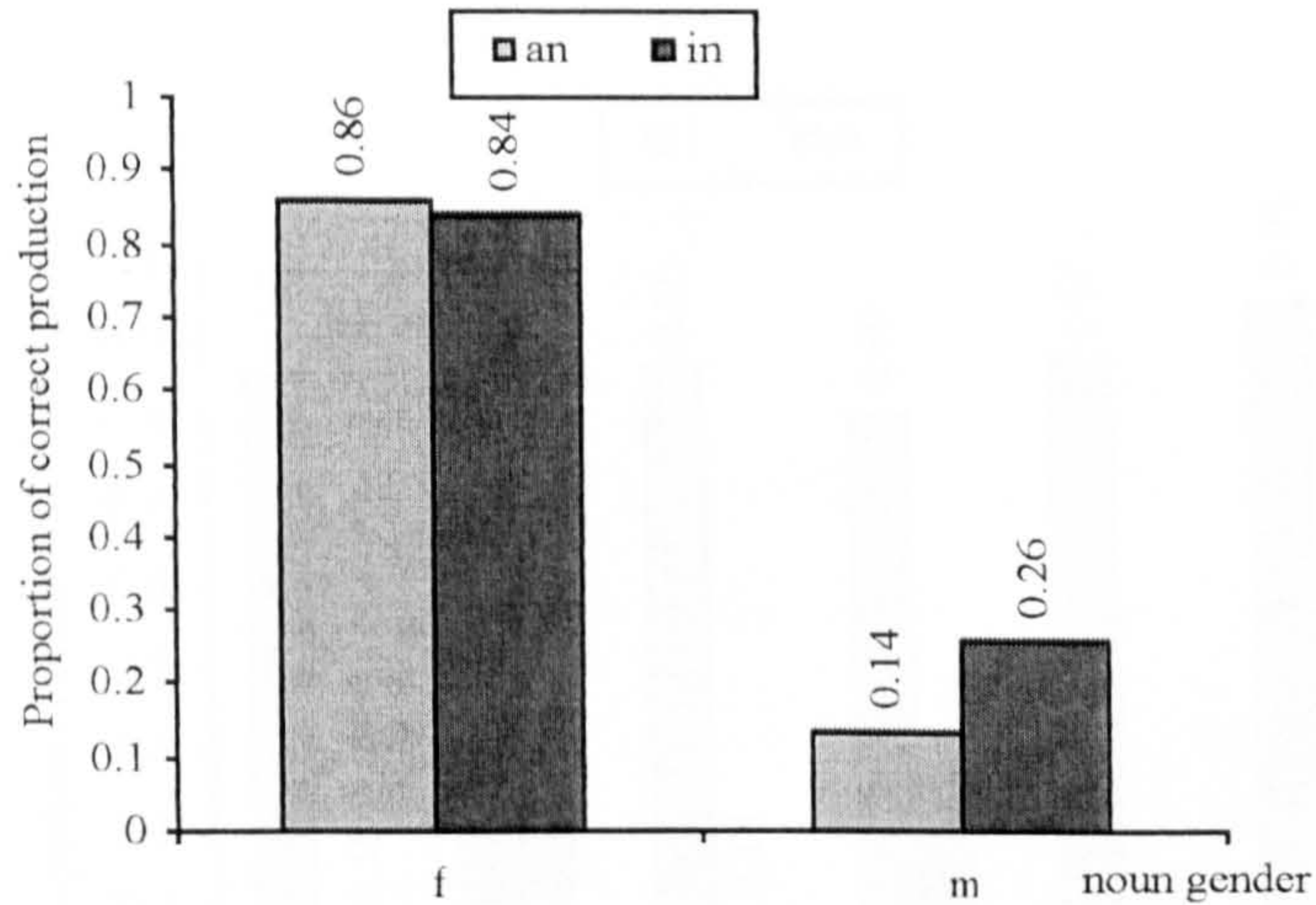


Figure 85. The effect of animacy x gender--collective

Performance by word type x animacy x gender is shown in Figure 86. Simple effects analysis for each animacy and word type reveals that the lowest score recorded is on masculine animal adjectives, while the highest is on feminine inanimate adjectives. These results indicate in general that regardless of animacy or word type, masculine collective nouns are lower than feminine unit forms.

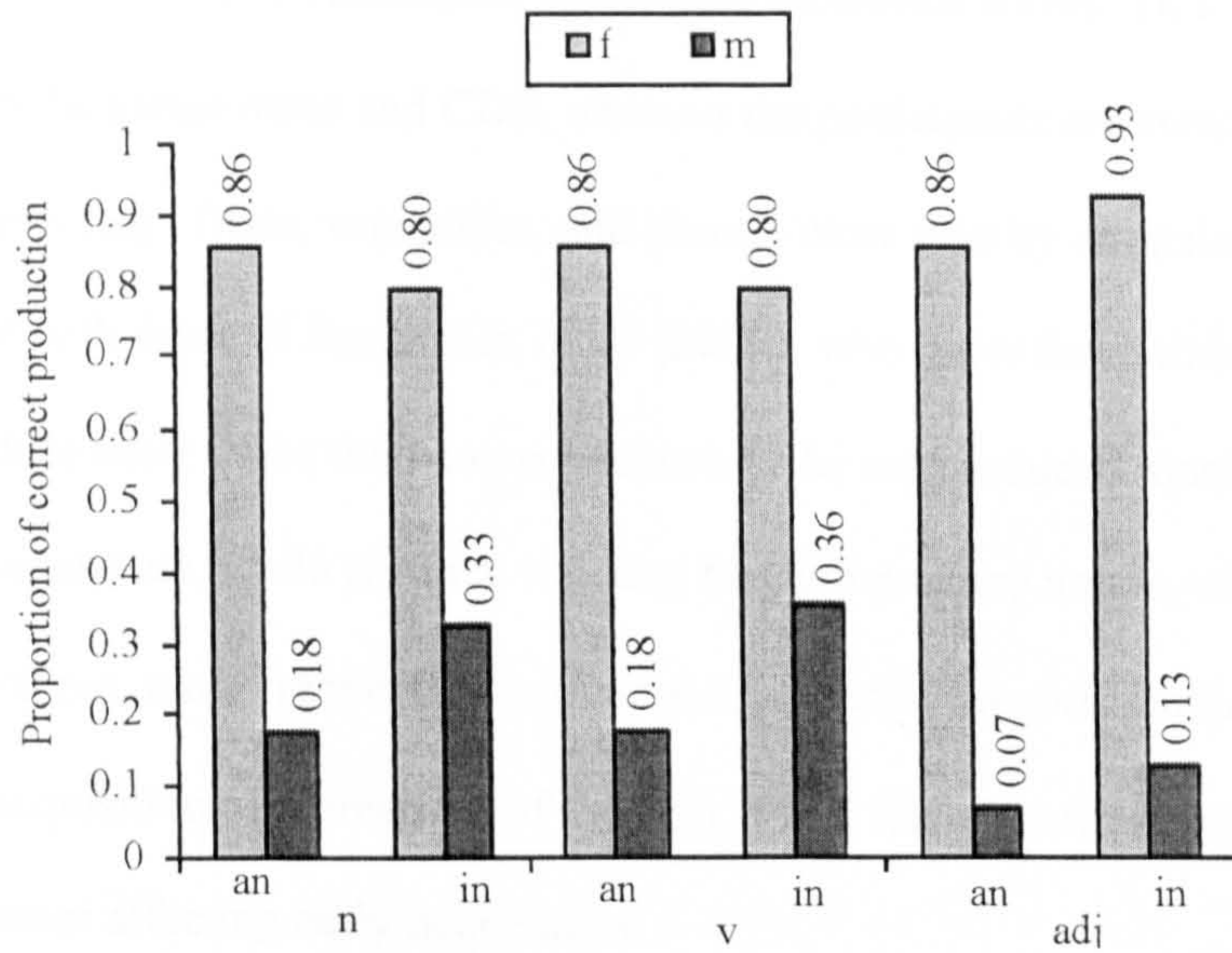


Figure 86. The effect of word type x animacy x gender--collective

Summary: Collectives

In terms of the collective category investigated in this study, the findings on the whole show that the participants perform better on inanimates than on animals. The results also indicate that they perform better on feminine with unit referent than on masculine with collective referent. In general, on this category children's performance reaches the adults' level at around the age of eight.

Discussion: Collectives

Data from the collective category reveals that animacy has significant effects; participants perform better on inanimate forms than on animal forms. This result could be attributed to the language input and CDS, wherein the participants are surrounded by inanimate objects (e.g., fruits, vegetables, and plants) more than by animals. This finding is in agreement with those of Sandhofer, *et.al.* (2000), who show that children learning Mandarin produce more verbs than nouns because verbs are produced more frequently in the input than nouns are, while children learning English produce nouns, which are frequent in the input, more frequently than verbs. Choi (1997) reports similar results regarding the acquisition of Korean vs. of English. Thus, it is clear that language input is an important factor affecting early acquisition.

Our results also reveal that gender has a significant effect; participants score higher on feminine (with unit referent) forms than on masculine (with collective referent) forms. This result could be attributed on the one hand to the fact that feminine forms embody a unit referent, and are therefore easier to acquire and produce than masculine forms that embody a collective referent. On the other hand, Ravid & Hayek (2003) argue that the collective masculine form is acquired later because it is considered an opaque form, which might explain the late acquisition of the masculine form. The later mastery of masculine collective vs. the feminine unit could also be due to the fact that in many cases in the vernacular dialects the feminine sound forms replace the masculine collective form (Ravid and Hayek 2003). Therefore, the masculine collective scores lower than the feminine unit in the collective category.

Our findings also show that, on the whole, children at around the age of eight reach adults' level on collectives. Yet, when examining all age groups' performance, the results show that even adults do not reach high levels of scoring on this category. Here, our findings are in agreement with those of Ravid & Hayek (2003). This result could be attributed to the fact that the masculine collective form in different dialects is pluralized in a different way, usually in the feminine sound plural form, therefore children and adults did not produce the masculine collective form which resulted in the low performance detected in our research.

Significant interactions between gender x age group, word type x animacy, word type x gender, animacy x gender, and word type x animacy x gender are also detectable. Performance by gender x age group shows that at around the age of eight, children reach adults' level on producing feminine forms, while on masculine forms they do not reach adults' level until around the age of ten. This result is not surprising, and could be, as discussed earlier, attributed to the opaque form of masculine collectives and to the fact that this category is a restricted form (restricted to some fruits, vegetables, and animals) (Ravid & Hayek, 2003). It could also be due to the meaning held by the masculine form, since acquiring a collective meaning might be more complicated than acquiring a single meaning. Or it could be attributed to the lower frequency of the masculine collective, where the feminine sound plural is used sometimes in its place in the vernacular dialects.

The results of the participants' performance by word type x animacy show that they display the lowest performance on verbs referring to animals as compared to on nouns and adjectives; this may be attributed to the language input and CDS, since verbs

referring to inanimates may be more frequent in the input and CDS than verbs referring to animals.

Performance by word type x gender generally indicates that the participants score higher on verbs referring to feminine forms than on nouns and adjectives referring to feminine forms. The reverse is true of masculine forms; they score higher on nouns and adjectives referring to masculine forms than on verbs referring to masculine forms. This result is unexpected for the feminine, because both nouns and adjectives are marked by a suffix, while verbs in this case are marked by a prefix, and according to Slobin (1985, b), children could be paying attention to the ends of the words. The results regarding the masculine form are not surprising, because verbs referring to animals in the plural form take the feminine singular form; however, in the case of collectives, they would take the masculine singular, and because this rule applies only to verbs referring to masculine collectives, it might not be frequent in the input and CDS.

Performance by animacy x gender shows that the participants perform equivalently on feminine animals and feminine inanimates; however, on masculine forms, they score lower on animals than on inanimate forms. This result could be due to the possible fact that inanimate forms are more frequent in the language input and CDS than animals are.

The participants' performance by word type x animacy x gender is not surprising, because investigation of all the previous collective results reveals that, on all word types and animacies, participants scored the lowest performance on the masculine forms. This brings us back to the fact that masculine forms have an opaque form, and to the fact that acquisition of a form with a collective meaning usually occurs later than acquisition of a form with a unit meaning.

6.2.1.5 Quantified nouns

The fifth set of analyses examines the responses to stimuli involving quantified nouns. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), animacy (human, animal, and inanimate), gender (feminine and masculine), and number (3 to 10 and 11+).

The test reveals main effects of animacy ($F(2, 19) = 13.79, p < .001$), number ($F(1, 96) = 23.2, p < .001$), and age group ($F(4, 96) = 24.49, p < .001$). (Means and Std. Errors in Appendix 2.2.5).

In terms of the effect of animacy, the test reveals that the participants perform better on inanimate quantified nouns ($M = .74$) than on animal quantified nouns ($M = .67$), and better on human quantified nouns ($M = .63$) and animal quantified nouns than on human quantified nouns.

In terms of the effect of number, the participants perform significantly better on 3 to 10 quantified nouns ($M = .74$) than on 11+ quantified nouns ($M = .62$).

Performance by age group is shown in Figure 87. These results reveal that six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. Eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten and

twelve-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .02$. These results indicate that all non-adult age groups lag behind adults on the production of quantified nouns.

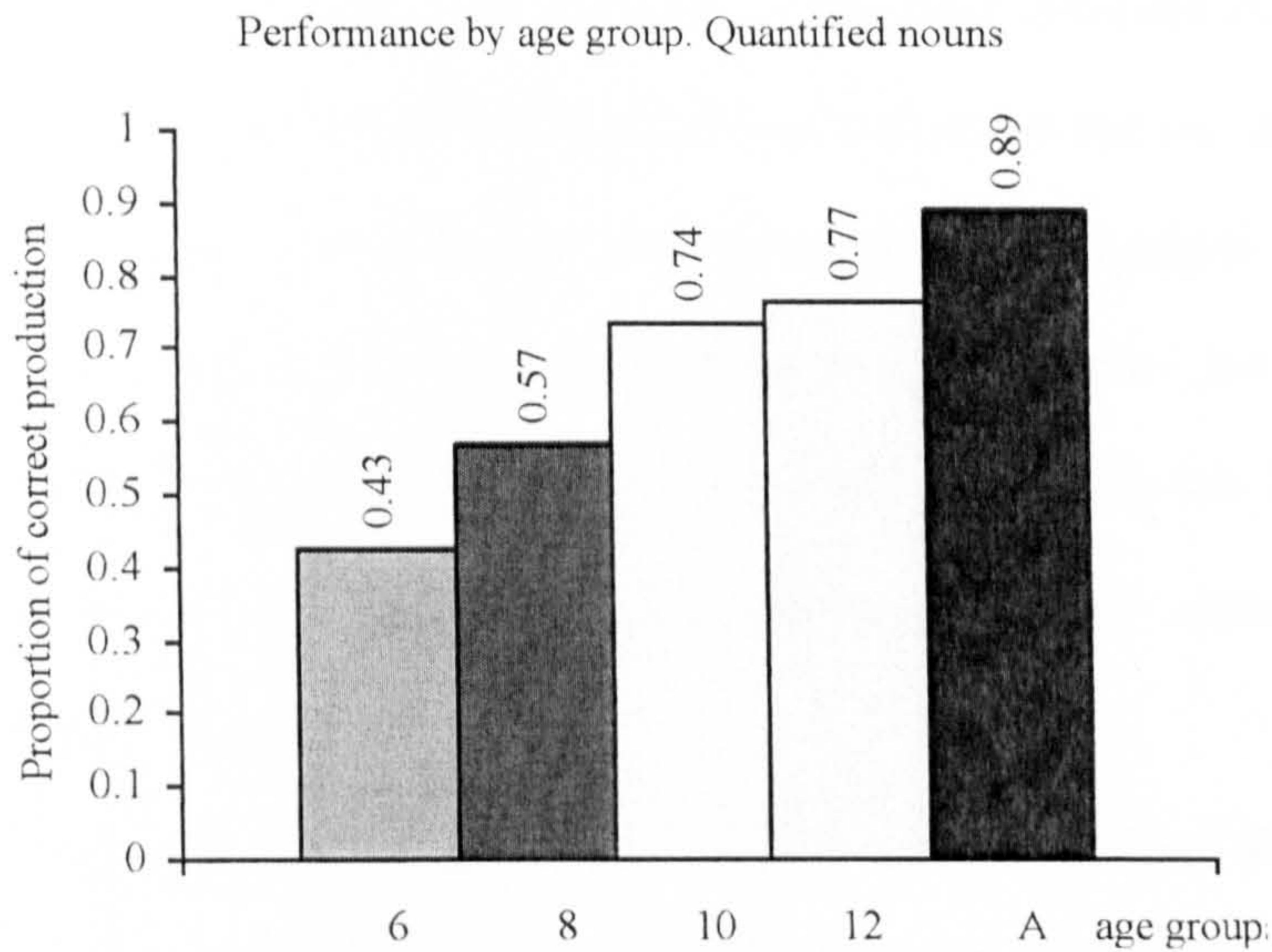


Figure 87. The effect of age group--quantified nouns

The main effects are moderated by the significant interactions of animacy x age group ($F(8, 192) = 2.01, p < .04$), number x age group ($F(4, 96) = 3.32, p < .001$), animacy x gender ($F(2, 19) = 12.19, p < .001$), animacy x number ($F(2, 19) = 13.12, p < .001$), gender x number x age group ($F(4, 96) = 2.59, p < .04$), and animacy x gender x number ($F(2, 192) = 9.03, p < .001$).

Performance by animacy x age group is shown in Figure 88. Simple effects analysis for each animacy reveals that on human nouns, six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. Eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten-year-olds perform significantly worse than twelve-year-olds and adults. However, twelve-year-olds perform significantly worse than adults. On quantified animal nouns, the effects reveal that six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. On quantified inanimate nouns, six-year-olds perform significantly worse than eight-, ten-, and twelve-year-olds and adults. Eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten- and twelve-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .03$.

These results show that, on human and inanimate quantified nouns, all age groups lag behind adults. On quantified animal nouns, however, only age groups six and eight lag behind adults.

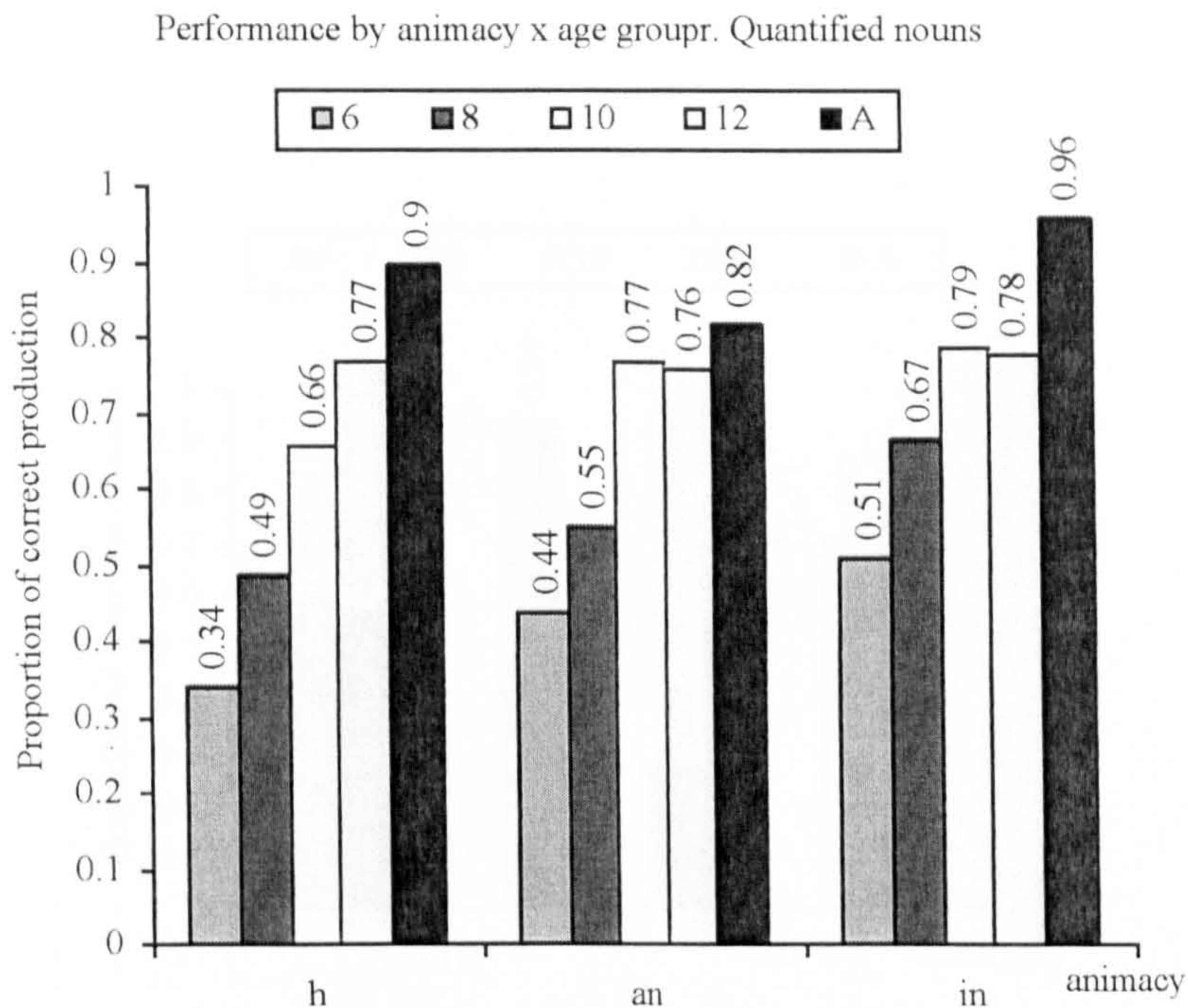


Figure 88. The effect of animacy x age group--quantified nouns

Performance by number x age group is shown in Figure 89. Simple effects analysis for each number reveals that on quantified nouns having numbers from 3 to 10, six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten-year-olds perform significantly worse than adults. On the 11 + quantified nouns category, six-year-olds perform significantly worse than all other age groups. Eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten- and twelve-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .03$. These results show that performance on the 3 to 10 quantified nouns category

reaches adult's performance at around the age of twelve. On the 11+ quantified nouns, the performance of all non-adult age groups lags behind the performance of the adult group.

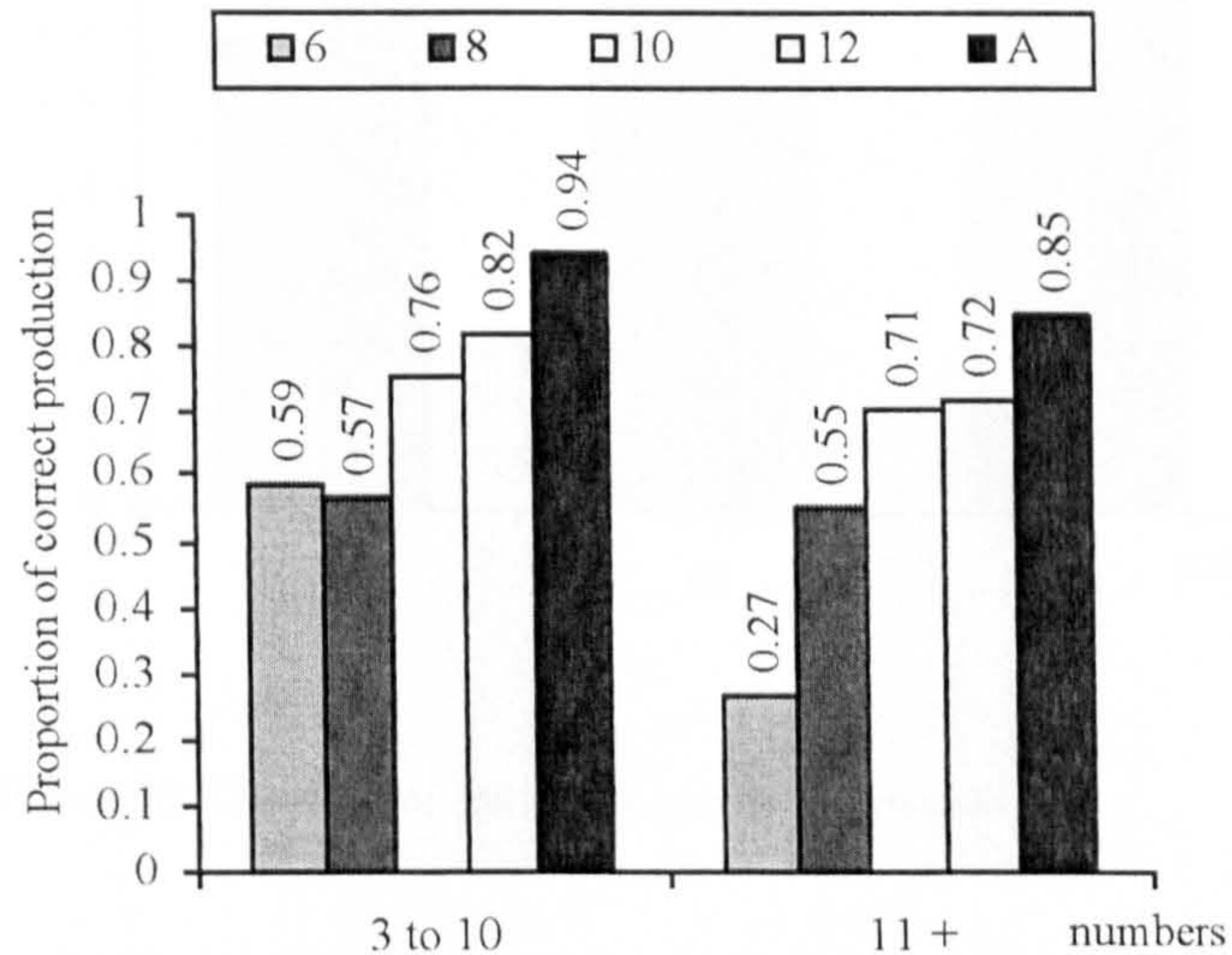


Figure 89. The effect of animacy x age group--quantified nouns

Performance by animacy x gender is shown in Figure 90. Simple effects analysis for each animacy reveals that on human nouns, the participants perform significantly better on masculine than on feminine forms. On quantified animal nouns, participants perform significantly better on feminine than on masculine forms, all pairwise comparisons $ps < .003$.

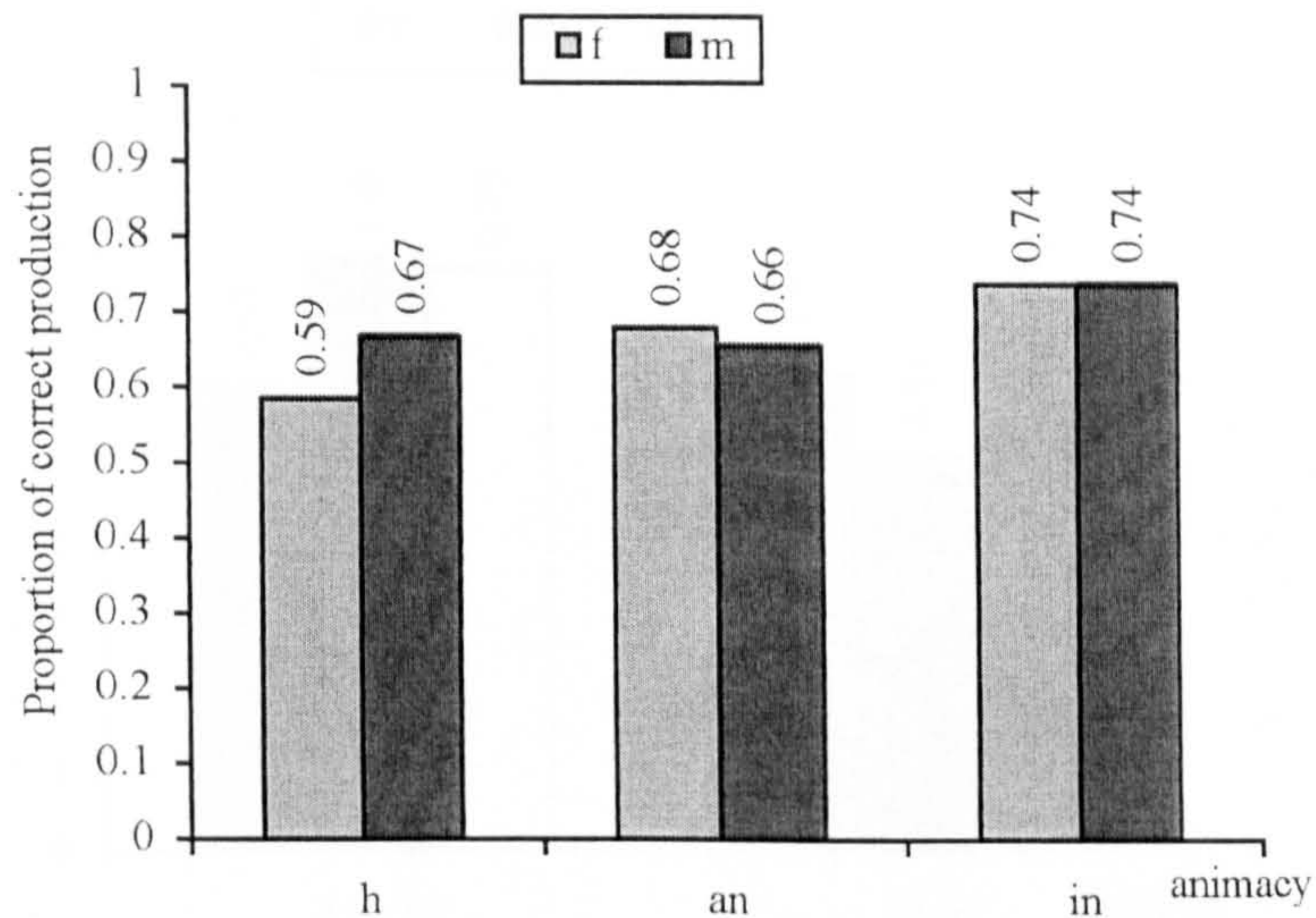


Figure 90. The effect of animacy x gender--quantified nouns

Performance by animacy x number is shown in Figure 91. Simple effects analysis for each number reveals that on the 3 to 10 quantified nouns, participants perform significantly worse on humans than on animals and inanimates. On the 11+ quantified noun category, the participants perform better on inanimate nouns than on human and animal nouns, all pairwise comparisons $ps < .003$.

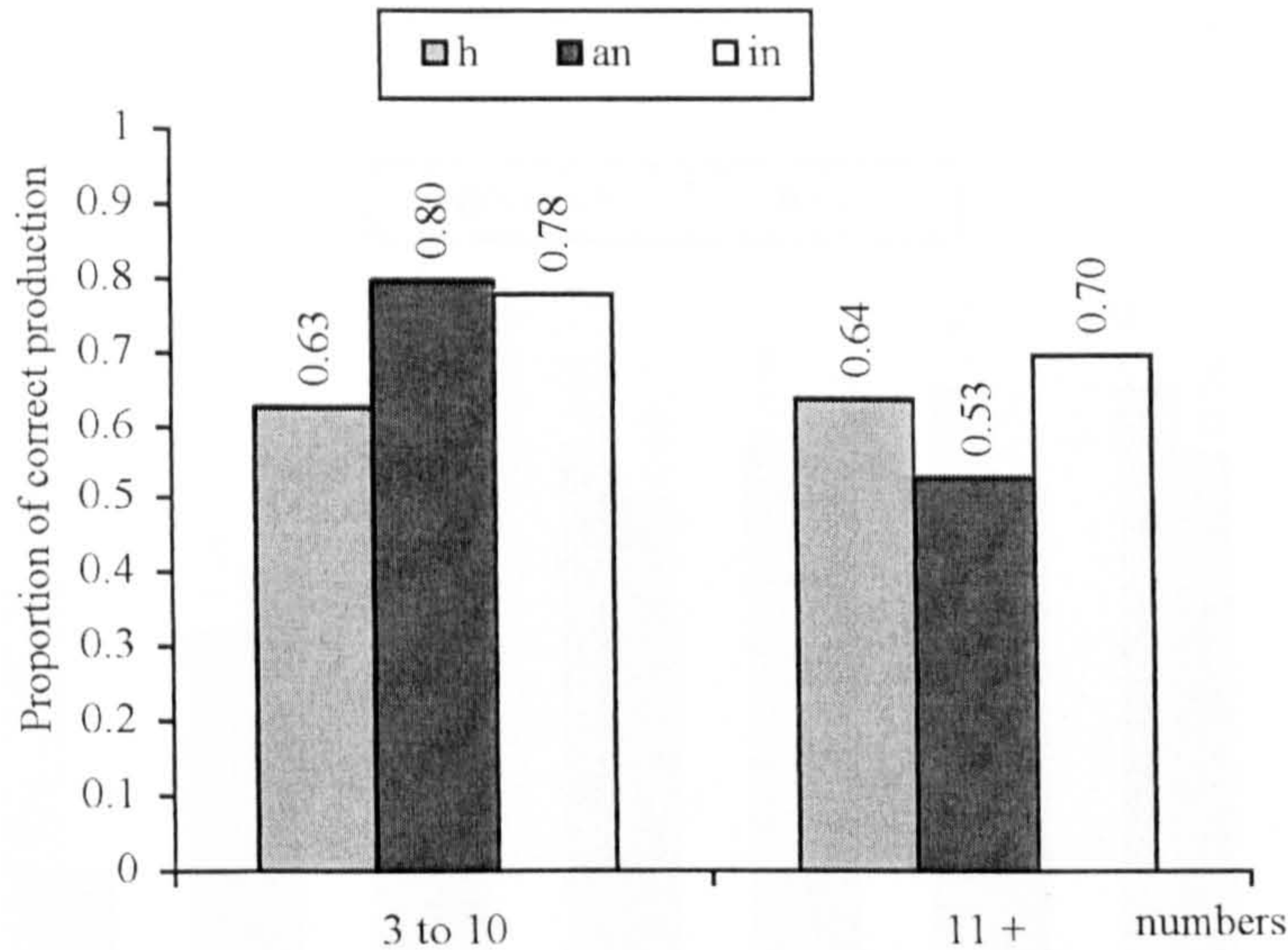


Figure 91. The effect of animacy x number--quantified nouns

Performance by gender x number x age group is shown in Figure 92. Simple effects analysis for each age group and animacy reveals that most of the interactions show that participants score higher in the 3 to 10 category than in the 11+ category, except in the performance of age group eight, which may have scored higher in the 11+ category than in the 3 to 10 category on feminine forms. This result might indicate that around the age of eight children start to comprehend the feminine plural form, and therefore their production on feminine forms shows improvement after the age of eight.

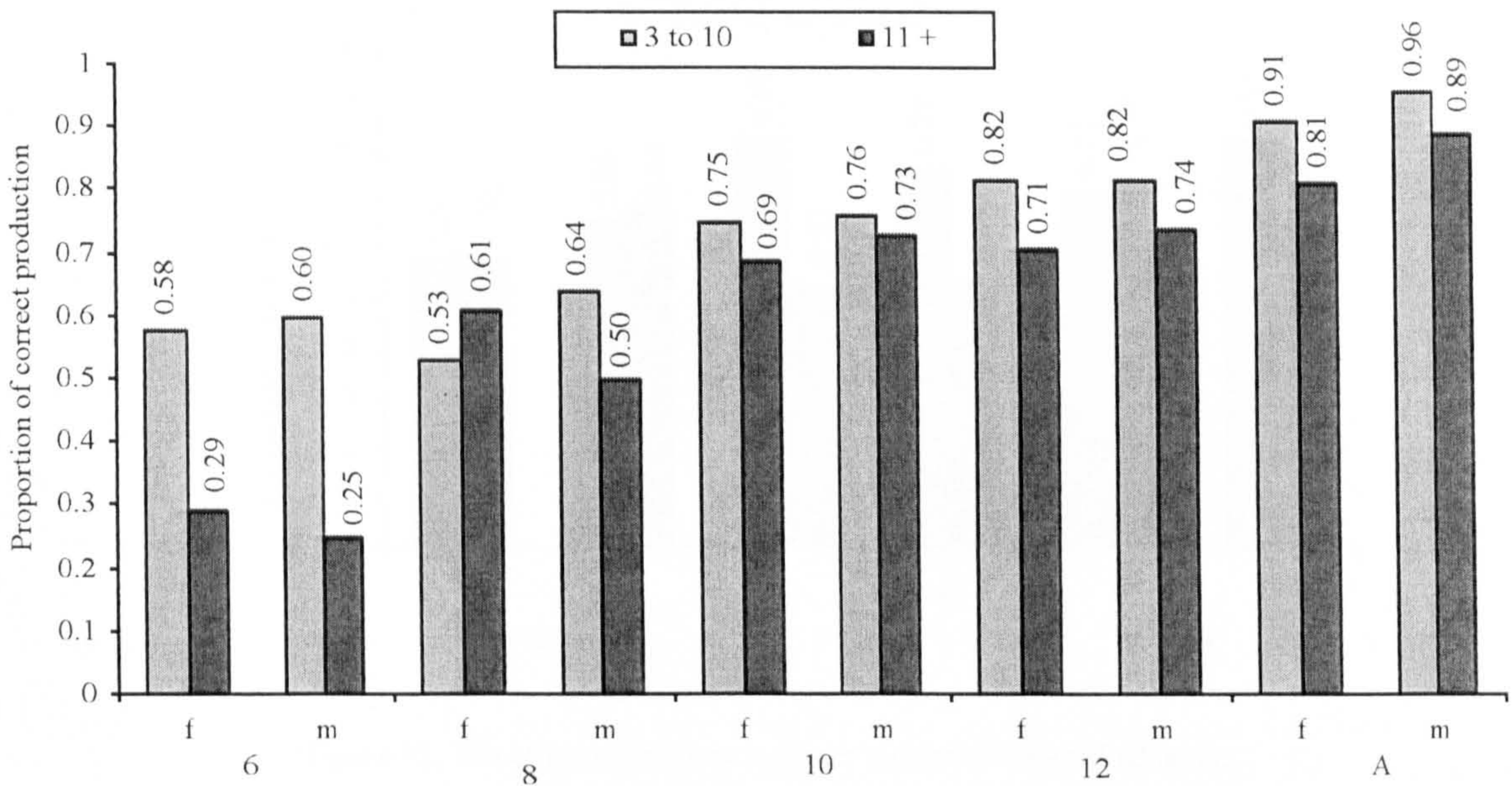


Figure 92. The effect of gender x number x age group--quantified nouns

Performance by animacy x gender x number is shown in Figure 93. The results of this interaction shows consistency, in that participants tested usually score higher in the 3 to 10 quantified forms category than in the 11+ quantified category. The results of this interaction show that on the human forms, the participants perform equivalently on both quantified categories and both genders. On animal nouns they perform better on the 3 to 10 category than on the 11+ category on both genders. On feminine inanimate forms the participants perform equivalently on 3 to 10 and 11+ categories, while on masculine inanimate forms they perform better on the 3 to 10 category than on the 11+ category.

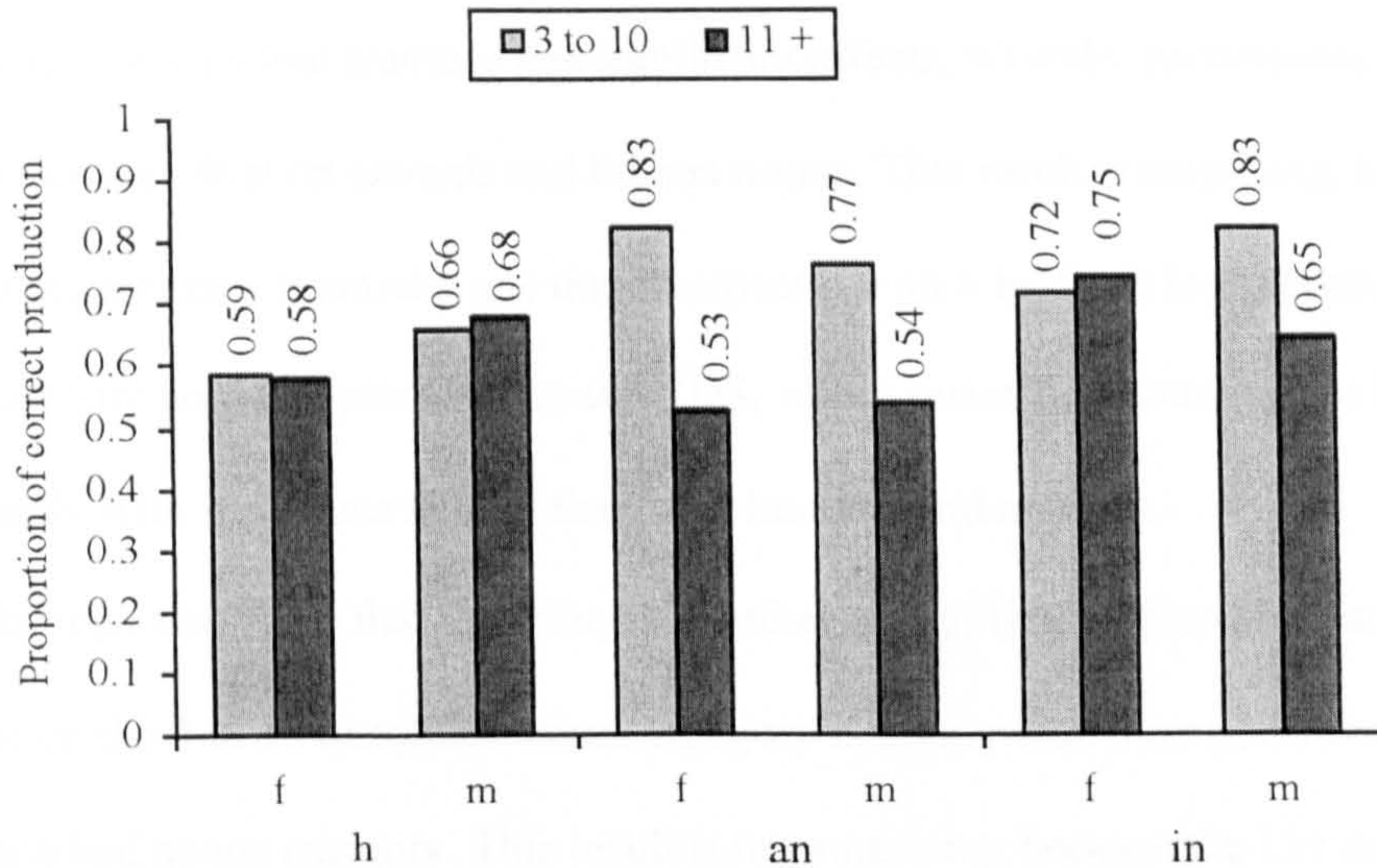


Figure 93. The effect of animacy x gender x number--quantified nouns

Summary: Quantified nouns

In terms of the quantified nouns category examined in this research, our results show that the participants perform better on inanimate forms than on animal forms, and better on animal forms than on human forms. The findings also show that the participants perform better on the 3 to 10 category than on the 11+ category. Overall, the children's performance on this category lags behind the adults' performance.

Discussion: Quantified nouns

The data regarding quantified nouns reveals that animacy has significant effects; the findings show that participants score the highest performance on inanimates than on

animal and human nouns. This significant result is surprising, because according to animacy hierarchy the results should have been $h > an > in$. The data regarding quantified nouns reveals that animacy has significant effects, whereby participants score higher on inanimates than on animals and human nouns. This result is surprising, because according to the animacy hierarchy one might expect $h > an > in$. Such high scores on the inanimate category could be attributed to the CDS, where quantified nouns might be used more frequently with inanimate objects than with humans and animals.

Our findings also show that the effect of number is significant; the participants' performance on the 3 to 10 quantified nouns category is higher than their performance on the 11+ quantified nouns category. This result is not surprising because the 11+ category could be considered an opaque form, while the 3 to 10 category may be considered a transparent form, since the 3-10 category takes the plural form as opposed to the 11+ category which takes a singular form. These findings are generally in agreement with those of Omar (1969), who reports that the 3 to 10 category is acquired earlier than the 11+ category.

The results also indicate that the performance of all children up until the age of twelve lags behind the performance of adults. This finding is again in agreement with those of Omar (1969), who reports in her research that quantified nouns are not mastered by the age of fifteen.

The quantified nouns category also shows significant interactions between the variables tested. Performance by number x age group indicates that in general, by the age of twelve children reach adults' performance level in producing the 3 to 10 quantified nouns, while on the 11+ noun category all age groups lag behind adults. This result may

be attributed to the fact that, as discussed earlier, the 11+ category is considered opaque and is therefore acquired later.

Performance by animacy x gender shows that, on human nouns, participants perform better on masculine forms, possibly due to the simplicity of the plural form as discussed in the human noun tasks category. On the other hand, the data show that on feminine forms participants score higher on animal nouns, perhaps due to the fact that feminine forms are usually pluralized in the sound form and masculine forms are usually pluralized in the broken form. This result could be attributed to the fact that children generally gain a command of regular forms before irregular forms (Kuczaj, 1977; and Simoes & Stoel-Gammon, 1979).

Performance by animacy x number shows different patterns of performance; on the 3 to 10 human nouns category participants scored the lowest performance, and on the 11+ category they also had a low performance. This result could be attributed to the fact that children tend to use the plural form more often with anything that is above two; therefore, most of the errors detected are errors related to using plural forms in place of the obligatory singular form (see Chapter 7).

Performance results by gender x number x age group indicate that, on the whole, children around the age of eight notice that the quantified 11+ comes in the singular form and therefore apply it to all quantified nouns, even those in the 3 to 10 quantified category.

Overall, the results in this category show that quantified nouns are one of the latest grammatical forms acquired and mastered by our participants. This is because one of this category's forms has an opaque formation; when the number preceding the noun is 11 or

above, the noun following it comes in the singular form. Children generally learn that anything that is quantified as 3 or more is a plural-- even numbers that are 11 and above, and therefore, the plural form is the appropriate form to use. Yet, quantified noun forms are divided into two formations: the 3 to 10 formation, which is acquired earlier, and the 11+ formation, which is acquired later because of its unique formation in the language.

6.2.1.6 Inanimate feminine nouns with no overt gender referent

The sixth set of analyses examines the responses to stimuli involving feminine inanimate nouns with no feminine overt gender referent. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), word type (adjectives and verbs), and number (singular, dual, and plural).

The test reveals main effects of number ($F(2, 19) = 19.41, p < .001$), and age group ($F(4, 96) = 15.60, p < .001$). (Means and Std. Errors in Appendix 2.2.6).

In terms of the effect of number, the test reveals that the participants on the whole perform significantly better on singulars ($M = 1.6$) than on duals ($M = .24$) and plurals ($M = .81$), and better on plurals than on duals.

The effect of age group is shown in Figure 94. Six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. Ten-year-olds perform significantly worse than adults, all pairwise comparisons $ps < .002$. These results clearly

show that by the age of twelve, children's performance on feminine inanimate nouns with no feminine overt gender referent reaches adults' level.

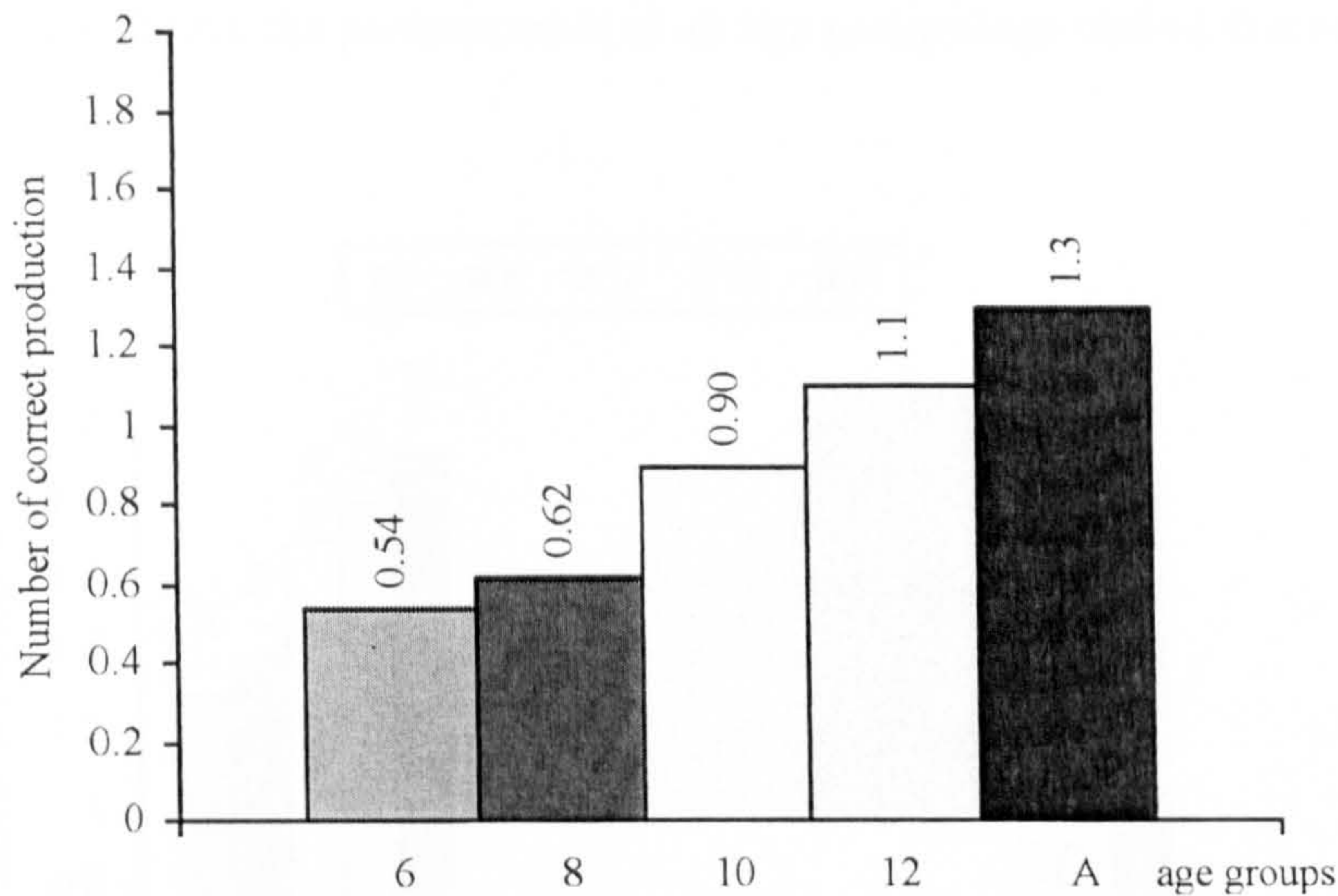


Figure 94. The effect of age group--feminine nouns

The main effects are moderated by the significant interactions of number x group ($F(8, 19) = 3.89, p < .001$).

Performance by number x age group is shown in Figure 95. Simple effects analysis for each number reveals that, on the singular, six- and eight-year-olds perform significantly worse than ten- and twelve-year-olds and adults. On the dual forms, six- and eight-year-olds perform significantly worse than twelve-year-olds, and ten-year-olds perform significantly worse than twelve-year-olds. On plural forms, six- and eight-year-

olds perform significantly worse than ten- and twelve-year-olds and adults. Ten- and twelve-year-olds perform significantly worse than adults, all pairwise comparisons $p < .03$. These results reveal that, overall, on singular forms ten-year-olds perform equivalently to adults. On dual forms, ten-year-olds' performance lags behind twelve-year-olds'. On plural forms, the performances of all age groups lags behind that of adults.

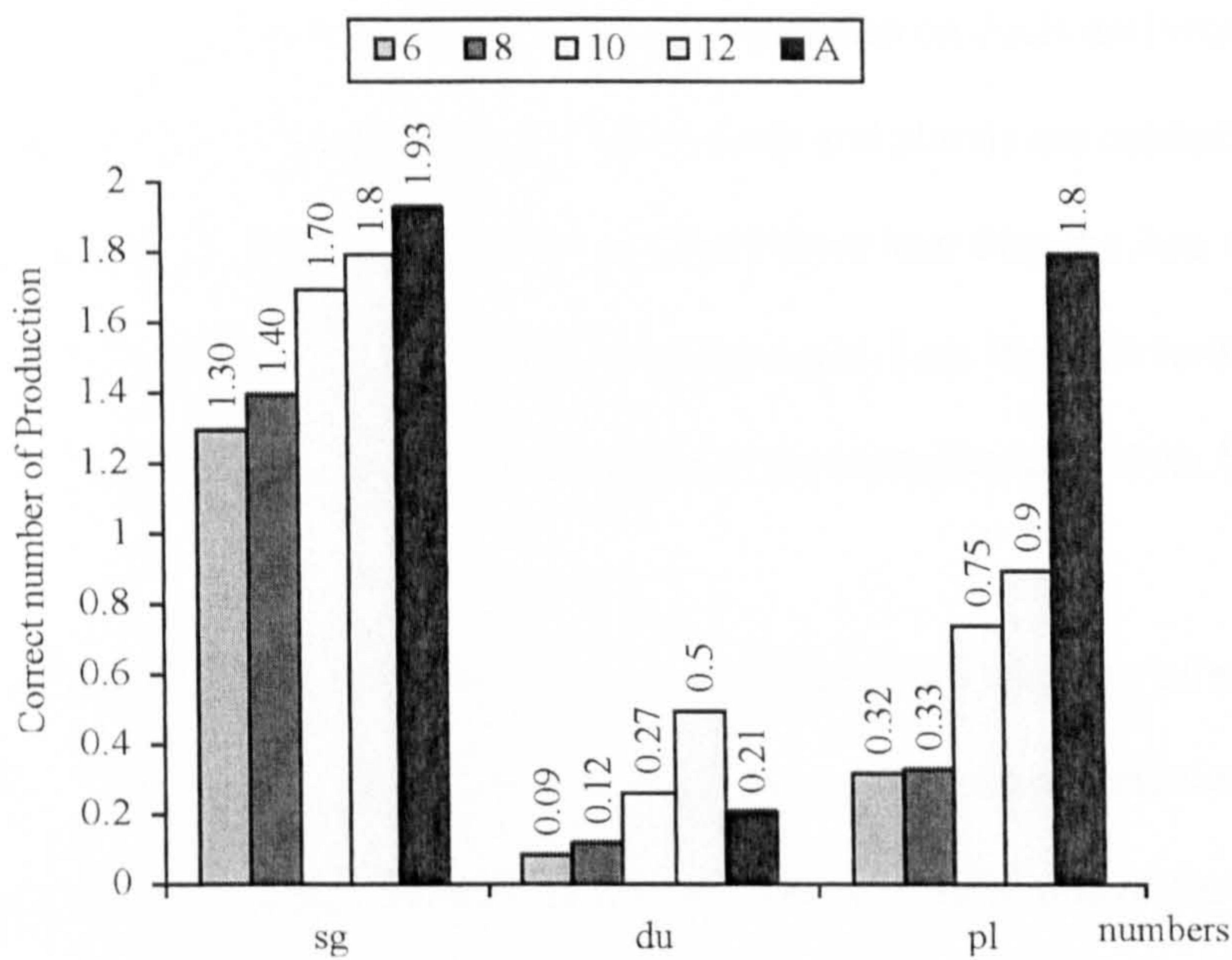


Figure 95. The effect of number x age group--feminine nouns

Summary: Inanimate feminine nouns with no overt gender referent

In terms of the results regarding inanimate feminine nouns with no overt gender referent, singulars were produced better than plurals and plurals better than duals, and the

children's performance on this category reached the adults' level at around the age of twelve.

Discussion: Inanimate feminine nouns with no overt gender referent

The findings concerning inanimate feminine nouns with no overt gender referent are not surprising. Participants score higher on singulars than on duals and plurals because singulars are unmarked for number while duals and plurals are marked. In addition, participants gained a command of the plural form later than the dual form because the dual form is not frequent in the language input. Less frequent forms are usually acquired later than forms that are frequent in the input (Moerk, 1992; Schlesinger, 1994).

The results also show that children gain a command of this category of nouns at around the age of twelve--the same time that they gain a command of feminine nouns marked for gender. This category and its agreement are considered one of the late categories acquired. Al-Aqtash (1998) also reports that this category is acquired late and that many errors occur even among adults.

The significant interaction between number and age group on the whole is not surprising. While it does show later mastery than forms marked for gender as reported earlier, this late mastery of the form could be due to the complexity of this form; these nouns appear in the masculine form while their agreement with numbers, verbs, and adjectives are in the feminine form, and this might confuse children. This result might be in agreement with Smoczynska's (1985) findings on the acquisition of Russian vs. Polish

gender; some Russian masculine noun forms have a similar ending to the feminine form and, according to Smoczynska, the un-clear-cut correspondence between form and gender could be the reason behind the late acquisition of Russian as compared to Polish.

6.2.1.7 Conclusion: Production of real words

In this part we have investigated the production of real words through investigating six different categories, and the results generally indicate that children do not have a command of any of these categories by the age of six. The results generally show that singular forms are acquired and mastered earlier than dual and plural forms. While plural adjective and verb forms were mastered earlier than the dual form, dual noun forms were mastered earlier than plural noun forms.

Our data also indicate that sound plural forms are acquired and mastered earlier than broken plural forms. The results in the collective category indicate an early acquisition of feminine forms and a later acquisition of masculine forms.

Participants gain a command of subject-adjective and subject-verb agreement last; they have not been mastered by our oldest children's age group (age group twelve).

Animacy hierarchy appears to affect the production of nouns, adjectives and verbs, where human nouns and adjectives and verbs referring to humans are produced better than animals and inanimate nouns, adjectives and verbs. However, the hierarchy effect seems to stop at humans > animals and inanimates, where adjectives and verbs referring to inanimates show a better performance than adjectives and verbs referring to animals. This result (inanimate > animal) does not agree with animacy hierarchy, which could be

due to language input and CDS, where children and adults are surrounded by inanimate objects more than animals, therefore, the use of verbs and adjectives referring to inanimates occur more often in a conversation, as a result, scoring higher on inanimates than on animals.

These are some of the main results regarding real word production; in the following section we will investigate novel word production and novel subject-verb agreement.

6.2.2 Production (novel words)

This set of analyses examines the responses to stimuli involving novel nouns. A multivariate test was conducted in which the variables tested were age group (6, 8, 10, 12, and A), noun gender (feminine and masculine), number (singular, dual, and plural), and word type (nouns and verbs). The nouns are novel, while the verbs used are real.

The test reveals main effects of word type ($F(1, 96) = 34.62, p < .001$), noun gender ($F(1, 96) = 4.13, p < .05$), number ($F(2, 192) = 19.7, p < .001$), and age group ($F(4, 96) = 65.68, p < .02$). (Means and Std. Errors in Appendix 2.2.7).

In terms of the effect of word type, the test reveals that the participants generally perform significantly better on nouns ($M = .63$) than on verbs ($M = .49$).

In terms of the effect of gender, the participants in general perform better on masculine forms ($M = .58$) than on feminine forms ($M = .54$).

In terms of the effect of number, the participants perform significantly better on the singular forms ($M = .79$) than on the dual ($M = .45$) and plural forms ($M = .43$). They also perform better on the dual than on the plural forms.

The effect of age group is shown in Figure 96. These effects indicate that six-year-olds and adults perform significantly worse than ten- and twelve-year-olds. Eight-year-olds perform significantly worse than twelve-year-olds, all pairwise comparisons, $p < .04$. This result shows that on novel words, twelve-year-olds perform significantly better than all other age groups, including adults.

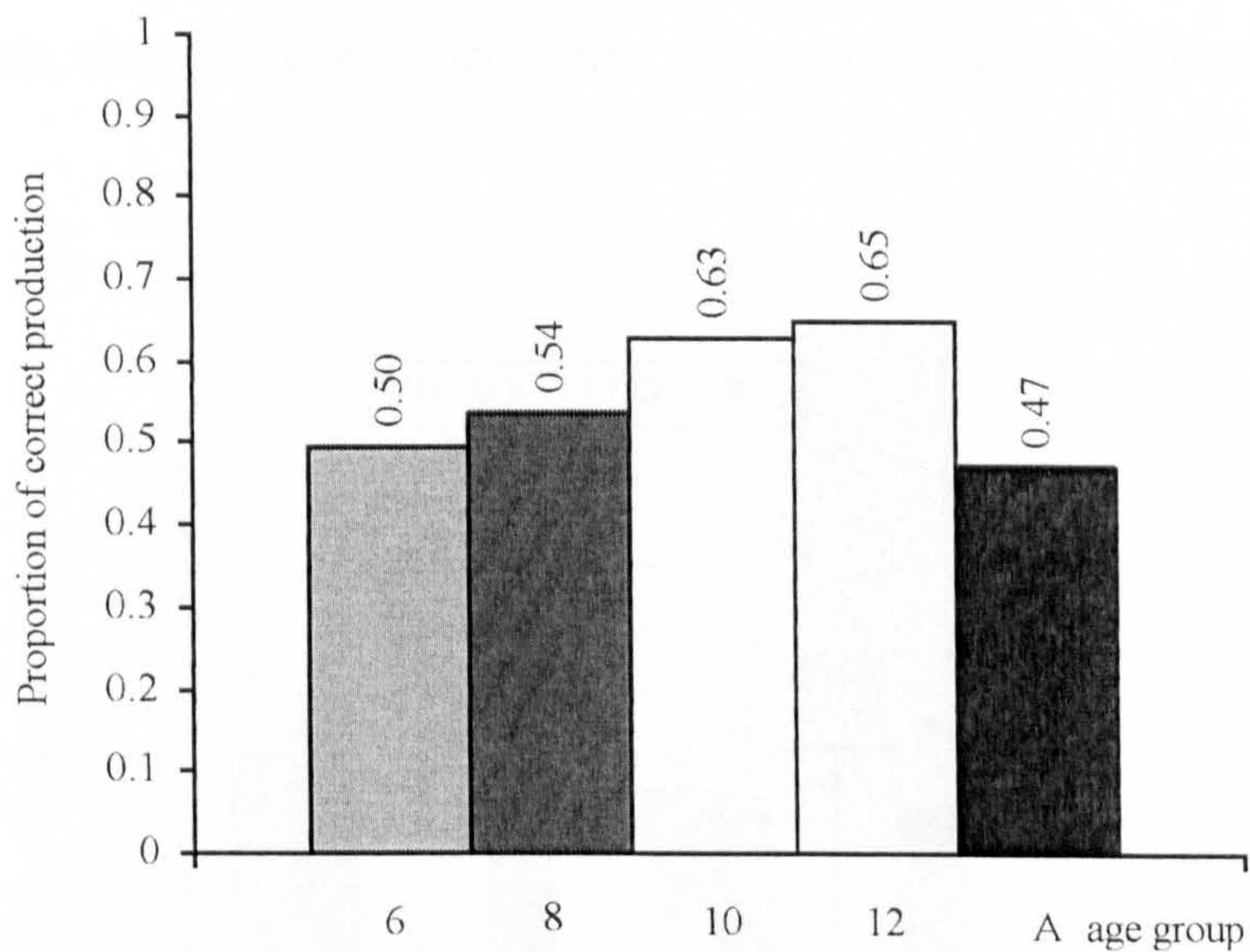


Figure 96. The effect of age group--novel nouns

The main effects are moderated by the significant interactions of word type x age group ($F(4, 96) = 3.83, p < .006$), word type x gender ($F(1, 96) = 17.27, p < .001$), word type x number ($F(2, 192) = 87.84, p < .001$), gender x number ($F(2, 192) = 33.31, p < .001$), and word type x gender x number ($F(2, 192) = 89.95, p < .001$).

Performance by word type x age group is shown in Figure 97. Simple effects analysis for each word type reveals that on novel nouns, six- and eight-year-olds and adults perform significantly worse than ten- and twelve-year-olds, all pairwise comparison, $ps < .04$. On verbs, participants' performances show no significant differences. These results show that novel nouns are produced equivalently by six- and eight-year-olds and adults. However, their performances lag behind that of ten- and twelve-year-olds, while on verbs all age groups performances perform equivalently.

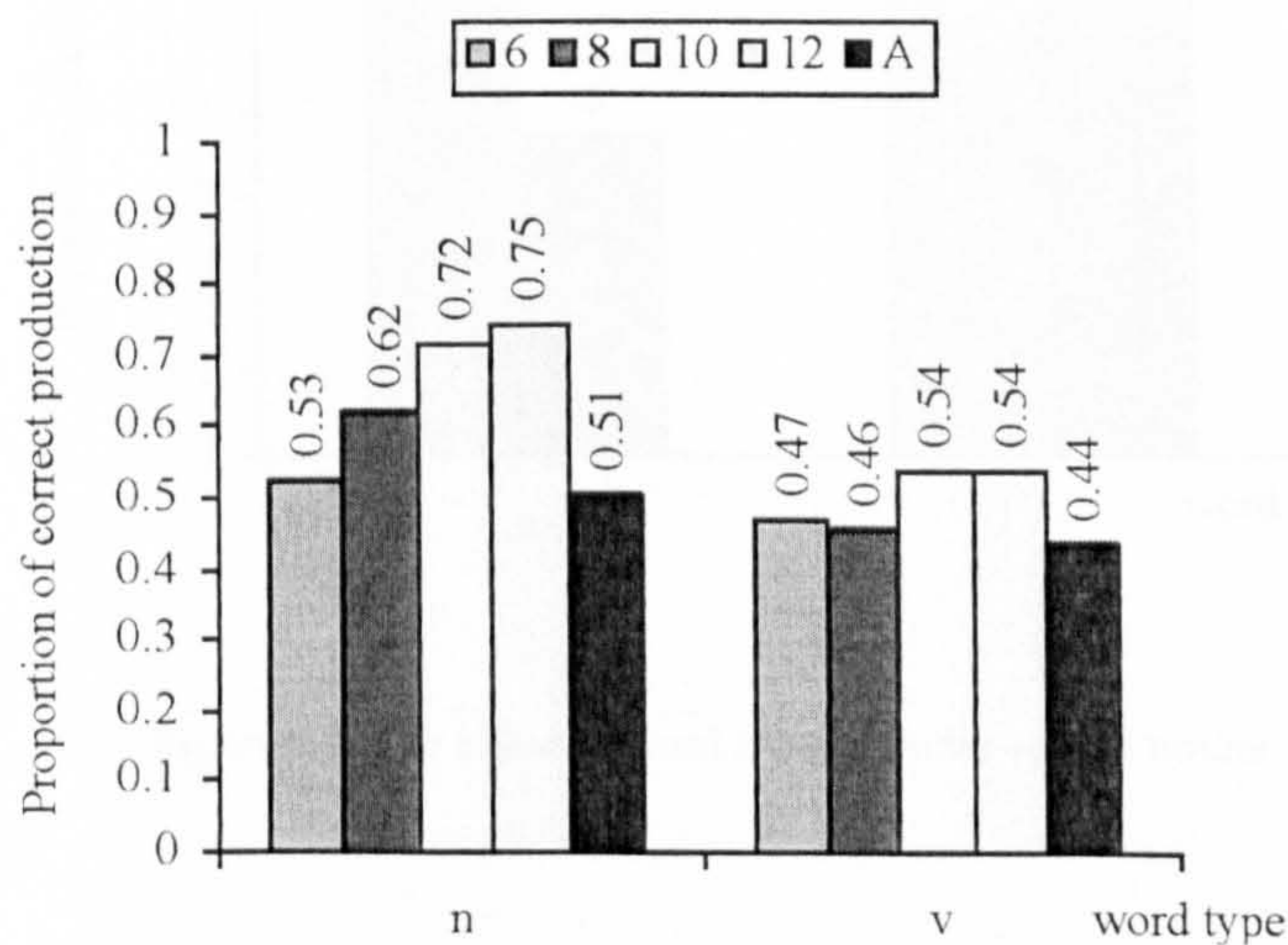


Figure 97. The effect of word type x age group--novel nouns

Performance by word type x gender is shown in Figure 98. Simple effects analysis for each word type reveals that on novel nouns, participants perform significantly better on feminine forms than on masculine forms. On verbs referring to novel nouns, participants perform significantly better on masculine than on feminine forms, all pairwise comparisons $p < .001$. These results show that on novel nouns, feminine forms are easier to produce than masculine forms, while on verbs, masculine forms are easier to produce than feminine forms.

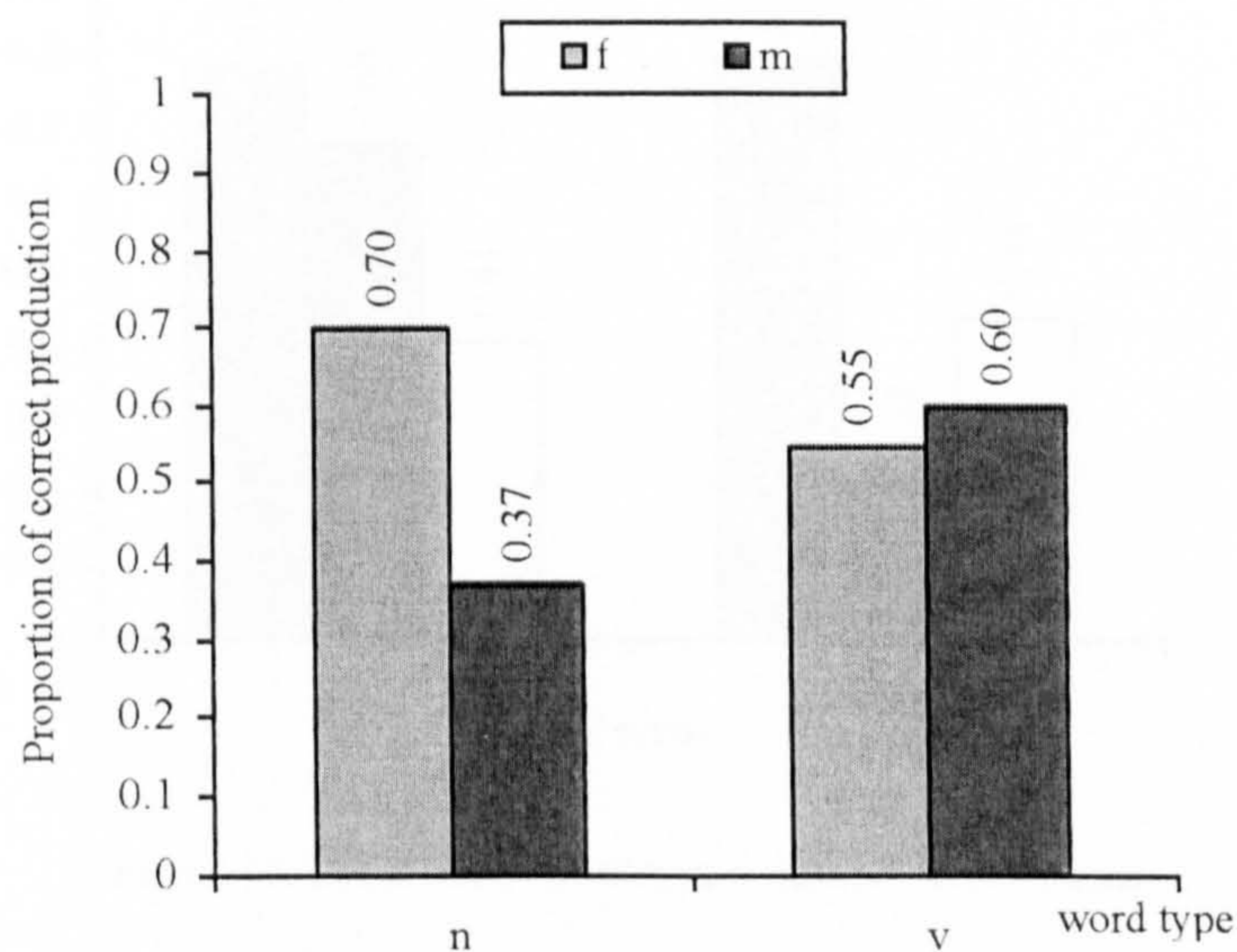


Figure 98. The effect of word type x gender--novel nouns

Performance by word type x number is shown in Figure 99. Simple effects analysis for each word type reveals that on novel nouns, participants perform significantly better

on singulars than on duals, and on duals than on plurals. In the verb category, participants perform significantly better on singulars than on plurals, and on plurals than on duals, all pairwise comparisons $ps < .001$. These results show that the pattern of mastering novel noun-number agreement is $sg > du > pl$, while the pattern of mastering verb-number agreement is $sg > pl > du$, indicating that dual noun forms are easier to acquire and produce than dual verb forms

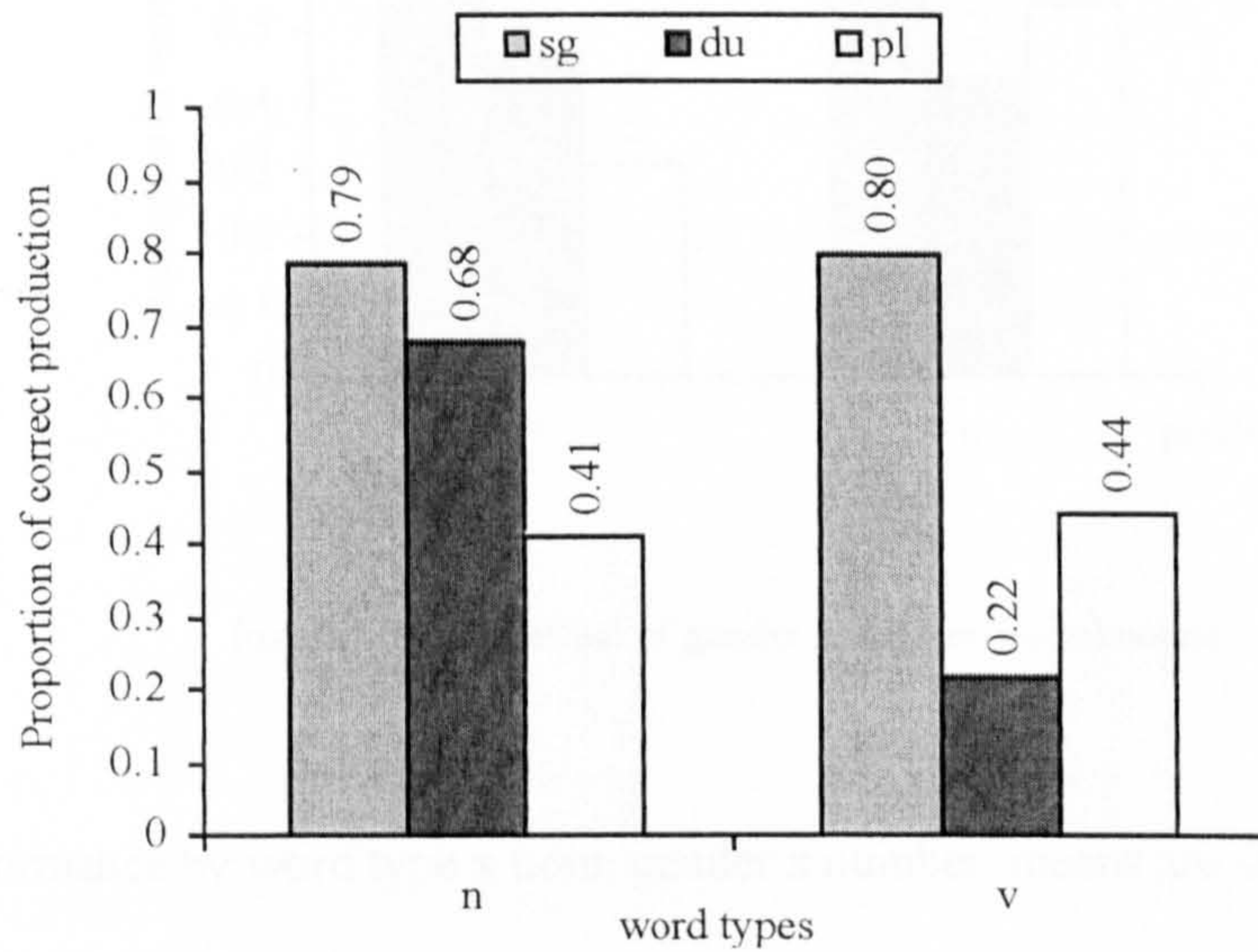


Figure 99. The effect of word type x number--novel nouns

Performance by noun gender x number is shown in Figure 100. Simple effects analysis for each noun gender reveals that on feminine forms, the participants perform significantly better on singulars than on duals and on duals than on plurals. On the masculine forms they perform significantly better on singulars than on plurals and on

plurals than on duals, all pairwise comparisons $p < .01$. These results show that the pattern of acquisition of feminine form-numbers agreement is $sg > du > pl$, while the pattern of acquisition of masculine form-numbers agreement is $sg > pl > du$.

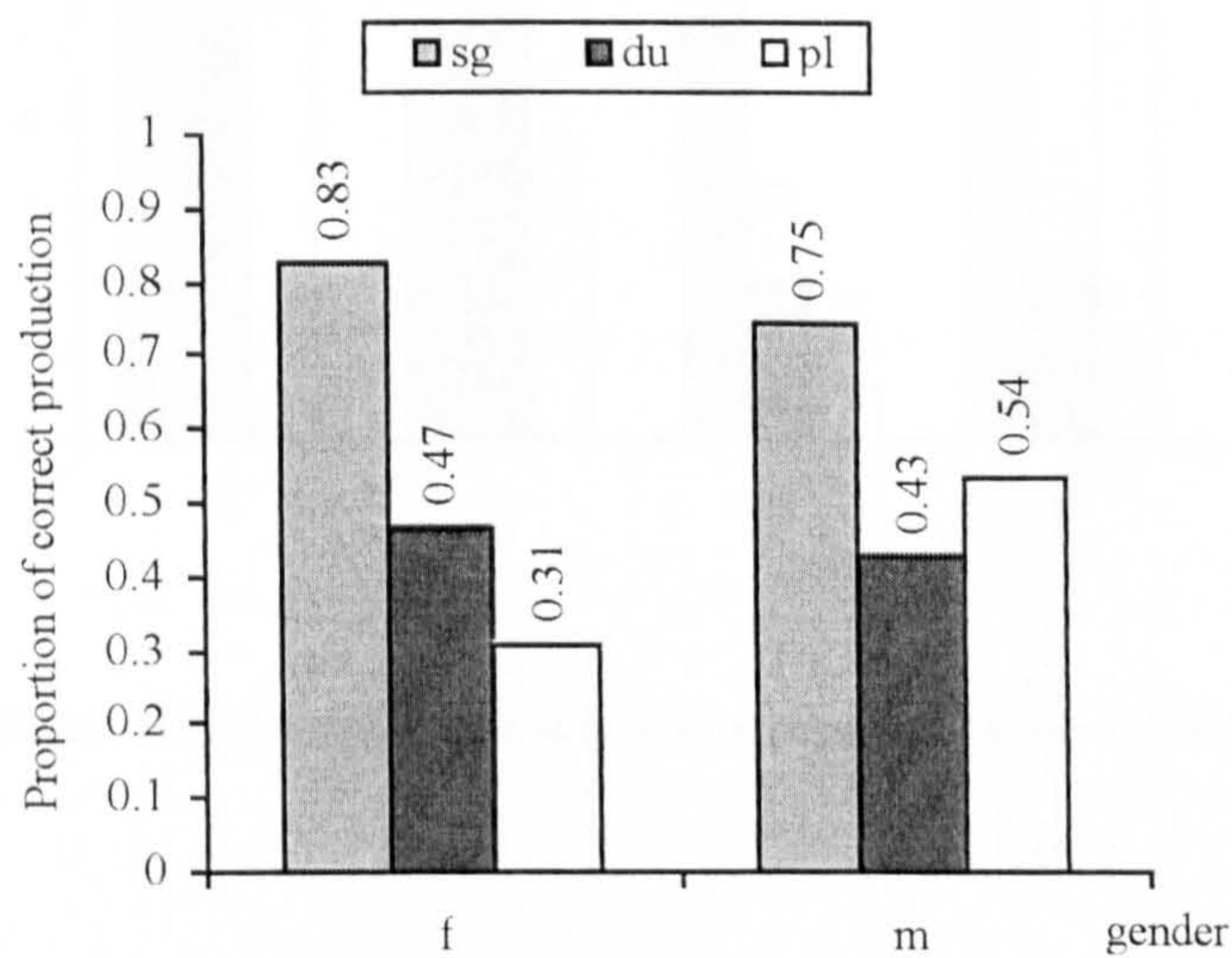


Figure 100. The effect of gender x number--novel nouns

Performance by word type x noun gender x number, means are shown in Figure 101. When examining this interaction we can see that the results show different patterns; numbers on both feminine and masculine nouns show that $sg > du > pl$. The same pattern is seen on the feminine verbs, but on masculine verb forms participants showed better performance on the singular and plural than on the dual.

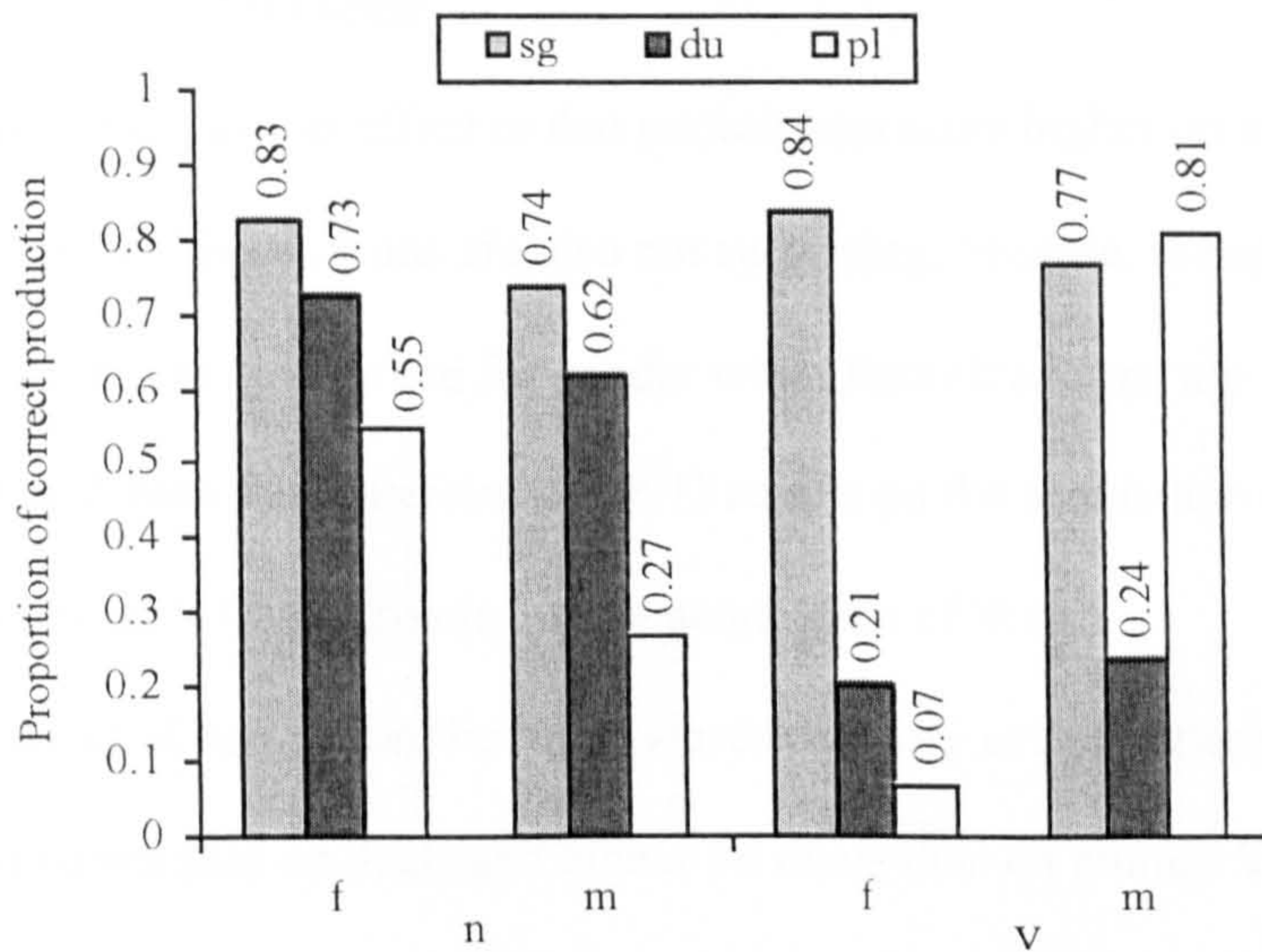


Figure 101. The effect of word type x gender x number--novel nouns

Summary: Novel nouns

In terms of the novel noun category, the results of this study indicate that the participants perform better on noun forms than on verb forms, and better on masculine forms than on feminine forms. The data also indicate that participants perform better on the singular forms than on the dual forms and on the dual forms better than on the plural forms. Our findings also show that adults perform equivalently to six-year olds.

Discussion: Novel nouns

The results of the novel word tasks indicate that the participants perform better on nouns than on verb forms, which is not surprising because, as explained before, nouns have clearer forms because they are marked for gender and number with suffixes, while

verbs take more forms and are marked for gender by a prefix and number by suffixes, as well as being marked for tense.

Gender does have an effect in that participants score higher on masculine forms than on feminine. These results are also not surprising, because, as explained earlier, masculine forms are not marked for gender while feminine forms are. This result is in agreement with both Pérez-Pereira's (1991) results on the acquisition of Spanish and Gathercole, *et. al.*'s (2001) results on the acquisition of Welsh.

The effect of number on the novel words category is that participants score higher on singular forms than on duals and higher on duals than on plurals. This result is in agreement with our results on the mastery of human and animal real word production discussed earlier. This result could be attributed to the fact that singular and dual forms are more regular forms created by adding a suffix, making them transparent forms. Plural forms, on the other hand, come in two forms--a sound and a broken (irregular), and irregular forms are more complicated and therefore acquired later (Smith & Kleeck, 1986; Dabrowiska, 2001).

A surprising result emerges in this category regarding age; the findings indicate that age group six and adults perform similarly and score lower than all other age groups. Age group six's results are not surprising because throughout our research they lag behind all other age groups. However, adults' performance in this category is surprising, and might indicate that they are not used to dealing with new and novel words, unlike children, who might be used to hearing and dealing with many novel words that they hear while watching television or playing computer games. Therefore, children might be able to apply the correct grammatical form better than adults.

In terms of the effect of word type x age group, the study shows that on noun forms, children of age group ten and twelve perform better than all other age groups including adults; however, on verbs, all age groups perform equivalently to each other. These results show differences between this category and the real noun and verb categories explained and discussed earlier. Real nouns are mastered by age group ten (they perform equivalently to adults); on verbs referring to real nouns all non-adult age groups lag behind adults, and on the novel category adults lag behind ten-year-olds. This result could be due, as argued earlier (p.218), to the possible fact that adults do not use novel words as frequently as children do.

Performance by word type x gender shows that participants score higher on feminine forms than on masculine forms in the noun category, possibly due to the fact that the masculine form in this category is created by omitting the gender suffix, while the feminine is formed by adding the gender suffix. This result is different from the results in the real nouns category, where in general participants perform better on the unmarked masculine form than on the marked feminine form. Participants had higher marks on masculine verb forms than on feminine verb forms; this result is similar to the results in the real verb form category, and in both cases the language input and CDS could be the reason behind the better performance on masculine than on feminine forms.

Performance by word type x number also shows that on novel nouns, participants score better on singular than on dual novel nouns, and better on duals than on plurals. However, participants score better on singular verbs than on plural verbs, and better on plurals than on duals. These results are similar to the results in the real noun and verbs categories discussed earlier.

Performance by noun gender x number shows that on feminine forms, participants score as follows: sg > du > pl. On masculine forms, they score as follows: sg > du < pl. These results are similar to those in the real word category, and could be due to the language input and CDS, where some feminine plural forms (verb forms) do not occur frequently in the Saudi dialect, the masculine noun plural forms take broken forms more frequently than the sound form, which might explain the poorer performance on these categories in comparison to the other grammatical categories.

6.3 General conclusion

The results in both the real and novel word categories bear some similarities and differences in production acquisition. The age of acquisition of novel nouns is a surprise in that adults perform lower than age groups eight, ten, and twelve, and equivalently to age group six, while on real words age group six performs worse than all other age groups. The performance of age groups eight, ten, and twelve varies across categories, but in general it seems that improvement in performance usually happens between the ages of eight and ten, possibly indicating that an important development takes place at around these ages.

In both the real and novel word categories, language input and CDS seems to play an important role in determining which forms are acquired earlier than the others, and our results show that most of the forms that occur frequently in the language input and CDS are the forms produced early. Forms that are not frequent in the input and CDS are mastered later; for example, adjectives and verbs and dual forms are acquired later than

singular forms. Our results also demonstrate animacy hierarchy in which performance on human nouns is better than on animal nouns and performance on animal nouns is better than on inanimate nouns. However, in some categories, a different pattern of animacy acquisition can be detected; participants score better on inanimate forms than on human and animal forms, as in the adjective, verb, collective, and quantified noun categories and, as argued earlier, this different result (seemingly inconsistent with animacy hierarchy) could be attributed to the language input. According to Moerk (1992), input frequency helps the acquisition and mastery of linguistic forms take place earlier than the acquisition and mastery of forms that appear infrequently in the input.

The acquisition of real and novel noun categories also seems to be affected by markedness and unmarkedness of the form; marked forms are acquired earlier than unmarked forms as detected in the early mastery of the unmarked masculine noun forms compared to the marked feminine form on both real and novel nouns.

Complexity of the form also affects its acquisition, and the broken form is considered complex because it is formed irregularly and can come in many forms, depending on the root of the noun. Therefore, children's performance on broken plurals generally reaches the adults' level at around the age of twelve.

The results also seem to suggest that the participants pay attention to the end of the words rather than to the beginning. This could be the reason that participants produce nouns and adjectives that are marked by suffixes better than they produce verbs that are marked by prefixes in the novel noun category.

Our results also seem to indicate that our participants add the suffix to the novel nouns better than they omit it. Therefore, they perform better on the singular novel noun

feminine forms, which are created by adding a suffix to the masculine form that they are given, than on the singular masculine, which is formed by omitting the suffix from the feminine form they are given.

A very interesting result emerges in the novel noun data, where on the noun forms adults perform equivalently to six-year-olds and score lower than the other age groups. This could be, as argued earlier (p. 218), due to the fact that adults are not used to dealing with novel nouns whereas children are. This result does not suggest that the adults have not mastered the dual noun forms, but it could imply that because adults do not use these novel forms frequently in their daily dialects, they do not see the importance of applying the correct grammatical form. However, because children are exposed to more novel and new nouns, they might have treated the novel nouns introduced in this study as one of the nouns they are exposed to and therefore tried to apply the correct grammatical form.

On the whole, the results show that mastering of the Arabic gender and number system occurs late; some forms are mastered after the age of ten and twelve, while some types of agreement are mastered after the age of twelve, where errors still occur. In the next chapter, errors produced by the participants on some of the categories tested will be examined.

Chapter 7

Error Analyses, Production

7.0 Introduction

In this part of the research the errors (a form is considered an error or a non-match form if it did not comply with the gender and number of the target form (the form encoded in the construction) and the criterion used is the */alfushah/* form, see sections (5.1.3 and 6.1.5) produced by our participants while performing on the production tasks are examined. Errors examined in the following section are divided into three sections: nouns (human and animal nouns in the plural and dual forms), verbs (humans, animals, and inanimates), quantified nouns, and errors produced with novel nouns and novel noun-verb agreements are also examined.

7.1 Errors made while Producing Nouns

The errors are reported as follows: first, errors associated with obligatory plural noun forms are considered; then, dual error type forms; then incorrect responses in subject-adjective agreement; then incorrect subject-verb agreement forms; and finally, errors detected in the novel noun category. For each category tested, errors are reported in a table by percentages, and then the incorrect responses are grouped and discussed.

7.1.1 Plurals

Table 19 displays the types of errors produced, by the five age groups that participated in our cross-sectional study, when plural nouns were required.

Table 19 Percentage of correct and incorrect performance on obligatory plural noun forms.

Target forms	Forms produced by the participants							
	f-sg	f-du	f-pl	m-sg	m-du	m-pl-sa	m-pl-br	different br
Age group 6								
n-h-f-pl ⁹	48% ¹⁰	2%	31% ¹¹	12%	1%	6%	4%	
n-h-m-pl-br			14%	47%	2%	25%	12%	
n-h-m-pl-sa			15%	60%	4%	20%	1%	
n-an-f-pl	10%	3%	15%	53%		2%	17% ¹²	
n-an-m-pl-br	10%		22%	62%		3%	3%	
Age group 8								
n-h-f-pl	3%		73%			16%	7%	1%
n-h-m-pl-br			4%	25%		21%	44%	
n-h-m-pl-sa	1%		7%	18%	4%	70%		
n-an-f-pl	1%		52%	13%			33%	1%

⁹ Throughout this chapter we will be using abbreviations: nouns (n), verbs (v), human (h), animal (an) inanimate (in), feminine (f), masculine (m), singular (sg), dual (du), plural (pl), sound (sa) and broken (br). Thus, n-h-f-pl would correspond to, noun, human in the feminine plural form.

¹⁰ All error percentage above 10% in bold.

¹¹ All correct responses are highlighted.

¹² A tentative acceptable form, usually used in the vernacular dialect

Target forms	Forms produced by the participants							
	f-sg	f-du	f-pl	m-sg	m-du	m-pl-sa	m-pl-br	different br
n-an-m-pl-br	1%		43%	36%		3%	11%	6%
Age group 10								
n-h-f-pl	2%	1%	81%		1%	7%	6%	1%
n-h-m-pl-br			7%	15%	4%	11%	61%	
n-h-m-pl-sa				11%	5%	82%	1%	1%
n-an-f-pl	1%		34%	7%	1%	1%	53%	2%
n-an-m-pl-br	1%		36%	15%		6%	36%	5%
Age group 12								
n-h-f-pl			91%			5%	2%	1%
n-h-m-pl-br				5%		3%	87%	5%
n-h-m-pl-sa				5%		95%		
n-an-f-pl	1%		40%	4%			50%	4%
n-an-m-pl-br			24%	14%	1%	2%	49%	9%
Adults								
n-h-f-pl			93%			4%	2%	
n-h-m-pl-br				7%			93%	
n-h-m-pl-sa						100%		
n-an-f-pl			52%	4%			43%	
n-an-m-pl-br			24%	9%		2%	64%	

By investigating our participants' incorrect responses as shown in Table 19, we can see that they show, in general, a tendency toward observing the gender of the

noun, especially masculine forms, more frequently than they do number and feminine forms. From the table above, it is clear that when the masculine plural form is obligatory, the participants' errors show that they have a tendency to apply a different number form within the masculine paradigm. For example, when the obligatory form is in the masculine plural /la:sibu:m/ ('players') لاعبون, a six-year-old says instead /la:sib/ ('player') لاعب in the singular masculine form. Such a result could indicate that by the age of six children's ability to produce the correct gender form is higher than their ability to produce the correct number particularly the plural). This finding also shows that overall, children up until the ages of ten and twelve change the plural form into a singular, but in general this error appears more frequently in the performance of age groups six and eight.

Another finding shows that the participants frequently substitute a masculine in place of a feminine obligatory form, while use of the feminine form in place of an obligatory masculine form occurs less frequently. For example, one of the participants of age group eight says /muhandisi:n/ ('engineers') مهندسين in the masculine plural form when the feminine /mula:kima:t/ ('engineers'-f) مهندسات is the obligatory form. This type of error seems to decrease around the age of ten.

The results also indicate that the masculine sound forms are not usually changed into broken forms; nevertheless, broken forms are changed into sound forms. For example, an eleven-year-old participant says /qusa:n-un/ ('pirates'-pl-sa) قرصانون, in place of the correct broken plural form /qarasina/ قراصنه. This type of error seems to decrease around the age of twelve.

The data also show that that masculine sound plural is changed into the feminine plural form by age group six. For example, a six-year-old participant says /*walad-at*/ ('boys'-f-pl) ولدات , instead of saying /*ʔawla:d*/ أولاد in the obligatory masculine plural form. By the age of eight this type of error does not appear frequently.

When comparing the incorrect responses in human plural forms and animal plural forms, we can see that across our five age groups up until the adults' performance, participants had more errors on animal plural forms had than on human nouns. The data show that human feminine and masculine sound plurals are mastered by the age of twelve; furthermore, the adult group has mastered the masculine broken plural form. On the other hand, on the animal plural forms we detect errors even among the adults' performance, especially on the feminine animal forms, which are frequently transferred into a broken form. For example, a ten-year-old child says /*ʔiʔa:b*/ ('wolves'-pl-br) ذئاب instead of the feminine form we are looking for *ʔiʔb-at*/ ذناب . This result is not surprising because when it comes to animal nouns use of the broken form is acceptable. In fact, the broken form might be more appropriate to use with the feminine animal nouns, but for the purposes of this research we are examining to see whether these different age groups apply the feminine plural form correctly with animals that are distinguished for gender by a ribbon (as they are in our study).

Overall, errors still occur at the age of twelve and adult, although they occur less frequently at these ages than at the younger ages.

Discussion: Plural

After viewing the errors that appear in the responses of the participants while performing on the noun plural production tasks, we can detect that the incorrect number type error from plural to singular decreases with age; six-year-olds seem to use singular forms more often than the other age groups do. However, it appears that by the age of six this incorrect number type takes place more frequently with masculine sound plurals, as illustrated in Table 19. These findings could be due to the fact that the feminine plural form mostly takes one form structure, while the masculine plural form structure occurs in two different forms and one of the forms is restricted to human nouns only.

Gender exchange is another error category that has emerged, and its results show that, in general, the participants tend to change the obligatory feminine form into an incorrect masculine form. This result could be due to the fact that masculine forms are unmarked for gender, while feminine forms are marked; therefore, participants produce fewer errors on the masculine form than on the feminine forms in the production task. According to Pérez-Pereira (1991), unmarked forms are more recognizable than marked forms; therefore in Spanish masculine forms are acquired earlier than feminine, and our results agree with Pérez-Pereira's findings. This could also be the reason behind the finding that the participants use the masculine in place of the feminine more frequently than they use the feminine form in place of the masculine.

The data also reveal an overregularizing error pattern, wherein broken plural forms are changed into sound forms. The percentage of errors shows that this incorrect response decreases with age. Omar (1969) and Ravid & Farah (1999) detect the overregularizing error type, but they observe it at a younger age--around the age of three. Their results also

show a U-shaped learning pattern that our data does not show, and this could be due to the difference in the age groups we have used in our research vs. the ones used by Omar and Ravid & Farah.

Errors present in the responses regarding the obligatory sound masculine form changing into the feminine plural form show that, on human nouns, six-year-olds use the feminine form more frequently than all other age groups, and the percentage decreases by the age of eight. This error pattern does not appear frequently in the older age groups' responses. This result could mean that by the age of eight children learn to differentiate between sound masculine plurals and feminine plural forms, and therefore use the appropriate suffix at an early stage. This could be due to the fact that the masculine sound plural form is restricted to human nouns only.

On the whole, the incorrect responses appear frequently up until the age of ten and decrease by the age of twelve. Some errors on the animal plural forms still occur in the performance of adults.

7.1.2 Dual

Table 20 displays the percentage of errors produced by the five age groups when dual nouns were requested. They are summed by form, gender, and animacy.

Table 20 Percentage of correct and incorrect performance on obligatory dual noun forms

Target forms	Forms produced by the participants											
	f-sg	# + f-sg ¹³	f-du	# + f-du	f-pl	# + f-pl	m-sg	# + m-sg	m-du	# + m-du	m-pl	# + m-pl
Age group 6												
h-f-du	20%	8%	25%		7%	4%	6%	2%	3%		2%	
h-m-du	1%		1%				29%	9%	32%		9%	2%
an-f-du	9%		13%		5%		19%	7%	15%		3%	3%
an-m-du	2%	2%	3%				21%	12%	31%		4%	
Age group 8												
h-f-du	1%	2%	71%		5%	7%		1%	3%		2%	3%
h-m-du					2%		2%	6%	74%	1%	8%	3%
an-f-du	1%	3%	47%		9%	3%	2%	8%	15%		4%	3%
an-m-du			4%		5%	1%	1%	7%	73%	1%	1%	1%
Age group 10												
h-f-du	1%	1%	75%		5%	3%			3%		2%	
h-m-du							1%	2%	87%		4%	5%
an-f-du			48%		1%	1%	1%	1%	38%	1%	6%	
an-m-du			3%		1%		1%	5%	87%	1%		1%
Age group 12												
h-f-du	1%		90%		3%	4%			2%			

¹³ (# + f-sg) corresponds to for number two + a singular, dual or a plural form. For example, /ʔiθna:n bint/ (two girl).

Target forms	Forms produced by the participants											
	f-sg	# + f-sg ¹³	f-du	# + f-du	f-pl	# + f-pl	m-sg	# + m-sg	m-du	# + m- du	m-pl	# + m-pl
h-m-du									86%		7%	6%
an-f-du		1%	62%		2%		2%	1%	27%		2%	3%
an-m-du			1%				2%	2%	93%		1%	2%
Adults												
h-f-du	7%		71%		5%	9%		2%	5%			
h-m-du							2%		80%			17%
an-f-du	2%	2%	45%			5%		10%	33%			2%
an-m-du			2%		5%			2%	84%			6%

The data in Table 20 show a that participants have a tendency toward producing the gender paradigm better than the dual forms. As argued with the incorrect responses earlier, in general, when the participants give an incorrect response it is usually in the correct gender form but with the incorrect number. For example, instead of the obligatory form /*yaʔa:s-a:n*/ ('divers'-du) غطاسان . an eight-year-old child gives the plural form /*yaʔa:s-u:n*/ ('divers'-pl-sa) غطاسون . This finding may indicate that the gender system is acquired earlier than the dual in our participants' Arabic acquisition.

On the animal noun forms, age group six and adults used the number two with a singular noun form. For example, an adult said /*ʔiθna:m ʔaqrab*/ ('two scorpion') instead of saying the obligatory /*ʔaqrab-a:n*/ ('scorpion'-du) in the dual form. The adults' data also show that on the masculine human dual obligatory form, they use the number two with the noun plural form. For example, they say /*muswir-u:n ʔiθn:n*/ ('photographer'-pl

two) instead of just saying /muswir-a:n/ ('photographer'-du) مصوران. This error does not occur as frequently in the performance of the younger age groups.

The participants also tend to change gender from the obligatory feminine to the masculine. This error type occurs most frequently in the animal noun category across age groups. For example, instead of saying /xuffa:fa-t-a:n/ ('bat'-f-du) خفاستان, they say /xuffa:f-a:n/ ('bat'-du) in the masculine form. On the other hand, using the feminine form in place of a masculine does not occur frequently in the data.

The data also show that our younger age group uses the singular form in place of the dual on both human and animal nouns, and that by the age of eight this type of error decreases. This incorrect response appears most frequently with the use of singulars; however, it also appears with the use of plural forms in place of duals. The frequency of use of the plural form in place of the dual is not as high as that of the use of the singular form; nevertheless, the use of singular forms with the number two seems to decrease with age, and the use of plural forms with two increases with age, perhaps indicating improvement in the acquisition of plural forms.

Discussion: Dual

Errors detected in the responses across our five age groups on the production of human and animal dual forms shows that, at the age of six, children tend to use the singular form in place of the dual form, which might suggest that at this age the dual is still in a developing stage. However, the results also indicate that some children use the plural form instead of the obligatory dual form, though not as frequently as the correct

dual form, and that could be due to the fact that the dual is formed by adding one suffix to both masculine and feminine forms, while masculine nouns are marked with a different suffix from feminine nouns, and the masculine sound form is also restricted to human nouns whereas animal nouns are pluralized in the broken plural forms. However, by the age of eight, the number exchange from dual to singular or plural has decreased. Overall, an improvement in the production of duals occurs between the ages of eight and ten.

The results concerning the noun dual form also indicate the use of the word 'two' and a number form. In this case the children might have been emphasizing the fact that they know that what they are looking at is two things. Therefore, they produce 'two' with a singular noun form more frequently at the age of six, indicating that they have a stronger hold on singulars than on duals and plurals, but when they start developing a stronger hold on the plural they start using plural forms with the number instead of singular forms.

Gender exchange can also be detected in the responses, though this is less frequent than the number exchange errors. The results indicate that the exchange from feminine to masculine is more frequent than the exchange from masculine to feminine, and this may be because the masculine noun is marked only for number, while the feminine is marked for both gender and number, making it perhaps less easy to produce than the masculine. This would explain participants' more frequent use of the masculine in place of the feminine.

Finally, we can tentatively say that by the age of eight, children produce the gender-dual agreement as the older age group does, and they perform better on the masculine dual forms than on the feminine dual forms.

Overall, errors detected in the noun dual category decrease between the ages of ten and twelve. Still, errors do occur in the performance of twelve-year-olds and adults, particularly in the feminine animal dual category.

7.2 Errors while producing quantified nouns

Table 21 displays the percentage of performance by five age groups while producing quantified human nouns on the production tasks. These are summed by form, gender, and animacy.

Table 21 Percentage of correct and incorrect performance on obligatory quantified human noun forms

Target forms	Forms produced by the participants						
	f-sg	f-pl	m-sg	m-pl	Number omitted ¹⁴		
					sg	du	pl
Age group 6							
h-f-3to10-pl	11%	35%		1%	33%	1%	22%
h-m-3to10-pl	13%		9%	38%	30%		10%
h-f-11+-sg	30%	12%		2%	18%		38%
h-m-11+-sg			44%	3%	20%		33%
Age group 8							
h-f-3to10-pl	2%	83%	1%	1%	1%		11%
h-m-3to10-pl	10%		8%	60%	5%	3%	14%
h-f-11+-sg	45%	9%	2%	5%	2%		37%
h-m-11+-sg		7%	56%	3%			34%
Age group 10							

¹⁴ In this error category the children omitted the number given by the experimenter, and produced the objects in the singular, dual or plural form.

Target forms	Forms produced by the participants						
	f-sg	f-pl	m-sg	m-pl	Number omitted ¹⁴		
					sg	du	pl
h-f-3to10-pl		76%		4%	4%		17%
h-m-3to10-pl	3%		3%	81%	6%	1%	5%
h-f-11+-sg	66%						34%
h-m-11+-sg			66%	1%	1%	1%	31%
Age group 12							
h-f-3to10-pl		85%					15%
h-m-3to10-pl				95%			5%
h-f-11+-sg	80%						20%
h-m-11+-sg			84%				16%
Adults							
h-f-3to10-pl		98%		1%			1%
h-m-3to10-pl			3%	97%			
h-f-11+-sg	100%						
h-m-11+-sg			93%				7%

By examining Table 21 we can see that the most common incorrect response on human nouns is omitting the number supplied by the experimenter and producing the noun in a plural form; thus, instead of saying */iθna ʕafara muʕalimah/* ('twelve teacher'-f-sg) they say */muʕalim-a.t/* ('teachers'-f-pl). This incorrect response present in the performance of age groups six, eight, ten, and twelve, and omitting the number and using a singular form instead appears frequently in the performance of age group six.

Omitting the number and using a singular or a plural form response does not occur frequently in the performance of adults.

Another incorrect response occurs when six- and eight-year-old participants change the obligatory plural form into a singular form with the 3 to 10 quantified nouns; thus, instead of saying */ʔarbaʔ malika:t/* ('four queens'-f-pl), a six-year-old child says */ʔarbaʔah malika/* ('four queen'-f-sg).

In the next section, participants' performance on quantified inanimate and animal nouns is shown in Table 22. The same incorrect patterns that occur on human nouns occur on these two animacies.

Table 22 Percentage of correct and incorrect performance on obligatory quantified inanimate and animal noun forms

Target forms	Forms produced by the participants						
	num-sg	3to10-pl	11+-sg	num-pl	Number omitted		
					sg	du	pl
Age group 6							
in-3to10-pl	21%	32%			39%		8%
in-11+-sg			72%		5%		23%
an-3to10-pl	27%	18%			31%	3%	21%
an-11+-sg			69%		4%	2%	27%
Age group 8							
in-3to10-pl	18%	63%	5%	4%	4%		6%
in-11+-sg			70%	12%			17%
an-3to10-pl	32%	20%			25%	1%	22%
an-11+-sg	5%		69%	8%			21%
Age group 10							

Target forms	Forms produced by the participants						
	num-sg	3to10-pl	11+-sg	num-pl	Number omitted		
					sg	du	pl
in-3to10-pl	4%	85%			4%	3%	4%
in-11+-sg			84%				16%
an-3to10-pl	11%	67%			3%		19%
an-11+-sg			80%				20%
Age group 12							
in-3to10-pl	2%	90%			1%		7%
in-11+-sg			93%				7%
an-3to10-pl	8%	75%	9%		3%		14%
an-11+-sg			91%				9%
Adults							
in-3to10-pl		100%					
in-11+-sg			98%				2%
an-3to10-pl	7%	83%					10%
an-11+-sg			98%				2%

As seen in the performance of human quantified nouns, here six-, eight-, and ten-year-old participants omit the number supplied by the examiner and produce the noun in a plural form. This incorrect response also appears in the data of age groups twelve and adults in the 3 to 10 animal nouns category. The results further show that omitting the number and using the singular form instead appears in the performance of age group six.

The results also show that on the 3 to 10 quantified category, age groups six and eight produce the number supplied by the examiner but use a singular form for the noun

instead of the correct plural form, as explained earlier in relation to the human quantified nouns category. In the 11+ category, age group eight sometimes produces the number with an incorrect plural form instead of the correct singular form. For example, instead of saying */xamastafar-sanduq/* ('fifteen box'-sg), one eight-year-old child says */xamastafar-sanadiq/* ('fifteen boxes'-pl) in the incorrect form (plural in place of singular). This error type occurs frequently in the inanimate category.

Discussion: Quantified nouns

Errors produced by the participants on the quantified noun category shows in general that most incorrect patterns decrease by the age of ten. The most frequent error detected is use of the plural or singular forms without using the number supplied by the experimenter. The singular form is used more frequently than the plural by six-year-olds, and this result could be due to the fact that six-year-olds perform better on the singular than on the plural (see Chapter 6). Also, because they perform better on the singular forms than on the plurals, they use the singulars in place of the plurals. This more frequent use of singulars than plurals by age group six could be attributed to the fact that singular forms are unmarked while plural forms are marked. This result agrees with the work of Robinson & Mervis (1998), who report that the first stage of the plural form is the stage at which children use the unmarked singular form in place of the plural marked form.

The other main error reported in this category is when six- and eight-year-olds use the singular noun form instead of the obligatory plural in the 3 to 10 quantified nouns

category. This result is not surprising because of the fact that the singular form is acquired and mastered earlier than the plural forms (see Chapter 6). Another interesting finding is that children of age group six use the correct singular noun forms with numbers 11+ 72% and 69% of the time, while on the 3 to 10 quantified plural nouns their performance is correct only 32% and 18% of the time. This result takes us back to the fact that singulars are acquired earlier than plurals, as discussed earlier.

Overall, the main errors detected in the quantified category are omitting the number supplied by the examiner and using a plural form. The other error is use of the singular form in place of the obligatory plural forms and vice versa. The simplicity of the singular form plays an important role in the type of errors detected in the quantified nouns category.

7.3 Errors while producing verbs

Table 23 displays the percentage of performance by five age groups while producing verbs, summed by form, gender, and animacy.

Table 23 Percentage of correct and incorrect performance on Verbs forms

Target forms	Forms produced by the participants								
	f-sg	f-du	f-pl	m-sg	m-du	m-pl	m-.....-f ¹⁵	f-.....m ¹⁶	f-past
Age group 6									
v-h-f-sg	98%			2%					
v-h-f-du	43%	0		5%		52%			
v-h-f-pl	39%		1%	12%		48%			
v-h-m-sg				100%					
v-h-m-du				45%	10%	44%			
v-h-m-pl				38%		62%			
v-a-f-sg	46%			54%					
v-a-f-du	21%	2%		35%		42%			
v-a-f-pl	4%		8%	35%		53%			
v-a-m-sg	5%			95%					
v-a-m-du	5%			47%	1%	46%			
v-a-m-pl	4%			42%		54%			
Age group 8									
v-h-f-sg	99%			1%					
v-h-f-du	13%	14%		1%		67%		2%	2%
v-h-f-pl	6%		9%			83%			2%

¹⁵ Corresponds to a verb marked by a masculine prefix and a feminine suffix, for example /ja-qfizna/ (m-jumping-f-pl).

¹⁶ (f-.....m) Corresponds to a verb marked by a feminine prefix and a masculine suffix

Target forms	Forms produced by the participants								
	f-sg	f-du	f-pl	m-sg	m-du	m-pl	m-.....-f ¹⁵	f-.....m ¹⁶	f-past
v-h-m-sg				98%		2%			
v-h-m-du				7%	14%	78%			
v-h-m-pl				5%	3%	92%			
v-a-f-sg	74%			24%	1%	1%			
v-a-f-du	13%	12%		8%	3%	63%			
v-a-f-pl	1%	1%	7%	1%	2%	81%			6%
v-a-m-sg				100%					
v-a-m-du	3%			8%	12%	76%			
v-a-m-pl	6%	1%		1%		89%			2%
Age group 10									
v-h-f-sg	100%								
v-h-f-du	9%	26%			5%	59%			
v-h-f-pl	4%	1%	1%		1%	92%			
v-h-m-sg				99%		1%			
v-h-m-du				5%	33%	61%			
v-h-m-pl				3%	3%	94%			
v-a-f-sg	68%			30%		2%			
v-a-f-du	9%	12%			14%	64%			
v-a-f-pl	13%		6%	4%		74%			2%
v-a-m-sg	1%			99%					
v-a-m-du	1%			4%	32%	62%			
v-a-m-pl	14%			4%	1%	80%			
Age group 12									

Target forms	Forms produced by the participants								
	f-sg	f-du	f-pl	m-sg	m-du	m-pl	m-.....-l ¹⁵	f-.....m ¹⁶	f-past
v-h-f-sg	100%								
v-h-f-du	7%	34%	1%		5%	50%	1%	1%	
v-h-f-pl	1%		10%	1%		79%	8%		
v-h-m-sg	1%			99%					
v-h-m-du				4%	46%	50%			
v-h-m-pl				1%		99%			
v-a-f-sg	70%			30%					
v-a-f-du	10%	20%		5%	19%	44%	1%		1%
v-a-f-pl	32%		4%			63%			1%
v-a-m-sg				100%					
v-a-m-du	5%	2%	1%	5%	38%	49%			
v-a-m-pl	32%		1%	2%		61%	1%		2%
Adults									
v-h-f-sg	100%								
v-h-f-du	8%	26%			3%	63%			
v-h-f-pl	2%		7%			88%	2%		
v-h-m-sg				98%		2%			
v-h-m-du				4%	36%	60%			
v-h-m-pl						100%			
v-a-f-sg	67%			33%					
v-a-f-du	19%	19%		7%	14%	38%			2%
v-a-f-pl	29%		17%	7%	2%	40%			5%

Target forms	Forms produced by the participants								
	f-sg	f-du	f-pl	m-sg	m-du	m-pl	m-.....-l ¹⁵	f-.....m ¹⁶	f-past
v-a-m-sg				100%					
v-a-m-du	5%			2%	30%	63%			
v-a-m-pl	52%			10%		38%			

Errors produced by the participants show that, in general, participants score the lowest error rate on masculine singular forms on both human and animal stimuli and masculine plurals on human stimuli, in comparison to all other subject and number-verb agreement categories examined.

The performance of age group six on verb form production shows that the youngest age group examined in this study does not make frequent errors while producing the singular verb form. The results also show some similar patterns across the ages examined in this study; for example, in most age groups the masculine verb form is used in place of the feminine verb form. This error type appears more frequently on plural forms. For example, instead of saying */ta-takalam-na/* (f-‘taking’-pl) تتكلمن in the obligatory feminine form, they say */ja-takalam-un/* (m-‘talking’-pl) يتكلمون in the masculine plural form. This could be due to the fact that masculine plural forms appear more frequently in the input than feminine plural forms do. In fact, in the vernacular dialects masculine plural forms are used in place of feminine plural forms. This error type--changing feminine to masculine--seems to increase with age, while changing the masculine form into the feminine is not detected as frequently.

The data also indicate that the dual form is not produced as frequently as the singular and the plural forms. For example, instead of saying */jaʔkul-a:n/* (m-‘eating’-du) *ياكلان* in the dual form, they say */jaʔkul-u:n/* (m-‘eating’-pl) *ياكلون*. This finding could also be attributed to input and CDS, since dual verb forms are not produced frequently in the vernacular dialects. In all five age groups participants usually use the plural form more frequently than all other number categories, particularly when the dual or feminine plural forms are obligatory.

Verbs referring to more than two animals take the feminine singular form rather than the plural form; therefore, the incorrect response is to use the plural form in place of the obligatory singular form. For example, in place of saying *ʃiʔra:nu ta-tazaʔlaq/* (‘mice’-m-pl-br f-‘sliding’-sg), participants say */ʃiʔra:nu ja-tazaʔlaq-u:n/* (‘mice’-m-pl-br m-‘sliding’-pl) in the masculine plural form. This error increases by the ages of eight and ten, then decreases by the age of twelve, but it still appears 38% of the time in the performance of adults. This might indicate that the connection between meaning and form could have been established at a young age; therefore, when a form does not agree with the meaning it takes a longer time to comprehend and acquire for production.

Infrequent forms are usually acquired later than frequent forms (Moerk, 1992).

Thus, errors are detected frequently on dual verb forms, where it is usually changed into a plural form even in the performance of adults.

Discussion: Verbs

After examining the errors produced across our five age groups we can, overall, see that language input and CDS has a strong effect on the acquisition and production of verb

forms. This could explain why the participants perform better and show fewer errors on masculine forms than on feminine verb forms, especially on the plural forms, since, as argued earlier (p. 243), the masculine plural verb forms appear more frequently in the language input and CDS than the feminine plural forms. This language input and CDS factor could also explain the frequent incorrect responses detected on the dual verb forms (substituting them with the masculine plural verb form). This result may be attributed to the fact that the masculine plural forms appear frequently in the input and CDS, and therefore, across the five age groups investigated in this study, participants use the more frequent masculine plural form in place of the obligatory infrequent dual form. These results agree with the findings of Clahsen, *et. al.* (2002), which state that low frequent forms in the input and CDS generally generate more errors than frequent forms.

The results also demonstrate that on both human and animal stimuli, participants produced fewer errors on the singular verb form than other number forms, which might indicate that the verb singular forms are acquired better around the age of six in comparison to the other forms. However, singular verb forms are generally used in the correct place, except on verbs with plural animal stimuli where the verb form is not in agreement with the noun form. In this case we might be able to say that the children are able to comprehend and therefore produce gender number agreement better than they can produce forms in which the noun gender and number are not in agreement with the verb gender and number form. There could be another reason behind this late acquisition, namely that the situation of non-agreement between the noun and verb is restricted only to non-human plural nouns with verbs, and therefore it is not a frequent form in the language. Infrequent forms might be acquired later than frequent forms.

Overall, the data show that participants score the lowest error rates on singular verb forms as compared to duals and plurals. The dual verb form is changed into a plural verb form frequently. Feminine plural forms are also changed into masculine plural forms, and language input and CDS seems to have played a big role in the errors detected in the verb category.

7.4 Novel words errors

Table 24 displays the percentage of performance by five age groups while participating on the novel word production tasks, summed by form, gender, and word type (novel nouns and real verbs with novel nouns).

Table 24 Percentage of correct and incorrect performance on novel words

	f-sg	f-du	said twice	f-pl	num + pl	m-sg	m-du	said twice	m-pl- sa	m-pl- br	different br	repeat	num + sg
Age group six													
n-f-sg	57%											41%	2%
n-f-du	17%	32%	7%	8%		4%	4%		4%	5%	2%		17%
n-f-pl	13%	2%		43%	1%	9%	1%		1%	11%	1%	18%	
n-m-sg						45%			2%		12%	38%	3%
n-m-du	10%	8%		10%		15%	25%	2%	1%	3%	1%		25%
n-m-pl	10%			20%	2%	22%			1%	20%		1%	24%
v-f-sg	70%					20%			10%				
v-f-du	22%	1%				20%	5%		52%				
v-f-pl	18%	1%				20%	5%		55%				

	f-sg	f-du	said twice	f-pl	num + pl	m-sg	m-du	said twice	m-pl- sa	m-pl- br	different br	repeat	num + sg
v-m-sg	15%					84%			1%				
v-m-du	14%					32%	9%		45%				
v-m-pl	9%					30%			61%				
Age group eight													
n-f-sg	96%					2%					2%		
n-f-du	4%	71%		10%		3%	10%	2%					
n-f-pl	4%	1%		73%			3%		11%	2%	2%		3%
n-m-sg	5%					83%					12%		
n-m-du	1%	16%		1%		9%	62%	2%	5%	1%			3%
n-m-pl	3%			27%		8%	11%		15%	9%			27%
v-f-sg	90%					8%			1%	1%			
v-f-du	11%	7%				5%	5%		72%				
v-f-pl	15%			4%		3%			76%		2%		
v-m-sg	6%					94%							
v-m-du	1%					15%	12%		72%				
v-m-pl	3%	1%		1%		9%	1%		85%				
Age group ten													
n-f-sg	95%										5%		
n-f-du	2%	88%	3%	5%			2%						
n-f-pl	1%	5%		83%					3%	3%	1%		4%
n-m-sg	5%		3%			87%					5%		
n-m-du		5%		2%		1%	85%	1%	2%				4%
n-m-pl	2%			25%		2%	6%		35%	25%	1%		4%
v-f-sg	96%					4%							

	f-sg	f-du	said twice	f-pl	num + pl	m-sg	m-du	said twice	m-pl- sa	m-pl- br	different br	repeat	num + sg
v-f-du	11%	31%				4%	4%		50%				
v-f-pl	10%			8%		6%			72%	4%			
v-m-sg	2%					96%			2%				
v-m-du	3%	1%				17%	40%		39%				
v-m-pl	4%					5%			91%				
Age group 12													
n-f-sg	92%					5%					3%		
n-f-du		90%		4%			6%						
n-f-pl		5%		89%					1%	5%			
n-m-sg	5%					90%					5%		
n-m-du	2%	7%					85%		4%	2%			
n-m-pl	2%	2%		12%			4%		43%	35%			2%
v-f-sg	82%					10%			8%				
v-f-du	8%	38%		2%		6%	1%		45%				
v-f-pl	13%	1%		18%		1%			67%				
v-m-sg	2%					98%							
v-m-du	3%					9%	40%		48%				
v-m-pl	6%					5%			89%				
Adults													
n-f-sg	100%												
n-f-du		89%		4%			7%						
n-f-pl				89%							11%		
n-m-sg						89%						11%	
n-m-du							82%		18%				

	f-sg	f-du	said twice	f-pl	num + pl	m-sg	m-du	said twice	m-pl- sa	m-pl- br	different br	repeat	num + sg
n-m-pl				14%	7%				14%	65%			
v-f-sg	86%					14%							
v-f-du	4%	21%				7%			68%				
v-f-pl	21%								79%				
v-m-sg						100%							
v-m-du						10%	18%		72%				
v-m-pl	4%					7%				89%			

Examining the errors produced by age group six and eight as shown in Table 24, we can see that these groups show a tendency toward producing novel feminine noun forms correctly more frequently than producing them in the masculine forms. For example, when the masculine form */dahsux/* دحشور is given to them by the experimenter, the feminine form */dahfura/* دحشورد is expected. When the feminine form */qita/* قيته is given to them, the masculine form */qit/* قيت is expected. It seems that forming the feminine form is easier than forming the masculine, possibly because feminine forms are created by adding a suffix, while masculine forms are created by omitting the suffix.

Errors produced by our participants also indicate that some errors occur across ages in the number system. Children use singular forms in place of obligatory dual forms, and this pattern seems to decrease with age. However, the use of plural forms instead of dual forms seems to increase with age. This result could be due to the fact that plural forms are not mastered at a young age; therefore, it seems easier for children to apply the singular

form than to apply the plural. Nevertheless, when their ability to use plural forms increases, the children start applying plural forms in place of duals.

Incorrect responses also show that sometimes participants repeat the given form. For example, when the form produced is in the feminine form */dahsur-ah/* and the form required is in the masculine form */dahsur/*, this error appears when the participant repeats the feminine form after it has been given to her/him. This error type is detected only in the performances of age group six.

Another interesting error detected is when different plural forms are produced. In these cases, mainly feminine forms are changed into broken plural forms. This error appears more frequently in the performance of age group six and adults.

The participants also change the broken noun form into the feminine sound form. This error pattern increases with age up to the age of ten, and can be attributed to the possible fact that acquiring broken plural forms increases with age and that broken forms are learned item by item. Given that this category is using novel nouns and therefore the broken forms for the nouns investigated do not exist in the participants' memory, the participants could be applying the sound form. This type of error then decreases as detected in the performance of age group twelve and adults, but does not disappear completely from their performance.

Instead of applying the plural form, our two younger age groups use the number of nouns with the singular form. For example, they say */ʔarbaʕah dahsurah/* ('four' *dahsurah*) instead of saying */dahsur-a:t/* in the plural form. This incorrect response indicates that plural forms have not been mastered by the age of eight.

In the following paragraphs, errors produced by the participants while they are examined on verbs with novel noun stimuli is examined and discussed.

After examining the errors in general, we can see that children of age group six have some difficulties with gender subject-verb agreement; they switch between the feminine and the masculine verb forms. However, by the age of eight children begin to use each obligatory gender verb form in its correct place more frequently. By the age of ten, gender subject-verb agreement is produced correctly more frequently, mainly on the singular forms and not on the plural forms. Nevertheless, twelve-year-olds and adults produce some errors in gender subject-verb agreement, though not as frequently as the younger age groups do.

The results also indicate that the participants in age groups six and ten generally switch between the singular and plural forms frequently, and then this error type becomes less frequent around the age of twelve. This result can be attributed to the language input and CDS as discussed earlier; in the vernacular dialects dual verb forms usually take the plural form rather than the dual. Plural forms are changed to the singular form particularly by the participants in age groups six and adults. The data also show that the participants change the obligatory feminine verb forms into masculine verb forms. These results could be due to the language input and CDS as discussed earlier in relation to the verb forms referring to real noun subjects.

Overall, the incorrect responses in the novel category generally indicate that participants made fewer incorrect responses on feminine and singular nouns than on the other forms.

Discussion: Novel nouns

The results show that forming feminine forms seem to be easier than forming masculine forms, and this result could be due to the fact that creating a form by adding an affix is easier than forming it by omitting an affix (the feminine form is created by adding the feminine gender suffix, while the masculine noun was formed by omitting the suffix).

The findings also show that the dual form is usually changed into singular in the responses of the younger age groups, and then changed into plural forms by the older age groups. This result could be due to the language input and CDS, since according to Moerk (1992), the language input and CDS influences the acquisition of a form and the transfer of it into the long term memory. This result indicates as usual that the singular is produced earlier than the plural, probably attributable to the transparency and simplicity of the singular form. This result agrees with the work of Gathercole (1986), who points out that the interaction of the language input and CDS and the simplicity of the form influences its early acquisition.

Overregularization is also detected in that the broken plural forms are changed into sound feminine plural forms. This result is not surprising because the nouns tested in this category are all novel; therefore, their plural forms do not exist in participants' memories and thus they use the feminine plural form and not the masculine sound plural form (which is restricted to human nouns only). Finally, across our five age groups, the use of the masculine plural verb form is more frequent than the use of the feminine plural verb form. This may be due to the language input and CDS as argued earlier.

Overall, the verbs referring to novel nouns contain a similar pattern of errors to the verbs referring to real nouns. The nouns show a major difference in that feminine nouns are produced with fewer errors than masculine nouns.

7.5 General discussion

Across all categories examined for incorrect responses, all age groups show a tendency to use the correct subject gender while producing errors in the number. This result seems to agree with the results of other studies that show that the gender system is acquired earlier than the number system. For example, Mills (1985) reports that the German gender system is acquired at around the age of two, while the number system continues to score errors at around the age of four.

Though on the whole the participants tend to produce gender correctly, when they make errors they usually change the feminine form into the masculine form. This error type appears in the plural and dual, and in verbs referring to real and novel words. This result is argued earlier (p. 228, 233, 245, and 251) to be due to the simplicity and transparency of the masculine noun form, because it is not marked for gender while the other form is. According to Demuth (2003) learning a transparent form is easier than learning a less transparent form. The result is also related to the language input and CDS wherein the masculine plural is more frequent than the feminine form.

Overregularization is one of the patterns detected on real and novel nouns. This result is in agreement with those of Omar (1969) and Ravid & Farah(1999).

The data also show that on the dual forms, children use the number two with a singular or a plural form, and, as argued earlier (p. 233), this error type might indicate that though children learn at an early age that two things have a special form, they make mistakes while producing it because of the fact that dual forms are not frequently present in the input.

Quantified noun errors show that because plural forms are not completely mastered by children, age group 6 makes errors more frequently on the 3 to 10 plural category than on the 11+ singular category. This can be attributed to their command over singular forms at that young age.

With verb forms referring to real or novel nouns, the participants generally make more errors on the feminine plural verb forms. This could be due to the language input.

Errors are detected more frequently on inanimate and animal-verb agreement. This result is attributed earlier to the fact that agreement of animals and inanimates with verbs is an opaque form, because verb forms do not agree with the noun number. When the noun takes the plural form, the verb takes the feminine singular form. This would make this agreement form opaque and complex, and acquiring such forms, according to Dabrowska (2001), is usually late.

On the whole, participants score fewer errors on masculine forms than on feminine forms, with the exception of novel nouns, where they score fewer errors on feminine forms. As argued earlier, this could be due to fact that feminine forms are created by adding a suffix while masculine forms are created by omitting them.

In general, input frequency, CDS and the transparency of the form are the main reasons behind the smaller number of errors detected in this section of the study. In the

following chapter, the language input and its effect on early language productivity is examined and discussed.

Chapter 8

Longitudinal study

8.0 Introduction

In this section, longitudinal data are reported. Three children's production of Arabic has been recorded and analysed to gain further insight into young children's productivity, language input and CDS, children's grammatical errors, and adults' responses to ungrammatical forms.

8.1 Method

8.1.1 Participants

Three Saudi monolingual children--two girls and one boy--and their mothers or grandmothers participated in this part of the research. At the beginning of the data collection (tape recording), the ages of the children were: 1;4.0 (child # 1 R), 1;4.14 (child # 2 N), and 1;5.10 (child # 3 M). At the end of the data collection their ages were 4;4.22 (R), 2;6.0 (N), and 2;7.17 (M). Children were tape-recorded by their mother or another adult, usually the grandmother. The children's spontaneous speech was tape recorded while they played, ate, looked at a picture book, or engaged in an activity that involved talking.

8.1.2 Procedure

The mother or grandmother was asked to tape record the child once every two weeks, for three to four hours. The actual data collection was more sporadic. The recording for R took place twice a month at the beginning of the study; after three months of recording the adult recorded R once a month, and sometimes twice. The recordings for M and N took place approximately once a month. While the data for R are the most evenly spaced, the data for N and M provide a further glimpse into young children's speech abilities. Table 25 shows in **bold** the sessions for each child and *Italics the age that the child was tape recorded*.

Table 25. Shows the ages of our three participants across the tape recorded sessions.

Months:	child: R	N	M
16	1 <i>16:0</i>	1 <i>16:14</i>	
	2 <i>16:14</i>		
	3 <i>16:20</i>		
17	4 <i>17:2</i>	2 <i>17:1</i>	1 <i>17:0</i>
	5 <i>17:15</i>	3 <i>17:14</i>	
18	6 <i>18:6</i>	4 <i>18:0</i>	2 <i>18:0</i>
	7 <i>18:22</i>		
19	8 <i>19:0</i>	5 <i>19:0</i>	3 <i>19:0</i>
20	9 <i>20:11</i>	6 <i>20:0</i>	
21	10 <i>21:0</i>	7 <i>21:0</i>	
22	11 <i>22:27</i>		
23	12 <i>23:20</i>		
24			
25			
26			4 <i>26:5</i>

27		8 27:0	5 27:0
28		9 28:0	6 28:17
29			
30		10 30:0	7 30:4
		11 30:14	
31			8 31:17
40		13 40:0	
53		14 53:22	

8.2 Results

All the word types (verbs and nouns) with both types and tokens, and the forms used by the participants, are shown in Tables 26, 27, and 28. If a form occurred only immediately after adult use of that form, it is followed by “[I]” (imitation) in the charts. The following section reports on these data, starting with productive use of verbs by the three participants, followed by their productive use of noun forms.

8.2.1 Production of verbs

R’s productive verb forms:

By examining R’s verb forms, types and tokens, as shown in Table 26 we observe that R produces a total of 500 verb tokens within 51 different verbs (root type) across all sessions. To examine the data of her verb productivity, criteria that have been used in a number of studies (Gathercole, *et al.*, 2000) were applied at each session:

- 1) the child must have produced at least two verbs in the same morphological form;
- 2) at least one of these verbs must also appear or have appeared in another grammatical form. Out of R's 51 verb root types we detect only 24 verbs produced in two or more grammatical forms.

Table 26. Shows R's produced verbs, and their types and tokens.

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m-pl	Verbs used: /Root/ types (tokens)
16.0 month Tape 1	هاتي Bring (1)	-	-	-	-	طاح Fall (2) [I]	-	2 /2/ (3)
Types (tokens)	1 (1)					1 (2)		
16.14 month Tape 2	نامي Sleep (1)	قم Stand (2) [I] قول Say (3)	-	-	-	طاح Fall (12) جا Come (1)	-	5 /5/ (19)
Types (tokens)	1 (1)	2 (5)				2 (13)		
cumulati ve count	2 (2)	2 (5)				2 (15)		
16.20 Tape 3	* قومي Stand (2)	قم Stand (1)	-	-	-	-	-	1 /2/ (3)
Types (tokens)	1 (2)	1 (1)						

¹⁷ Abbreviations used, verbs (v), imperative form (imp), present tense (pres), past tense (past), plural form (pl), feminine form (f) and masculine form (m).

¹⁸ When the form first met productivity criterion.

Age and tape	v:imp/ f	v:imp /m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m- pl	Verbs used: /Root/ types (tokens)
cumulati ve count	3 (4)	2 (6)				2 (15)		
17.2 Tape 4	-	-	-	-	-	-	-	
Types (tokens)								
cumulati ve count	3 (4)	2 (6)				2 (15)		
17.15 Tape 5	(23) اتومر Stand (9) دورو turn	(1) افتح open-1	-	-	-	(16) طاح fall	-	3 /3/ (49)
Types (tokens)	2 (32)	1 (1)				1 (16)		
cumulati ve count	4 (36)	3 (7)				2 (31)		
18.6 Tape 6	(7) هاتي bring (1) تعالي come (2) فكي open -2	(2) افتح open-1 (7) حط put (1) دوح go	-	(1) باكل eat	(1) جت come	(28) طاح fall (10) سكب spill (30) نام sleep		11 /11/ (90)
Types (tokens)	3 (10)	3 (10)		1 (1)	1 (1)	3 (68)		
cumulati ve count	6 (46)	5 (17)		1 (1)	1 (1)	4 (99)		
18.22 Tape 7	(2) هاتي bring	(1) كا eat (1) قوم stand (1) تعال come	-	-	(1) راحت go	(4) طاح fall		6 /6/ (10)
Types (tokens)	1 (2)	3 (3)			1 (1)	1 (4)		

Age and tape	v:imp/ f	v:imp /m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m-pl	Verbs used: /Root/ types (tokens)
cumulative count	6 (48)	7 (20)			2 (2)	4 (103)		
19.0 Tape 8	(3) هاتي bring	-	-	-	(2) جت come (1) طاحت fall	(4) نام sleep (2) راح fall		5 /5/ (12)
Types (tokens)	1 (3)				2 (3)	2 (6)		
cumulative count	6 (51)	7 (20)			3 (5)	5 (109)		
20.11 Tape 9	(6) قومي stand (7) سكي shut (1) اطلعي ascend (2) هاتي bring (1) ارمي throw (1) افتحي open (1) حطي put (2) خدي take (1) نامي sleep (1) قولي say (1) كلي eat (1) كمي spill	(1) اسكت be quiet (1) نام sleep (1) روح go (3) سك shut (1) خد take (1) السس wear (1) كل eat (5) شوف look (16) افتح open (3) قوم stand	-	(1) يطير fly	(2) راحت go (2) نامت sleep (1) قعدت sit (3) اخدت take (1) طاحت fall	(1) راح go (7) نام sleep (1) طار fly (2) اكل eat (5) طاح fall	-	21 /33/ (84)
Types (tokens)	12 (25)	10 (33)		1 (1)	5 (9)	5 (16)		
cumulative count	15 (76)	15 (53)		2 (2)	6 (14)	7 (125)		

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m-pl	Verbs used: /Root/ types (tokens)
21.0 Tape 10	(1) قومي stand (1) سكي shut (1) افتحى open (1) دوقى taste (5) تعالى come (1) فكي open	(2) افتح open (3) انزل descend	(1) تلبس wea r	(1) ياكل eat	-	(1) راح go (1) نام sleep (4) اكل eat (3) طاح fall		11 /14/ (25)
Types (tokens)	6 (10)	2 (5)	1 (1)	1 (1)		4 (9)		
cumulati ve count	16 (86)	16 (58)	1 (1)	2 (3)	6 (14)	7 (143)		
22.27 Tape 11	(6) حطى put (1) شرفى look (3) سكي shut (1) سبي leave (4) كلمى talk to (address) (11) اخذى take (5) افتحى open (4) تعالى come (1) جيبى Bring	(7) افتح open (1) خذ take (1) سبب leave (1) تعال come	-	(1) ياكل eat (1) يفتح open (1) يجي come	(5) راحت go (1) طاحت fall (1) كبت spill	(4) طاح fall (1) اخذ take (1) راح go (1) نام sleep (1) اكل eat (1) لبس wear	-	16 /25/ (65)
Types (tokens)	9 (36)	4 (10)		3 (3)	3 (7)	6 (9)		
cumulati ve count	20 (122)	17 (68)		4 (6)	7 (21)	9 (152)		
23.20	(1) هاتى bring	-	-	(2) ياكل eat	(5) راحت go	(2) راح go	-	13

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m- pl	Verbs used: /Root/ types (tokens)
Tape 12	(2) شرفي look (3) افتحني open (2) غمصي shut eyes (2) نامي sleep (2) اوقفي stand (1) كلني address (4) استني wait			(2) برد answer		(3) طاح fall (1) نام sleep (1) جاء come		/15/ (33)
Types (tokens)	8 (17)			2 (4)	1 (5)	4 (7)		
cumulative count	24 (139)	17 (68)		5 (10)	7 (26)	9 (161)		
40.0 Tape 13	(2) شيلي carry (1) قومي stand (1) افتحني open	-	(1) نسوي do	(1) بيكي cry (4) بسوي do (2) يجي come (1) يحط put (2) بيني build (1) يلعب play (1) يدخل enter (10) يتكلم talk (1) يكون be (1) ينام sleep (1) يشرف look	(3) راحت go (1) نامت sleep (1) طلعت ascend (1) شافت look (1) خافت scared (1) هربت escape (1) جات come	(2) جاء come (4) راح go (2) فتح open (1) شاف look (1) لقي find (1) خاف scared (1) قفا close (1) قعد sit	(1) يتكلموا talk (1) ينظفوا clean	24 /34/ (59)

Age and tape	v:imp/ f	v:imp /m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m-pl	Verbs used: /Root/ types (tokens)
				(1) بهجري run (3) ياكل eat				
'Types (tokens)	3 (4)		1 (1)	13 (29)	7 (10)	8 (13)	2 (2)	
cumulative count	25 (143)	17 (68)	2 (2)	16 (39)	11 (36)	15 (192)	2 (2)	
53.22 Tape 14	(2) شرفي look	(1) تف,stand	-	(1) يهاب scared	(2) نامت sleep (1) بهزت prepare (1) اكلت eat (1) ماتت die (1) ركبت ride	(2) سوي do (1) ركب ride (1) رصي accept	(1) بهسلا was h (1) ياكل eat (1) بروحا go (1) يفر want	13 /15/ (18)
'Types (tokens)	1 (2)	1 (1)		1 (1)	5 (6)	3 (4)	4 (4)	
cumulative count	25 (145)	18 (69)	2 (2)	17 (40)	15 (42)	18 (196)	6 (6)	

On examining Table 26, it is clear that the first verb form meeting both criteria appears at 16.20 when R produces the imperative verb /gu:m/ "stand" قوم in the feminine form /gu:mi/ قومي and in the masculine form /gu:m/ قوم. The first criterion is met at an earlier age.

The second productive verb form detected is at 18.22, when R produces the past feminine form /raħat/ “go” راحت. This form meets criterion 1 when she produces “go” in the feminine past form and /ʒat/ “come” جت at 18.6 in the same grammatical form. The second criterion is met because she produces “go” at 18.6 in the masculine imperative form.

At 20.11, the past masculine form meets both productivity criterion when R produces /tɑ:r/ “fly” طار in the past masculine form amongst six other verbs produced in the same form. The second criterion is met at the same session when she produces /jaʔi:r/ “fly” يطير in the present masculine form. The present masculine form also meets both criteria at 20.11, when /jaʔi:r/ “fly” يطير is produced; the other verb produced in the same form is /ja:kul/ “eat” ياكل at 18.6. The other criterion is met at the same age when R produces “fly” in the masculine past tense form.

After investigating R’s productive forms between the ages of 16.0 and 23.20, we detect five productive verb forms: imperative masculine and feminine at 16.20; feminine past tense form at 18.22; and the masculine past with the masculine present tense forms at 20.11.

N's productive verb forms:

By examining N's verb forms, types and tokens, we observe that N produces a total of 106 verb tokens within 27 different verbs (root type) across all sessions, as shown in Table 27. To examine the verb productivity, the same criteria are applied.

Table 27. Shows N's produced verbs, and their types and tokens.

Age and tape	v:imp/ f	v:imp /m	v:pres/ f	v:pres/ m	v:pas/ f	v:pas/ m	v:pres/m -pl	Verbs used: /Root/ types (tokens)
16.14 Tape 1	-	-	-	-	-	-		
Types (tokens)								
17.1 Tape 2	-	-	-	-	-	طح fall (2)	-	1 /1/ (2)
Types (tokens)						1 (2)		
cumulative count						1 (2)		
17.14 Tape 3						طح fall (8)		1 /1/ (8)
Types (tokens)						1 (8)		
cumulative count						1 (10)		
18.0 Tape 4	-	-	-	-	-	(3) راح go (6) طح fall		2 /2/ (9)

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m -pl	Verbs used: /Root/ types (tokens)
								(2)
'Types (tokens)	1 (2)							
cumulative count	8 (20)				3 (14)	2 (38)		
28:0 Tape 9	(2) اسمعي listen	-	-	-	(7) راحت go (3) رقت, ascend	(1) طلع leave (1) شد pull (5) راح go		
'Types (tokens)	1 (2)				2 (10)	3 (7)		
cumulative count	9 (22)				4 (24)	3 (45)		
30:0 Tape 10	-	-	-	-	-	(2) سافر travel		1 /1/ (2)
'Types (tokens)						1 (2)		
cumulative count	9 (22)				4 (24)	4 (47)		
30:14 Tape 11	(1) اقرأي read (1) اوقفني stand (1) صلي pray (1) تعالي come (1) شرفني look (1) استني wait (1) ارفعني lift up	-	(1) نسمع listen (1) تضرب hit	-	(1) راحت go (1) صاحت cry	-	-	11 /1/ (11)

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m -pl	Verbs used: /Root/ types (tokens)
Types (tokens)	7 (7)		2 (2)		2 (2)			
cumulative count	15 (29)		3 (4)		5 (26)	4 (47)		

On examining Table 27 we detect that the first two verb forms that meet both criteria appear at 19.0, when N produces /ra:h/ “go” راح and /ʔa:h/ “fall” طاح in the masculine past tense form, which means criterion 1 has been met. She meets criterion 2 at the same age when she produces /ra:hat/ “go” راحت and /ʔa:hat/ “fall” طاحت in the feminine past tense form. In this case we observe that both forms become productive at the same age.

At 20.0, N produces the third productive form, the feminine imperative. The feminine imperative meets criterion 1 when N produces /na:mi/ “sleep” نامي and /ha:ti/ “bring” هاتي in the imperative form. Criterion 2 is met at the age of 20.0 when N produces /na:mat/ “sleep” نامت in the feminine past tense form.

After examining N’s productive forms we detect three productive forms; the first two are the feminine and masculine past tense forms and they appear at 19.0. At 20.0, the feminine imperative form also becomes productive.

M's productive verb forms:

The verb data of the third child, M, are shown in Table 28. We observe that M produces a total of 151 verb tokens within 46 different verb types across the sessions. The same criteria are applied to examine M's productivity.

Table 28. Shows M's produced verbs, and their types and tokens.

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m-pl	v:imp/m-pl	Verbs used: /Root/ types (tokens)
17.0 Tape 1						(4) طاح Fall			1 /1/ (4)
Types (tokens)						1 (4)			
18.0 Tape 2		(12) طيح Fall				(8) طاح Fall (1) راح go			2 /3/ (21)
Types (tokens)		1 (12)				2 (9)			
cumulative count		1 (12)				2 (13)			
19.0 Tape 3		-	-	-	-	-	-		-
Types (tokens)									
cumulative count		1 (12)				2 (13)			
26.5 Tape 4	(2) شرفي look (4) كلي eat	(2) افتح open (1) شرف look (2) دخر	(1) تقول say	(1) يلعب play (1) يرخر remove	(7) راحت go	(9) راح go (2) دق knock			14 /13/ (36)

Age and tape	v:imp/ f	v:imp/ m	v:pres/ f	v:pres/ m	v:pas/ f	v:pas/ m	v:pres/m-pl	v:imp/m-pl	Verbs used: /Root/ types (tokens)
	(1) جبي bring	remove							
	(2) قومي stand								
	(1) اميني stay away								
Types (tokens)	5 (10)	3 (5)	1 (1)	2 (2)	1 (7)	2 (11)			
cumulative count	5 (10)	4 (17)	1 (1)	2 (2)	1 (7)	3 (24)			
27.0 Tape 5	(1) قولي say (1) شودي look (1) جبي bring (1) سيبي releas e	(1) حيب bring	(1) تلعب play	(1) یركب ride (1) یرور hurt	(8) راحت go	(1) راح go (1) نام sleep (1) طباب heal (1) یرخل enter			13 /10/ (20)
Types (tokens)	4 (4)	1 (1)	1 (1)	2 (2)	1 (8)	4 (4)			
cumulative count	7 (14)	5 (18)	2 (2)	3 (4)	1 (15)	6 (28)			
28.0 Tape 6	(2) شودي look (1) کلمي address	-	(1) سبح swim (1) تاکا cat (2) تروح go	(1) یركب ride (2) يسبح swim (2) یرول say	(3) راحت go (1) وقت stand	(2) نط jump (2) سافر travel (4) راح go		(2) شودوا look	/18/ 14 (117)

Age and tape	v:imp/ f	v:imp /m	v:pres/ f	v:pres/ m	v:past/ f	v:past/ m	v:pres/m-pl	v:imp/m-pl	Verbs used: /Root/ types (tokens)
	(3) اتمني sit		(7) تقول say (1) نسوي do (1) تلعب do						
Types (tokens)	3 (6)		6 (13)	3 (5)	2 (4)	6 (6)		1 (2)	
cumulative count	9 (20)	5 (18)	6 (15)	6 (9)	2 (19)	8 (34)		1 (2)	
30.4 Tape 7	(1) قولاي say		(3) تعطي give (1) تقول say	(3) بقول say (2) بقرا read		(3) نط jump (1) نام sleep			/7/ 4 (14)
Types (tokens)	1 (1)		2 (4)	2 (5)		2 (4)			
cumulative count	9 (21)	5 (18)	7 (19)	7 (14)	2 (19)	8 (38)		1 (2)	
31.17 Tape 8	(2) خدي take (2) شومي look (1) اركي Ride (1) كلي eat (2) استني wait		(1) تقول say	(1) بركب ride	(2) راحت go	(1) شري buy (3) سوي do (1) عمل work (1) ركب ride (1) راح go (1) نط jump			/14/ 11 (20)
Types (tokens)	5 (8)		1 (1)	1 (1)	1 (2)	6 (8)			
cumulative count	12 (29)	5 (18)	7 (20)	7 (15)	2 (21)	12 (46)		1 (2)	

M's data show that the first productive form detected is the masculine past tense, which he produces at the age of 18.0. The first criterion is met when M produces /ra:h/ "go" راح in the masculine past tense at the same age that he produces "fall". The second criterion is met at the same age as well, when he produces /t:i:h/ "fall" طيح in the masculine imperative form.

Between session 3 (19.0) and session 4 (26.0) there is a seven-month gap in the tape recording of M. The data then show that at 26.0, the masculine and feminine imperative forms meet the productivity criteria, when /ʃu:f/ "look" شوف is produced in the masculine form along with three other verbs produced in the same grammatical form. The second criterion is met when M produces /ʃu:fi/ "fall" شوفى in the imperative feminine form.

At 27.0, the feminine present tense meets both productivity criteria. The first criterion is met when M produces /taʃab/ "play" تلعب in the feminine present tense with another verb in the same grammatical form. The second criterion is also met at an earlier session when he produces /jaʃab/ "play" يلعب in the masculine present tense form. However, the masculine present tense meets the productivity criteria at a later session, when at 28.0 M produces /jaʃab/ "swim" يسبح in the masculine present tense form, and by this stage he has produced five other verbs in the same grammatical form. The second criterion is met at the same age when he produces /taʃab/ "swim" تسبح in the feminine

present tense. The feminine past tense becomes productive as well at the age of 28.0 when he produces the verb “go” in this form.

After investigating M’s productive forms, the data show that the first form in his data that meets the productivity criteria is the masculine past tense form at 18.0. Then the masculine and feminine imperative forms are detected and become productive forms at 26.0. The feminine present tense meets the productivity criteria at 27.0. The last two productive forms detected in M’s data are the feminine past tense and masculine present tense forms at the age of 28.0

The productivity data of the three children (shown in Table 29) suggest some differences in the order of emerging productive forms. The results show that both masculine and feminine imperative forms are first produced productively in R’s speech at 16.20, and in M’s speech at 26.0; however, in N’s speech only the feminine imperative form is productive at 20.0 while the masculine imperative form is not detected in her production.

Past tense productivity is also detected early in R’s production, at 18.2, the feminine past tense meets both criteria, yet masculine form productivity is detected at 20.11. N’s results, however, show that the masculine and feminine past tense are both productive at 19.0. M’s results indicate that the masculine past tense meets the productivity criteria earlier than the feminine past tense does. M’s results disagree with R’s results, since the present tense forms meet the productivity criteria for the masculine form in R’s production at 20.0 and it does not meet them for the feminine form except at a later stage. Still, in M’s production the feminine present tense is considered productive at 27.0 while

the masculine form meets the criteria at a later session--28.0. The present tense does not appear productive in N's data.

Table 29. The productive forms detected summed by age and child.

Verb Form	Age form appeared		
	R	N	M
Feminine imperative	16.20	20.0	26.0
Masculine imperative	16.20		26.0
Feminine past	18.22	19.0	28.0
Masculine past	20.11	19.0	18.0
Feminine present	20.11		27.0
Masculine present	-		28.0

The differences detected in the productivity results could be due to the language input and CDS the children are exposed to. Adults' input (types and tokens) will be examined and discussed in the following section.

8.2.2 Adults' language input (verbs types and tokens)

Language input, CDS and the environment children are exposed to affect their language acquisition by supporting or counteracting whatever processing biases the child may bring to the task (Tardif, 1996). In this section, adults' language input (types and tokens) is examined and compared with the children's types and tokens separately. The data examined will start with child R.

R's input and CDS

Table 30 shows the types and tokens for both the adult and R during each session separately.

Table 30. Shows R's and the Adult's types and tokens.

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Tape 1 (16.0)									
Types	R	1	-			-	1		
	adult	3	-	1	1	-	1		
Tokens	R	1	-			-	2		
	adult	7	-	2	4	-	2		
Tape 2 (16.14)									
Types	R	1	2	-	-	-	2		
	adult	8	1	1	1	1	1		
Tokens	R	1	5	-	-	-	13		
	adult	40	1	8	14	1	1		
Tape 3 (16.20)									
Types	R	1	1	-	-	-	-		
	adult	13	3	2	5	1	3		
Tokens	R	2	1	-	-	-	-		
	adult	61	4	2	8	1	5		
Tape 4 (17.2)									
Types	R	-	-	-	-	-	-		
	adult	15	3	1	1	3	2		
Tokens	R	-	-	-	-	-	-		
	adult	96	4	9	2	3	2		

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Tape 5 (17.15)									
Types	R	2	1	-	-	-	1		
	adult	17	2	2	4	5	-	4	
Tokens	R	32	1	-	-	-	16		
	adult	106	5	9	18	7	-	4	
Tape 6 (18.6)									
Types	R	3	3	-	1	1	3		
	adult	21	5	3	10	2	2		
Tokens	R	10	10	-	1	1	68		
	adult	146	9	17	30	7	10		
Tape 7 (18.22)									
Types	R	1	3	-	-	1	1		
	adult	16	6	2	2	2	4	1	
Tokens	R	2	3	-	-	1	4		
	adult	132	12	13	13	5	4	1	
Tape 8 (19.0)									
Types	R	1	-	-	-	2	2		
	adult	5	1	-	5	-	6		
Tokens	R	3	-	-	-	3	6		
	adult	11	2	-	5	-	7		
Tape 9 (20.11)									
Types	R	12	10	-	1	5	5		
	adult	23	13	7	11	10	22		1
Tokens	R	25	33	-	1	9	16		
	adult	140	20	10	18	24	45		2

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Tape 10 (21.0)									
Types	R	6	2	1	1	-	4		
	adult	15	6	4	7	3	9		1
Tokens	R	10	5	1	1	-	9		
	adult	73	8	10	26	5	30		4
Tape 11 (22.27)									
Types	R	9	4	-	3	3	6		
	adult	26	10	7	24	7	11	3	1
Tokens	R	36	4	-	3	7	9		
	adult	101	10	10	34	11	20	3	1
Tape 12 (23.20)									
Types	R	8	-	-	2	1	4		
	adult	7	1	5	13	10	8		
Tokens	R	17	-	-	4	5	7		
	adult	25	1	7	22	14	13		
Adult's cumulative count									
		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Types		59	25	33	24	26	29	5	2
Tokens		938	76	97	194	78	139	8	7

By investigating R's verb productivity and the verb input she has been exposed to, we detect that the highest frequency (types and tokens) she has been exposed to is the feminine imperative form, which is the first form that meets the productivity criterion (at the age of 16.20). Looking at the adults' types and tokens when R is 16.20, we can see that the feminine imperative forms score the highest types and tokens.

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
	adult	-	-	-	1	2	2		
Tape 2 (17.1)									
Types	N	-	-	-	-	-	1		
	adult	5	2	1	-	-	1		
Tokens	N	-	-	-	-	-	2		
	adult	21	3	1	-	-	1		
Tape 3 (17.14)									
Types	N	-	-	-	-	-	1		
	adult	11	1	2	-	-	1		
Tokens	N	-	-	-	-	-	8		
	adult	37	2	1	-	-	6		
Tape 4 (18.0)									
Types	N	-	-	-	-	-	2		
	adult	3	-	-	1	2	-		
Tokens	N	-	-	-	-	-	9		
	adult	8	-	-	1	4	-		
Tape 5 (19.0)									
Types	N	1	-	1	-	2	2		
	adult	11	-	1	-	2	-		
Tokens	N	1	-	2	-	10	5		
	adult	20	-	2	-	8	-		
Tape 6 (20.0)									
Types	N	5	-	-	-	1	1		
	adult	14	-	-	-	4	3		
Tokens	N	10	-	-	-	4	14		

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
	adult	26	-	-	-	16	4		
Tape 7 (21.0)									
Types	N	1	-	-	-	-	-		
	adult	-	-	-	-	-	-		
Tokens	N	4	-	-	-	-	-		
	adult	-	-	-	-	-	-		
Tape 8 (27.0)									
Types	N	1	-	-	-	-	-		
	adult	3	-	2	1	2	1		
Tokens	N	2	-	-	-	-	-		
	adult	6	-	9	1	2	1		
Tape 9 (28.0)									
Types	n	1	-	-	-	2	3		
	adult	-	-	-	-	1	2		
Tokens	N	2	-	-	-	10	7		
	adult	-	-	-	-	3	3		
Tape 10 (30.0)									
Types	N	-	-	-	-	-	1		
	adult	-	-	-	-	-	-		
Tokens	N	-	-	-	-	-	2		
	adult	-	-	-	-	-	-		
Tape 11 (30.0)									
Types	N	7	-	2	-	2	-		
	adult	11	-	2	1	5	5		
Tokens	N	7	-	2	-	2	-		

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
	adult	24	-	4	1	7	7		
Adult's cumulative count									
		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
types		27	3	5	4	9	5		
tokens		142	5	17	4	42	24		

When examining N's input and CDS we detect that the highest verb form produced by adults is the feminine imperative form (27 types, 142 tokens), followed by the feminine past tense form (9 types, 42 tokens). The language input N has been exposed to until 30.0 months of age does not contain any plural or dual verb forms.

N's verb productivity is also investigated in light of the language input and CDS, and the results show that the three forms with the highest type and token frequencies in the input and CDS are the same three productive forms detected in N's verb production. This result might imply that she is able to produce these forms productively because she has been exposed to them more frequently than to the other forms.

M's input and CDS

M's language input and his verb production (types and tokens) are shown in Table

32.

Table 32. Shows M's and the Adult's types and tokens.

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Tape 1 (17.0)									
Types	M	-	-	-	-	-	1		
	adult		9		1		4		
Tokens	M	-	-	-	-	-	4		
	adult		29		1		6		
Tape 2 (18.0)									
Types	M	-	1	-	-	-	2		
	adult		5	2	6	1	3		
Tokens	M	-	2	-	-	-	9		
	adult		33	5	8	1	7		
Tape 3 (19.0)									
Types	M	-	-	-	-	-	-		
	adult	1	13	1	3	-	1		
Tokens	M	-	-	-	-	-	-		
	adult	1	73	4	13	-	1		
Tape 4 (26.0)									
Types	M	5	3	1	2	1	2		
	adult	2	11	1	8	2	3		
Tokens	M	10	5	1	2	7	11		
	adult	2	82	1	15	8	19		
Tape 5 (27.0)									
Types	M	4	1	1	2	1	4		
	adult	3	14	8	13	5	11		
Tokens	M	4	1	1	2	8	4		
	adult	5	50	16	32	16	26		

		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Tape 6 (28.0)									
Types	M	3	-	6	3	2	6		
	adult	2	8	7	15	3	6		
Tokens	M	6	-	13	5	4	6		
	adult	2	34	19	28	4	20		
Tape 7 (30.4)									
Types	M	1	-	2	2	-	2		
	adult	-	3	3	3	-	2		
Tokens	M	1	-	4	5	-	4		
	adult	-	5	9	7	-	2		
Tape 8 (31.17)									
Types	M	5	-	1	1	1	6		
	adult	-	11	2	5	1	3		
Tokens	M	8	-	1	1	2	8		
	adult	-	32	2	10	1	6		
Adult's cumulative count									
		imp-f	imp-m	pres-f	pres-m	past-f	past-m	m-pres-pl	m-past-pl
Types		8	32	13	30	8	19		
Tokens		10	338	56	114	30	87		

M's input data show that the highest frequency of types and tokens detected is in the masculine imperative form (32 types, 338 tokens), followed by the masculine present tense (30 types, 114 tokens), and then the masculine past tense form (19 types, 87 tokens). Dual and plural verb forms are not detected in M's language input and CDS.

With regard to the language input and M's verb productivity, the results show that the first productive form produced by M is the masculine past tense; however, the masculine past tense in the input and CDS does exist but not as high as the masculine imperative. The masculine and feminine imperative forms reach the productivity criteria at 26.0, and with regard to the input and CDS, the masculine imperative has the highest types and tokens detected.

Overall, the early productive forms produced by M do not occur hand in hand with the CDS as they do with children R and N, as seen in tables 31 and 32 the first productive forms in the production of each child was one of the frequent forms produced by adults in their direct speech to the child. For example, child R reached productivity criterion on the feminine imperative form before the other verb forms (and this form was the most frequent verb form detected in the adults direct speech to the child) while child N reached productivity level on both feminine and masculine past tense, which she was exposed to frequently in her input.

Summary

In terms of the productivity and language input and CDS for the three children investigated in this study, we find that the imperative forms have overall the highest types and tokens recorded; therefore, the imperative forms become productive in the three participants at an early stage. The findings also show that the feminine and masculine imperative forms become productive at around the same age in general. On the other forms, both genders reach the productivity criteria at the same age or at a relatively close time to each other. For example, in M's production, the feminine present tense becomes

productive at 27.0, while the masculine present tense follows in productivity after a month at 28.0.

The order of productive verb forms emerging shows differences across the three children. The language input and CDS data also show differences; and these differences could be the main reason behind the differences in the rate and order of production and productivity between our participants.

Our results also indicate that the past tense reaches the productivity criteria before the present tense. This result could be attributed to the fact that the masculine past tense is an unmarked form, while the feminine is marked for gender by a suffix. The present tense forms are marked for gender by prefixes (see Chapter 2), and according to Slobin (1985, b), children usually pay attention to ends of the words; therefore, the past tense might have been easier to produce than the present tense. This result (past tense productive before present tense) could not be attributed to the language input and CDS, because the present tense in the input and CDS of two of our participants generally had higher types and tokens than the past tense, but in this case it seems that the form of the past tense is behind the early acquisition of the past tense over the present tense.

In the following section the incorrect forms produced by the children are examined and discussed.

8.2.3 Incorrect grammatical forms

Incorrect types produced by our three longitudinal participants are grouped into different categories, starting with grammatical word types. The children produce mostly

subject-verb and subject-adjective agreement incorrectly. We will start with R's data within the correct use of word types.

8.2.3.1 Incorrect use of word types

For R, most of the individual word types used incorrectly are imperative verb forms. This is the first incorrect form used by R; at the age of 17.15 while talking to her mother she says /ħuʔ/ ('put') and /ħiftaħ/ ('open') in the masculine form when it should have been produced in the feminine form. We detect this error in R's production up until the age of 22.27, and it is always using the masculine imperative form in place of the feminine. This incorrect type of error does not occur frequently in N and M's production.

The data also reveal that infrequently our participants use a plural noun form in place of an obligatory singular form; for example, they say /ħajawan-at/ ('animals'-pl) in place of /ħajawan/ ('animal'-sg). However, singular noun and verb forms are produced mainly in the singular form rather than in plural forms, as seen in Tables 26, 27, and 28.

8.2.3.2 Incorrect syntactical use of subject agreement

We investigated two types of syntactical agreement produced by our three participants: incorrect subject-verb agreement and incorrect subject-adjective agreement.

a) Subject-verb agreement

Incorrect subject-verb agreement occurs in the recorded production of our three participants. In the next section, errors produced by the three children are presented in the following order: R, N, and M respectively.

R's incorrect subject-verb agreement errors

The data from R begin when she is at the age of 16.0. From that age until she was 17.2 the data do not show any syntactical forms produced. Her first incorrect form occurs at the age of 17.15, when she says /tʰa:h ʃamʕ-ah/ ('fell'-m 'candle'-f) 'The candle fell'; in this case she produces the verb in the masculine past tense form, and the noun 'candle' in the feminine form, whereas an adult would say /tʰa:h-at a1-ʃamʕah/ ('fell'-f 'candle'-f) all in the feminine form. Alternatively, an adult would say / a1ʃamʕ tʰa:h / ('candle'-m 'fell'-m) with both the verb and the noun in the masculine form.

This incorrect form appears across R's data until she is 23.20, and usually the adult with her corrects her error by repeating the sentence in the correct form; for example, when R says /iʃ-ʃams ra:h/ ('sun'-f 'left'-m), the mother immediately says /iʃ-ʃams ra:h-at/ ('sun'-f 'left'-f) (here the subject and verb are in agreement). Sometimes R repeats the correct form after the adult.

N's incorrect subject-verb agreement errors

N's first audio tape is at the age of 17.0 and we do not detect syntactical forms in her data. At 18.0, she makes her first incorrect subject agreement when she says /hama:m-a tʰa:h/ ('pigeon'-f 'fell'-m) "the pigeon fell". The correct form should be /hama:m-a tʰa:h-at/ ('pigeon'-f 'fell'-f) with both subject and verb in the feminine form. On the whole, we do not detect many incorrect syntactical forms in N's recorded data.

M's subject-verb agreement errors

M's audio recording begins when he is at the age of 17.0, and we do not detect any incorrect subject-verb forms up until the age of 28.17, at which point he is explaining a picture and says /ʔarnab ta-kul ʒazr/ ('rabbit'-m f-'eating carrots'). The correct form is /il-ʔarnab ja-kul ʒazar/ ('rabbit'-m m-'eating carrots'), with subject-verb agreement all in the masculine forms. However, this type of error does not occur frequently in M's data.

On the whole, this type of incorrect production is detected more frequently in R's data than in N's and M's data. The data do not show frequent responses to N and M's incorrect forms as detected in R's data. However, R's recorded findings include more frequent correct forms than N's and M's production.

b) Subject-adjective agreement

Incorrect subject-adjective agreement is also detected in the data of our three participants. In the next section, errors produced by R, N, and M respectively are presented.

R's incorrect subject-adjective agreement errors

The first incorrect form detected in R's production is at the age of 20.11, when she says /jad wisx/ ('hand'-f 'dirty'-m), whereas the correct form is /jad wisx-ah/ ('hand'-f 'dirty'-f) all in the feminine form. This incorrect response is understandable at this young age because this feminine noun form does not have a gender suffix and therefore might be harder to acquire. Still, at the age of 23.20, she produces the incorrect agreement even

with a feminine suffixed noun /ʔuʔa kabir/ ('cat'-f 'big'-m) (the correct form is /ʔuʔa kabirah/ ('cat'-f 'big'-f), all in the feminine form. On the whole, in R's recorded production errors in subject-adjective agreement do not occur as frequently as errors in subject-verb agreement. .

M's subject-adjective agreement errors

The first case of incorrect subject-adjective agreement detected in M's production is at the age of 27.0, when he says /ʕasfur hilwa/ ('bird'-m 'pretty'-f) whereas the correct form is /ʕasfur hilw/ ('bird'-m 'pretty'-m) all in the masculine form. This incorrect production is detected across M's recorded sessions; however, it is detected less frequently than incorrect subject-verb agreement.

This incorrect production agreement is not detected in N's recorded sessions.

In terms of the incorrect forms produced by our participants, in general, the three children's incorrect production indicates subject-verb agreement and subject-adjective agreement are not fully mastered at this young age, even though correct syntactical forms are detected more frequently across their recorded sessions.

Follow up on R's productive verb forms (40.0 and 53.22 months of age)

As shown earlier (Table 26), R's tape-recorded sessions continue until she is 23.20 months of age. Then the mother resumes recording R's language once more when she is 40.0, and then again when she is 53.0. Verbs produced by R in these two sessions are shown in Table 26 with the data for the other sessions. As explained earlier, the productive verb forms detected in R's language production until she is 23.20 are the masculine and feminine imperative verb forms, feminine and masculine past tense, and the masculine present tense. All these forms are in the singular.

At 40.0, the feminine present tense in the singular form becomes productive. R's late productivity on the feminine present tense could be attributed to the fact that the present tense is marked for gender by a prefix. It could also be attributed to the language input and CDS, wherein the feminine present tense is not detected as frequently as the masculine form.

The masculine present tense in the plural form also reaches the productivity criteria at 40.0. This result could be attributed to the language input and CDS, since this form is not detected in the input and CDS as frequently as the singular forms. The late productivity acquisition of the plural form could also be due to the fact that at this age, the child might have had more opportunities to talk about collective subjects and objects than they have had before (Rubino & Pine, 1998).

The same types of errors occur in R's production at 40.0. Yet, we do not detect any of the error types investigated in our study in her production at 53.0 months of age. This might indicate that by 4;5 years of age, she is able to produce the gender system and

subject-verb and subject-adjective agreement in her spontaneous speech without frequent errors.

On the whole, R's productivity results show that by 40.0 months of age, singular verb forms reach productivity criteria, while the plural verb forms start to become productive at this age.

8.3 Discussion

The pattern of producing productive forms differs among our three participants. Child #1, R's, pattern is (f + m imp → f + m past → m pres → f pres); child #2, N's, pattern is (f + m past → f imp); and finally, child #3, M's, pattern shows (m past → f + m imp → f pres → f past + m pres). These different productivity patterns produced by the children show in general that imperative forms become productive at an early stage, which, accordingly the input and CDS results, could be attributed to the language input, since the highest input types and tokens detected in our study are in the imperative forms. These results are in agreement with those of Leonard & Swanson (1999) and Ragnarsdottir, *et.al.* (1999). In their studies they have pointed out the effect of language input on acquiring English plurals and Icelandic and Norwegian inflections respectively. They have indicated that the more frequently a form appears in the input, the earlier it is acquired.

Our results are also in agreement with those of Ninio (1999), who indicates that most early verbs produced by children are the same verbs provided frequently in the input by mothers.

The results of the present study show overall that the verb tense system begins to be productive by the age of two. Demuth (2003) reports that the Bantu verbal inflection is productive before the age of three. This result shows a later productivity system than that found in Arabic. Demuth's argument is that the late productivity found in Bantu is related to its rich and complex tense/aspect marking system.

Children learning the Arabic verb system show some early productive forms at around the age of 16.20, but they also use incorrect forms. As explained earlier, we have examined two main types of incorrect production: the first is the use of incorrect word forms, and the second is subject-verb and subject-adjective agreement. The main error in word type detected is the use of the masculine imperative form instead of the feminine imperative form, particularly in R's data. It is difficult to attribute this error type to language input and CDS, because the feminine imperative form is recorded in higher frequency of types and tokens in the input as compared to the frequency of the masculine imperative. Therefore, it could be attributed to the fact that the masculine imperative is unmarked for gender, which might make it easier to master and produce.

Incorrect subject-verb and subject-adjective agreement is detected, and yet correct agreement is also frequent in our participants' data. This result is compatible with that of Rubino & Pine (1998), whose data show low overall error rates in the production of subject-verb agreement. Our results also indicate a higher frequency of singular forms in comparison to plural forms; this result is in agreement with the works of Caselli, Leonard, Volterra & Campagnoli (1993) and Rubino & Pine (1998), who have stated that singular forms are used with higher frequency than plural forms.

The results also show that plural forms do not frequently occur in our recorded data. This could be simply because children have fewer occasions to make reference to collections of people or things in their speech (Rubino & Pine, 1998) in comparison to the chances they have to produce singular forms.

Overall, the data regarding productive forms and incorrect productions underscore the important role of the language input and CDS and its effect on early or late production and productive forms.

Chapter 9

General Discussion

9.0 Introduction

In this thesis, three studies were conducted with the aim of examining the rate and order of acquisition of Arabic gender and number systems in Saudi children. The first study investigated participants' comprehension through a picture selection test. The second study investigated production through an elicited production test, which included both real and novel words. The third study was a longitudinal study, in which productivity, language input and CDS, and the errors produced by three children were investigated.

The results indicated by the main effects of the variables tested for comprehension and production are summarised in Table 33.

Table 33. A summary of the comprehension and production results, summed by Nouns, Adjectives, Verbs, Collectives and Quantified Nouns.

		Comprehension	Production
h & an nouns	animacy	h > a	h > a
	numbers	sg = du > pl	sg > du > pl
	age group	6 < 8, 10, 12 and Adults.	6 < 8 = 10 = 12 = Adults
	noun gender	-	m > f
Adjectives	animacy	h > a > in	h = in > an
	gender	f > m	m > f

		Comprehension	Production
	numbers	sg = du > pl	sg > pl > du
	age group	6 < 8 < 10 ≤ ¹⁹ 12 = Adults.	6 < 8 ≤ 10 < 12 = Adults
Verbs	gender	m > f	m > f
	animacy	h = a > in	h > in > an
	numbers	sg > du > pl	sg > pl > du
	age group	6 < 8 < 10 < 12 = Adults.	6 < 8 ≤ 10 = 12 < Adults.
Collectives	word type	n > adj > v	-
	animacy	in > an	in > an
	number	m > f	f > m
	age group	6 < 8 ≤ 10 = 12 = Adults.	6 < 8 = 10 = 12 = Adults.
f nouns with out overt gender	word type	adj > v	-
	numbers	du > pl	sg > du = pl
	age group	6 < 8 = 10 < 12 = Adults.	6 = 8 < 10 ≤ 12 = Adults
Quantified nouns	animacy	-	in > an > h
	number	-	3-10 > 11+
	age group	-	6 < 8 < 10 = 12 < Adults.

In the sections that follow, these results are discussed with regard to their overall implications for Arabic acquisition in particular, and for language in general. We will

¹⁹ When this symbol is used (≤) we mean that the form has an equivalent mastery with the form (or age) immediately following it, but lower than any subsequent form (or age). For example, 10 ≤ 12 = Adults means that the performance of age group 10 is equivalent to age group 12 but less than Adults, while age group 12 performed equivalently to the Adult group.

start with comprehension results and then production, followed by productivity and language input and CDS in the longitudinal study.

9.1 Comprehension

In the following section we will examine our hypotheses in light of the comprehension results.

Our first hypothesis, that masculine gender agreement with singular and dual would be acquired earlier than feminine gender agreement with singular and dual, but that feminine gender agreement with the plural would be acquired earlier than the masculine forms, is generally unsupported by the results of this study. On the basis of the noun category examined during this study, the results show that the participants perform better on the masculine singular than on the feminine singular. For the dual forms they perform better on the feminine duals than on the masculine duals. On the plural forms they perform equally on both genders.

The results regarding dual and plural forms are unexpected. It has already been pointed out that this is because the masculine dual form is marked only for number, while the feminine dual form is marked for both gender and number. Thus, the reason behind the easier comprehension of the feminine form could be that it is more transparent than the masculine form, primarily because the feminine gender and the dual suffix are clear on the noun.

The results do not support the second part of the hypothesis regarding the earlier acquisition of feminine plural forms than masculine plural forms. This result could reflect the frequency of the broken form for masculine plural forms. This would support the position that complex forms that are frequent in the input are not necessarily acquired later than simple forms (Gathercole, 1999; Dabrowska, 2001).

Our second hypothesis, that singular forms would be acquired earlier than dual and plural forms is supported by the results. Overall, our results indicate that the participants comprehend the singular forms of nouns, adjectives, and verbs better than the dual forms, and similarly they comprehend the dual forms better than the plural forms. This result is not surprising since both singular and dual forms are considered transparent, and some studies suggest that the acquisition of transparent forms usually occurs earlier than stem-alternating forms (Dabrowska, 2001; Demuth, 2003).

The results show that the participants comprehend singular and dual forms better than plural forms. This result is as expected; other studies investigating different languages have drawn similar conclusions. The singular is acquired earlier than plural forms in the case of German (Mills, 1985). The results regarding Arabic plural forms might be due to the fact that plural forms take more than one form; that some of its forms are restricted to one animacy type (the sound masculine plural is restricted to human nouns); and that some forms are infrequent in the vernacular language input and CDS (e.g., the feminine plural verb form). In our results we find that the dual form is comprehended better than the plural. However, Al-Akeel (1998) found that three-year-old children confuse the plural and dual forms and do not distinguish between them. The

differences between our results and his might be due to the age differences of our participants; our participants are older than Al-Akeel's participants.

Collective forms are the only exception to this hypothesis. The participants comprehend the collective referent better than the unit referent, which could be due to the fact that the collective referent form is unmarked while the unit referent form is marked.

Our third hypothesis, that plural forms would be acquired earlier than dual forms, is unsupported by the results. The comprehension test results show that the participants on the whole comprehend dual forms better than plurals. This result could be attributed to the simplicity of the dual form and to the fact that it is considered a salient form. The dual suffix morpheme /a:ʔ/ is similar to the number two ending /ʔiθn a:ʔ/, and this might be the reason that the dual form is comprehended better than the plurals--which have more than one form depending on gender agreement (see Chapter 2). Plural formations also differ depending on word type (nouns and adjectives, or verbs). Verbs referring to masculine animals and inanimate subjects do not take the plural form (they take instead the feminine singular). Although plural forms are more frequent in the language input and CDS than duals are, our participants comprehend duals better than plurals. This could be attributed to the fact that there is a clear connection between the meaning (dual in Arabic) and the clear context (the ending on the number two) (Peters, 1985), while in the plural form there is no connection between the form and the sound.

Our fourth hypothesis, that sound plural forms would be acquired earlier than broken forms, is unsupported by the results. We do not find any significant differences

between sound forms and broken forms on the comprehension tasks. To investigate this hypothesis we have considered feminine plural forms to be the sound form, because all feminine forms used in the tasks conducted are in the sound form, while animal nouns and some of the human nouns are produced in the broken form. However, masculine animal and inanimate verbs and adjectives do not take the plural form; they take the feminine singular. For the clarity of the test we use the masculine sound form (which is restricted to human nouns) (see Chapter 2), because the feminine singular form could confuse participants who might then have pointed to the picture corresponding to a female singular. In consequence, for the small number of broken forms used to assess their comprehension, we can tentatively say that because broken forms are frequent in the input and CDS they are comprehended as well as the sound forms are. These results concur with the position that children are usually aware of the distributional characteristics in the input rather than the abstract characteristics of an inflectional paradigm (Kim, 1997).

With regard to the questions put forth in this study concerning the means through which some of the grammatical forms are acquired and what affects their acquisition, our results indicate that the performance of eight-year-olds reaches the adults' level on the comprehension tasks for noun gender, singular and dual forms. They reach adult levels on the plural forms at around the age of ten.

The children generally reach adult comprehension levels on adjectives and verbs at around the age of twelve. Singular verbs are comprehended between the ages of eight and ten, while duals and plurals are comprehended at adult levels between the ages of ten and

twelve. The comprehension of collective nouns reaches adult levels at around the age of ten on masculine collective referent nouns, while on feminine unit referent forms it reaches this level at around the age of twelve.

Finally, we have argued that form frequency in the spoken language and form transparency —the clear connection between meaning and sound—are some of the main reasons contributing to the early acquisition and mastering of comprehension of the Arabic gender and number systems. We will see that slightly different factors influence order and age in production.

9.2 Production

In this section we will examine the same hypotheses examined in the comprehension section, but we will examine them according to our production results.

Our first hypothesis was that masculine gender agreement with singular and dual would be acquired earlier than feminine gender agreement with singular and dual, but that feminine gender agreement with plural would be acquired earlier than masculine forms. The results of the study support the first part of the hypothesis. The results do show that masculine singular and dual nouns are produced better than feminine singular and dual nouns. This could be due to the fact that the masculine singular is an unmarked form, while the feminine singular is marked for gender, and likewise, the masculine dual is marked only for number whereas the feminine dual is marked for both gender and number. Thus, both singular and dual masculine forms seem to be less complicated to produce than feminine forms, which are marked. When our participants' errors are

investigated we find that, on the whole, very young children replace the dual form with a singular. On the plural, up until the age of ten children use the singular forms in place of the plural. These results agree with those of Omar (1969) and Hermize (1987), both of whom state that young children do not usually inflect nouns for plurals. Ravid & Farah (1999) point out that one of the plural acquisition stages is the use of a separate lexical item (e.g. */kitir zamal/* 'many camel' (see Chapter 3)), with the singular form. Yet, this type of error is not found in our data. That could be due to the fact that Ravid & Farah's youngest participants are younger than ours.

The second part of the hypothesis regarding the earlier acquisition of the feminine plural forms than the masculine is not supported by the study. The differences between feminine and masculine plural forms are not significant. This could be due to the fact that even though the masculine form is more complicated, because of its animacy restrictions and its sound and broken forms, as compared to the unrestricted and sound feminine form, masculine plural noun forms occur frequently in the input and CDS, which might compensate for their complexity, thus aiding their early acquisition.

Kopcke (1998) states that restricted forms and forms having low input and CDS frequency are not acquired as early as high-input and unrestricted forms. In the case of the sound masculine plural form we detect errors; for example, six-year-olds mostly use the singular animacy form or the feminine animacy plural form. Eight- and ten-year-olds mainly use the singular form.

Our second hypothesis, that singular forms would be acquired earlier than dual and plural forms, is supported by the data. The results indicate that on all word types (nouns,

adjectives, verbs, collectives, nouns with no overt gender, and novel nouns), the singular form is produced better than both the dual and the plural. Such a result is not unusual, because singular forms are not marked for number, though the feminine form is marked for gender. In general, singular forms are used in place of plural forms in obligatory plural contexts. Similar results have been reported elsewhere; for example, for German (Mills, 1985). This result is also in agreement with the findings of Omar (1969), Hermiz (1987), and Ravid & Hayek (2003).

Our third hypothesis, that plural forms would be acquired earlier than dual forms, is unsupported for real and novel nouns but supported for adjectives and verbs. The results indicate that dual noun forms are produced better than plural forms, while plural adjective and verb forms are produced better than the corresponding dual forms. These results could be attributed to the language input and CDS, since dual nouns are used frequently in the vernacular dialects, while dual adjectives and verbs are not produced frequently in the vernacular dialects. Plural adjectives and verbs, on the other hand, are produced more frequently than duals in the vernacular dialects.

The earlier acquisition of dual noun forms than plural noun forms could be attributed to the fact that the dual form is a transparent form, while the plural noun form is a more complex form. Our results agree with those of Omar (1969) and Ravid & Hayek (2003).

However, plural adjectives and verbs are produced better than the dual forms are. This result could be due to the fact that in the vernacular dialects, dual forms are not used as frequently as plural forms. Moreover, the errors detected show that all age groups,

including adults, use the plural form in place of the obligatory dual form. These results imply the importance of language input and CDS; a simple but infrequent form such as the dual produces higher rates of errors than a more complicated yet frequent form such as the plural does. This result corresponds to that of Moerk (1992), who claims that high-frequency input helps children to acquire and produce complex forms at an early age. Leonard & Swanson (1999) and Gathercole *et al.* (1999) also agree that frequent language input plays an important role in determining early acquisition of forms.

Our fourth hypothesis, that sound plural forms would be acquired earlier than broken forms, is supported. The results indicate that the participants perform better on the sound plural forms than on the broken plural forms. The errors recorded show that the children use the human masculine sound plural form in place of the broken plural form and not the other way around. The feminine sound form is also used sometimes in place of the broken plural form, more often with animal nouns than with human nouns. Our results agree with those of Omar (1969), who states that the feminine sound plural forms are overgeneralized, and not the sound masculine forms. They also agree with Hermiz (1987), who reports that the feminine sound plural is acquired before the masculine sound form, while the broken forms are acquired later.

Our findings differ from those of Ravid & Hayeks (2003) regarding the earlier acquisition of the sound masculine form. Ravid & Hayeks report that broken forms are acquired earlier than the masculine sound form. They argue that the broken plural forms are not semantically restricted, while masculine sound forms are, which should make the latter harder to acquire. However, in the present research, the results and errors recorded

indicate that, even though the masculine sound plural form is semantically restricted, it is a simple and frequent form in the language input. While broken plural forms might also be frequent in the language input, they are still a more complicated form and are usually acquired item-by-item (Omar, 1969).

Our fifth hypothesis, that children would overregularise the broken plural to the sound plural forms, is supported by the data. This hypothesis is related to hypothesis number four. As indicated earlier (p. 228), errors produced by our participants show that they mainly use the feminine sound plural form in place of the broken forms. Our findings show that the participants tend to use the feminine sound form, and we have argued that this is because it is not semantically restricted. This result is in agreement with those of Omar (1969) who states that children always overgeneralize the feminine form by applying the feminine suffix */-at/* and never the masculine suffix */-un/*.

Ravid & Farah's (1999) findings indicate a U-shaped curve. Our findings do not show such a curve in which middle age groups overgeneralize a sound form more frequently than younger and older age groups. The differences in our findings could be due to the age differences between Ravid & Farah's participants and our participants. Their older age group is younger than our youngest age group, which might indicate that the U-shaped curve in performance occurs around the age of 3;0 (Ravid & Farah, 1999).

To summarize, our findings show that children's production of the noun gender system in general reaches adults' level between the ages of eight and ten. The number system is acquired later; on nouns children reach adults' performance by the age of eight,

on duals around the age of ten, and on plurals around the age of twelve. For adjectives, children reach adult performance on singular forms around the age of eight and duals around the age of ten. On plural forms, twelve-year-olds' performance lags behind adults'. For verbs, children master producing singular forms around the age of eight and the duals around the age of ten, while plurals are mastered after the age of twelve. Feminine collective nouns were mastered before masculine collective forms. The results also indicate that transparency, language input and CDS, high frequency input in the language, and form restrictions influence mastery of the production of gender and number systems.

Some of the main errors produced by our participants involved turning plural and dual obligatory forms into singulars, or duals into plurals, and most of the time these errors appeared more frequently at younger ages. Affix exchange and overregularization, where sound plural forms are used in place of broken plural masculine forms, also appeared more frequently in the younger age groups. Illicit (incorrect) stem change, where broken plural forms are changed into different broken plurals, appeared more often in the performance of our middle age groups. Before the dual form is mastered some children used the number two plus a singular or a plural form instead of just producing the dual form. Gender exchange from an obligatory feminine form into a masculine form and from an obligatory masculine into a feminine form was also among the errors our participants produced. Our findings on quantified nouns also pointed out that the participants changed obligatory plural forms into singulars and obligatory singulars into plurals, but these errors decreased by age. Our results also indicated that the children reach adult level in producing adjective agreement around the age of twelve. However,

on verbs our findings seem to suggest that children do not reach the adult level on producing verbs until after the age of twelve.

When examining both comprehension and production results we can detect some differences between them. It seems that transparency affects early comprehension. For example, comprehension of the feminine dual noun form is better than that of the masculine dual noun form. As discussed earlier, this result could be due to the transparency of the feminine form, because it is marked for gender and number, while the masculine form is marked only for number. However, production of non-marked forms or forms marked with fewer suffixes seems to be better than production of forms with more marks attached to it. For example, the masculine dual form is marked only for number and has better a production level among the participants than does the feminine form, which is marked for both gender and number.

Our findings also show that form simplicity helps children to comprehend forms, even if the form is not produced frequently in the input and CDS. For example, dual adjective and dual verb forms that are not frequently produced in the input and CDS are comprehended better than plural forms, which are frequently produced in the language input and CDS. This result is attributed earlier to the simplicity of the dual adjective and verb forms. In contrast, production is affected by the frequency of a form in the input and CDS; for example, plural adjective and plural verb forms which are present in the language input and CDS are produced better than dual forms, which are considered simple forms but are not present in the input and CDS.

Another difference between comprehension and production is that sound and broken plural forms are comprehended equally well, probably due to the high frequency of broken plurals in the input and CDS. However, in production, sound plurals are produced better than broken plurals, which are often used in place of broken forms by most age groups in this study, and this result is argued earlier to be due to the clear-cut nature of the sound form in comparison to the more complicated plural broken forms.

Overall, simplicity of a form and language input and CDS or input frequency in the language are some of the main factors behind children's comprehending and producing some forms better than others. The language productivity and language input that children are exposed to bears some similarities with comprehension and production as explained in the following section.

9.3 Longitudinal study

In our longitudinal study, language productivity and the language input and CDS of three children are investigated.

The hypothesis, that singular forms would be acquired earlier than dual and plural forms, was supported. Our findings do show that all three children produce singular forms before plurals and duals. This finding agrees with those of Omar (1969) and Hermiz (1987), whose findings indicate that children of age 2;6 use singular forms in place of plural forms. The findings of the present study are also in agreement with hypothesis three, in which plural forms are hypothesized to be acquired earlier than dual forms. The results, as shown in Chapter 8, indicate that dual forms are not produced

frequently up until the age of 4;5. This finding is also in agreement with those of Omar (1969), in which plurals are found to be used instead of duals up until around the age of 5;6.

To sum up the longitudinal study, the results regarding verb tenses and their agreement with number generally indicate individual differences in verb tense productivity (see Chapter 8). However, the first productive verb form detected occurs between 16.20 and 18.0 months of age. Dual verb forms are not detected in the production of any of the children who have participated in this study. However, plural verb forms are considered productive at around the age of 3;4 in the case of one of the participants.

It is difficult to pinpoint which grammatical form is the first form to be productive because the data show individual differences among our participants. Nevertheless, we can tentatively say that between the ages of 16.20 and 18.00, children start to produce their first productive forms. Still, although they start producing productive forms at a young age, they also tend to produce some errors. The highest frequency errors detected are related to subject-verb or subject-adjective gender agreement; in these cases the children alternate between using the masculine form and the feminine. Generally, we detect a rise in the children's errors according to age. Finally, the language input and CDS plays an important role in determining early and late productive language forms.

The results of the three studies show that the grammatical forms examined in this study begin to reach productivity levels (in the imperative, past and present tenses in both feminine and masculine forms) for children at an early age, between 1;4.20 and 2;7.17.

However, verb productivity levels across languages do differ. For example, the English present tense becomes productive between 3;1 and 3;8, while the past tense becomes productive a few months later (Akhtar & Tomasello, 1997). Jeschuull (2003) reports that both the past and present tense in English become productive before the age of 2;0. Spanish verbs start to become productive around 1;11 and 2;1 (Gathercole, *et al.* 1999), while Bantu verbs become productive before the age of 3;0. Our productivity results show that some of the forms we have investigated become productive earlier than those in other languages.

Though the Arabic verb system does show early productivity levels, the results of the production and comprehension tests show late mastery in comparison to other languages. Our results also show differences between our findings and the results of other studies that have investigated the acquisition of Arabic. The differences detected could be attributed to age differences, since the participants of the other studies were either younger or older than our participants. They may also be due to the fact that we have used a different methodology than the ones used in the other studies. For example, Al-Akeel (1998) used a picture selection task that had a target word and three distracters, while our picture selection tasks had a target word and five distracters.

Differences could also be a result of the dialectal differences between the Arabic dialects studied. More studies are needed on the acquisition of different Arabic dialects, to compare these with the acquisition of the Arabic forms in other dialects.

9.4 Discussion

The acquisition of Arabic gender and number systems shows late mastery of nouns, adjectives and verbs, and children do not reach an adult level of performance on comprehension and production except at a late stage of their development. For example, noun gender, singular and dual forms reach an adult level of comprehension around the age of eight. On production, the gender system, singular nouns, adjectives and verbs, sound plurals and collective forms reach an adult level at around the age of eight as well, while forms as plural adjectives and verbs, and the 11+ quantified noun forms seem to reach an adult level of production after the age of 12;0.

The late mastery of Arabic gender and number agreement is due to complexity, lack of regularity, lack of CDS and input frequency, and the existence of some opaque gender-number agreement rules.

Complex, irregular (broken) forms and forms with opaque gender-number agreement (such as broken plurals (nouns), plural adjective and verb forms and quantified nouns) reach an adult level of production around the age of 12;0 and beyond. This late acquisition of these forms agree with e.g. the acquisition of the German plural system, which is mastered according to Mills (1985) after the age of 11;0, because of the complexity of the German plural system. The German gender system is mastered much earlier than the number system, with children learning German as a first language using the appropriate gender forms around the age of two (Corbett, 1991), because the German gender system is more transparent than the German number system.

For our research we predicted that dual forms particularly verb and adjective duals were to be mastered after plural forms, because of the fact that plural forms are more frequent in the input and CDS. Yet, our results show that duals reach adults level at an earlier age than the plural. As we have discussed earlier this is due to the simplicity and clarity of the dual vs. the more complex form of the plural. This would agree with the acquisition of German plural system, which that is mastered after the age of eleven (Mills, 1985), because of its complexity and lack of regularity.

In general, such early and late acquisition of two different grammatical systems in one language indicate that the structure of the form has a significant role on the time of acquiring and mastering that form. However, there are other reasons and factors that affect language acquisition. Language input represented in the CDS and input frequency influence the acquisition and mastery of grammatical forms as well. For example, the animacy hierarchy does not predict all our results. In some categories inanimate forms reach an adult level earlier than animal forms, as discussed in chapter 6 particularly with adjectives and verbs referring to animals and inanimates.

This result is likely to be due to the CDS because inanimate objects surround the children at home, school, and everywhere. Therefore, adjectives and verb forms may be used more frequently with inanimates than with animals, which are mostly seen in pictures, television, booksetc. Therefore, adjectives and verbs are not used frequently in the input with them. Such a result agrees with all the studies that highlighted the importance of CDS and language input in the literature (Gathercole, 1986; Moerk, 1992; Choi, 1997; Leonard & Swanson, 1999; Ragnarsdottir, *et al*, 1999; and Mintz, 2003).

Overall, we can say that the Arabic gender system is acquired earlier than the number system, because it has a more clear-cut distinction between masculine forms and feminine, and both grammatical forms are frequent in the input (CDS). Some of the number forms do not appear in the CDS as frequently as other forms do.

9.5 Conclusion

The studies conducted in this research aimed to investigate the rate and order of acquisition of the Arabic gender and number systems and the agreement of verbs and adjectives with them. The main order of comprehension and production of these forms are shown in Table 34.

Table 34. Shows the main order of comprehension and production of the gender and number systems and the agreements of adjective and verbs with subjects.

Age	Comprehension		Production	
		The form		The form
8	Noun gender	f = /-ah/ m = /unmarked/	Singular nouns	f = /-ah/ m = /unmarked/
	Singular form	f = /-ah/ m = /unmarked/	Sound plurals	f = /-a:t/ m = so /-u:n/
	Dual form	f = /-t-a:n/ m = /-a:n/	Collective feminine	f-sg = /-ah/
			Singular adjective	f = /-ah/ m = /unmarked/

Age	Comprehension		Production	
		The form		The form
			Singular verbs	f = /ta-/ m = /ja-/
8-10			Gender system	f = /-ah/ m = /unmarked/
10	Plural form	f = /-a:t/ m = so /-u:n/ br /irregular/	Dual nouns	f = /-t-a:n/ m = /-a:n/
	Collective masculine	m-pl = /unmarked/	Collective masculine	m-pl = /unmarked/
			Dual adjective	f = /-t-a:n/ m = /-a:n/
			Dual verbs	f = /ta- a:n/ m = /ja- a:n/
12	Adjectives	f = /-ah/ m = /unmarked/	Plural nouns	f = /-a:t/ m = so /-u:n/ br /irregular/
	Verbs	f = /ta-/ m = /ja-/	Broken plurals	/irregular/
	Collective feminine	f-sg = /-ah/	3-10 quantified nouns	3-10 + pl
After the age of 12			Plural adjectives	f = /-a:t/ m = so /-u:n/
			Plural verbs	f = /ta- na/ m = /ja- u:n/

Age	Comprehension		Production	
		The form		The form
			11+ quantified nouns	11+ a singular

Transparency could be the main reason behind the early acquisition of the forms acquired (comprehended and produced) by our participants at the age of eight (shown in the table above). Most of the forms acquired and mastered early are either unmarked or marked by suffixes. These forms are considered to be concrete and transparent; such forms are usually acquired earlier than abstract forms (Dell & Gordon, 2003), which in Arabic could be the broken plural forms and the opaque subject-adjective and subject-verb plural agreement forms (see chapter 2 tables 13, 14 and 16).

The effects of transparency on acquisition are reported across languages. For example, the German gender system, which is acquired earlier than English, is considered more transparent than the English in that gender is usually established by a different lexical (Mills, 1985; and Corbett, 1991). The Turkish gender system (Aksu-Koc and Slobin, 1985) and the Spanish gender system (Pérez-Pereira, 1991; and Gathercole, 2002) are also acquired early because of their system transparency.

Less transparent and opaque forms in general are reported to be acquired late across languages. Gathercole, *et al.* (2001) report that the Welsh gender system up until the age of nine is not mastered. Our results agree with those of Gathercole, *et al.*, in regard to the late acquisition of the gender system, in that we report that the Arabic gender system is mastered between the ages of eight and ten.

The number systems across languages also have regularities and irregularities. Some of these systems are transparent; others are less so. The Hungarian plural system (MacWhinney, 1985), Georgian plural system (Imedadze and Tuite, 1992), and Finnish regular plural forms (Toivainen, 1997) are acquired early because their plural forms are transparent due to their regularity. Our results seem to follow the findings of these studies, since we find that sound and regular forms are generally mastered earlier than broken and irregular forms. Opaque grammatical agreement affects acquisition and contributes to children's late mastery of these agreement forms in Arabic. Plural subject-adjective and subject-verb agreement and subject agreement with the quantifiers 11 and above are not mastered by the age of twelve. However, there are other factors that interact side by side with transparency, such as form frequency in the language and language input.

Our results, particularly regarding production, show that the form's frequency in the CDS prompts the acquisition and mastery of the sound plural forms earlier than the noun dual form, even though adding suffixes forms them both. Nevertheless, dual forms are produced less frequently in the vernacular dialects in comparison to plurals. The errors detected show that, generally, the plural is used in place of the obligatory dual form more often than the dual is used in place of the obligatory plural form. We have pointed out that this result could be attributed to the frequent appearance of the plural form in the daily input and CDS.

These results agree with the results of Gathercole (1986), who states that the frequency of a form in the input is a major contributor to differences detected in the

acquisition of the present perfect between Scottish and American children. Leonard & Swanson (1999) also report a similar finding.

Likewise, Norwegian and Icelandic frequent morphological inflections are the easiest to acquire (Ragnarsdottir, *et al.* 1999). On the whole, low input frequency as pointed out by Moerk (1992) results in slow improvement. High frequency in the input and CDS helps children to categorise forms and enables them to master these forms early (Mintz, 2003).

Our results also point out that animacy hierarchy is affected by the language input and CDS as well. Adjectives and verbs referring to inanimates score higher than adjectives and verbs referring to animals as discussed in (p. 210), because adjectives and verbs referring to inanimates occur in the input more than adjectives and verbs referring to animals.

The language input children are exposed to is also an important factor in determining the order in which they acquire and reach productivity levels as seen in the production of our three longitudinal subjects. Imperative feminine and masculine forms are among the first verb forms that reach productivity levels in the production of two of our participants. These forms have the highest types and tokens in the adults' production. The plural forms are not frequent in the adults' production and therefore, reach productivity levels later than the singular forms that are frequent in the input and CDS. However, dual forms do not exist in the input and in the children's production.

These results agree with the fact that language input and CDS helps children acquire grammatical forms at an early age, as well as helping to determine the order in which forms are mastered. Choi (1997) and Sandhofer, *et al.* (2000) state that children ..

exposed to action verb forms in Korean and Mandarin learn verb forms earlier than noun forms, which are less frequent in their language input and CDS. However, children learning English acquire nouns earlier than verbs, because nouns are more frequent in their direct language input.

Our results indicate that children acquiring Arabic as a first language master noun grammatical forms earlier than verb grammatical forms. One of the reasons behind this finding is that all noun grammatical forms are frequent in the language input and CDS, while verb grammatical forms do not all occur in the language input and CDS as shown in matrixes (1 & 2) where the vernacular columns correspond to the forms that exist in the input therefore, more frequent in the CDS.

Overall, our results show that early-acquired forms are affected by the language input children are exposed to, and the differences we detect among our three participants in the longitudinal research are attributable to the differences detected in the CDS.

As explained earlier regarding language input and CDS's importance to language acquisition a limitation seems to emerge in our study, where word frequency in the input and CDS was not controlled. Some of the words that were used in the stimuli might have been infrequent words in the input and CDS, which might have affected our participants' comprehension and production. In this case these words are novel to them, which could be the reason behind the errors that occurred. Therefore, future studies should try and control the frequency of the words in the input and CDS in the stimuli used.

Another possible limitation is related to the acquisition of collective nouns. There are forms and possibilities for the collective types we did not investigate. For example, some collective noun forms in the vernacular dialect could either take the unmarked

masculine (unit referent), or the feminine plural form in certain situations, which were not part of our aims. These collective type forms and situations should be investigated in future research, which might shed more light on the reason behind such late acquisition and the type of errors produced.

Yet, another reason behind the late mastery of the forms investigated in this study is the Diglossia situation of Arabic. However, Diglossia has not been investigated or controlled in this research, where our participants were left to choose the dialect they felt comfortable with. Therefore, in future studies controlling the dialect or instructing the participants to use a specific dialect might shed light on the participant's acquired knowledge of the language and their learnt knowledge of the language.

Our results show on the whole that Arabic gender and number systems are acquired late; some of the grammatical forms are not mastered until the age of twelve, and other forms are acquired even after the age of twelve. The late acquisition of these forms, as argued earlier, may be attributed to the complexity of the forms, low frequency in the language, or the opaque forms and agreement in the language. Other languages also have late mastery of some grammatical forms--for example the late mastery of the Welsh gender system, which is attributed to the opaqueness and complexity of their gender system (Gatercole, *et al.* in press).

The German plural system is mastered after the age of 11,0. Mills (1985) attributes such late mastery of the system to the complexity of the form, and to the lack of regularities in it. The results of our study agree with Mills's findings; we have found that Arabic plural nouns are mastered at around the age twelve, while other plural forms are

mastered at an even later age. Finally, children's production of Modern Greek verb forms reaches adults' levels by the age of twelve. Stephany (1997) attributes this late mastery of the system to the complexity of its structure as well. Some of the Arabic verb forms are produced at adults' level after the age of twelve.

Across all of these four languages-- Welsh, German, Modern Greek, and Arabic, the complexity of the grammatical forms is the main reason behind the late mastery of these forms.

Additionally, the results of this study reveal a few unexpected findings. One such finding is the earlier mastery of feminine collective forms as opposed to the later mastery of the masculine collective forms in the production tasks. Could this be due to the meaning embodied in the feminine form (a unit) as opposed to the collective meaning in the masculine form? Are children able to produce a unit better than a collective depending on the meaning and not simply on the form itself? Studies are needed to investigate the possibility that a cognitive factor could be behind the early acquisition of singulars and the later acquisition of plurals in Arabic. Moreover, is it the meaning that affects the acquisition of the grammatical form, or the other way around?

Another unexpected finding is that on the novel nouns, adults perform equally to six-year-olds and less well than eight-, ten-, and twelve-year-olds. We attribute this unusual result to the fact that there may be frequent situations in which the children might apply grammatical forms to novel words they hear; for example, they may be practiced at doing this with all the new characters they watch on television or while playing computer

games and so on. Further studies are needed to investigate the main reason behind the low performance of adults on novel nouns.

Furthermore, the results demonstrate that it is easier to comprehend a transparent form even if it doesn't occur frequently in the input and CDS, though when it comes to producing that form it is usually delayed. For example, in Arabic the dual verb form is transparent and therefore comprehended better and earlier than plural forms (p. 107), but when it comes to producing the dual verb form, there are more errors than in the production of the plural form (p. 245), which exists more frequently in the language input and the vernacular dialects.

These findings, overall, agree with the fact that transparency and language input (CDS) are two important factors that affect the mastering of grammatical forms, but it also seems that transparency affects comprehension and the input influences production. Further studies are required to investigate the role and extent of each factor on both comprehension and production.

There are many factors interacting side-by-side and affecting language acquisition. When a language has a complex grammatical system embodying irregularities and opaque forms and agreement combined with infrequency in the language input and CDS, it is acquired and mastered at a late age.

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Appendix 1: Comprehension.

Appendix 2: Production.

Appendix 1: Comprehension.

Appendix 1.1 Comprehension Stimuli.

Appendix 1.1.1: Stimuli for the human and animal nouns category.

Human nouns (feminine – singular).

Number	Form	English	Arabic
40	n-f-sg	Clown	مهرجه
48	n-f-sg	Chemist	كيميائية
55	n-f-sg	Diver	غطاسه
59	n-f-sg	Cook	طباخة
67	n-f-sg	Worker	عاملة
75	n-f-sg	Teacher	معلمه

Human nouns (feminine – dual).

Number	Form	English	Arabic
82	n-f-du	Carpenter	مخارتان
88	n-f-du	Woman	سيداتان
98	n-f-du	Photographer	مصورتان
107	n-f-du	Painter (house)	دهانتان
112	n-f-du	Painter (artist)	رسامتان
174	n-f-du	Student	طالتان

Human nouns (feminine – plural).

Number	Form	English	Arabic
9	n-f-pl	Sales woman	بياعات
17	n-f-pl	Child	طفلات
28	n-f-pl	Speaker	متحدثات
34	n-f-pl	Runner	عدائات
121	n-f-pl	Doctor	طبيبات
209	n-f-pl	Employee	موظفات

Human nouns (masculine – singular).

Number	Form	English	Arabic
139	n-m-sg	Soldier	عسكري
150	n-m-sg	Archaeologist	باحث الثار
163	n-m-sg	Musician	عازف
292	n-m-sg	TV presenter	مذيع
356	n-m-sg	Dancer	راقص
370	n-m-sg	Teacher	مدرس

Human nouns (masculine – dual).

Number	Form	English	Arabic
235	n-m-du	Nears	ممرسان
244	n-m-du	Police officer	شرطيان
255	n-m-du	Doctor	طيسان

Number	Form	English	Arabic
340	n-m-du	Model	عارضان
377	n-m-du	Singer	مغنيان
394	n-m-du	Player	لاعبان

Human nouns (masculine – plural).

Number	Form	English	Arabic
185	n-m-pl	King	ملوك
199	n-m-pl	Chemist	كيميائيون
204	n-m-pl	Graduate	خريجون
219	n-m-pl	Farmer	زارعون
308	n-m-pl	Cook	طباخون
326	n-m-pl	Painter (artist)	رسامون

Animal (feminine nouns – singular).

Number	Form	English	Arabic
142	n-f-sg	Fox	ثعلب
154	n-f-sg	Bear	دب
297	n-f-sg	Octopus	أخطبوط
347	n-f-sg	Cat	قط
366	n-f-sg	Rabbit	ارنب
374	n-f-sg	Whale	حوت

Animal (feminine nouns – dual).

Number	Form	English	Arabic
214	n-f-du	Dragon	تنينتان
228	n-f-du	Crocodile	تمساحتان
240	n-f-du	Snake	ثعبانان
248	n-f-du	Chick	كتكتان
257	n-f-du	Giraffe	زرافتان
390	n-f-du	Frog	ضفدعتان

Animal (feminine nouns – plural).

Number	Form	English	Arabic
137	n-f-pl	Donkey	مزارات
166	n-f-pl	Squirrel	سحابات
183	n-f-pl	Parrot	بففات
190	n-f-pl	Elephant	فيلات
269	n-f-pl	Tiger	فترات
328	n-f-pl	Spider	عنكبوتات

Animal (masculine nouns – singular).

Number	Form	English	Arabic
41	n-m-sg	Octopus	أخطبوط
51	n-m-sg	Penguin	بطريق
72	n-m-sg	Dog	كلب
81	n-m-sg	Bird	عصفور
83	n-m-sg	Wolf	ذئب
87	n-m-sg	Horse	حصان

Animal (masculine nouns - dual).

Number	Form	English	Arabic
3	n-m-du	Elephant	فيلان
31	n-m-du	Mouse	فأران
266	n-m-du	Monkey	فردان
284	n-m-du	Eagle	نسران
309	n-m-du	Parrot	سغاثان
321	n-m-du	Rabbit	أرثان

Animal (masculine nouns - plural).

Number	Form	English	Arabic
10	n-m-pl	Mouse	فئران
21	n-m-pl	Peacock	طراويس
96	n-m-pl	Scorpion	عقارب
105	n-m-pl	Falcon	صقور
115	n-m-pl	Cat	قطط
124	n-m-pl	Bird	عصافير

Appendix 1.1.2: Stimuli for the adjective category.

Human (adjective – feminine – singular).

Number	Form	English	Arabic
237	Adj-f-sg	Fast	سريعه
246	Adj-f-sg	Energetic	نشيطه
253	Adj-f-sg	Weary	برهنه
381	Adj-f-sg	Angry	غصابه
387	Adj-f-sg	Surprised	ذهوله
398	Adj-f-sg	Cold	بردانه

Human (adjective – feminine – dual).

Number	Form	English	Arabic
147	Adj-f-du	With a fever	مسختان
158	Adj-f-du	Confused	حيرانتان
178	Adj-f-du	Terrified	مرعوبتان
300	Adj-f-du	In a hurry	مستعجلتان
345	Adj-f-du	Cold	بردانتان
362	Adj-f-du	Strong	قويتان

Human (adjective – feminine – plural).

Number	Form	English	Arabic
38	Adj-f-pl	Happy	سعيدات
65	Adj-f-pl	First	اولات
195	Adj-f-pl	Proud	فخريات
211	Adj-f-pl	Old	محوريات
222	Adj-f-pl	Annoyed	متصايفات

Human (adjective – masculine – singular).

Number	Form	English	Arabic
6	Adj-m-sg	Arrogant	مفروور
15	Adj-m-sg	Happy	فرحان
231	Adj-m-sg	Compassionate	حنون
286	Adj-m-sg	Pleased	مستوسط
319	Adj-m-sg	Busy	مشغول
352	Adj-m-sg	Ill	مرريض

Human (adjective – masculine – dual).

Number	Form	English	Arabic
25	Adj-m-du	In a hurry	مستعجلان
32	Adj-m-du	First	اولان
37	Adj-m-du	Upturned	مكروسان
208	Adj-m-du	Fast	سريعان

Human (adjective – masculine – plural).

Number	Form	English	Arabic
100	Adj-m-pl	Happy	سعداء
109	Adj-m-pl	In Pain	متألون
114	Adj-m-pl	Cold	بردانون
136	Adj-m-pl	Scared	خائفون

Number	Form	English	Arabic
141	Adj-m-pl	Fast	سريعون
272	Adj-m-pl	Wet	مبللون

Animal (adjective – feminine – singular).

Number	Form	English	Arabic
135	Adj-f-sg	In a hurry	مستعجلة
243	Adj-f-sg	Cautious	حذره
252	Adj-f-sg	Artistic	فنانه
270	Adj-f-sg	Strong	قويه
378	Adj-f-sg	Fast	سريعه
388	Adj-f-sg	Cold	بردانه

Animal (adjective – feminine – dual).

Number	Form	English	Arabic
173	Adj-f-du	Relax	مرتاحتان
193	Adj-f-du	Sleepy	نعسانتان
200	Adj-f-du	Sweet	طيبتان
220	Adj-f-du	Fast	سريعتان
314	Adj-f-du	Scared	خائفتان
333	Adj-f-du	Fat	سمينتان

Animal (adjective – feminine – plural).

Number	Form	English	Arabic
145	Adj-f-pl	High	عاليات
156	Adj-f-pl	Hungry	جائعات
187	Adj-f-pl	Alert	متحذرات
294	Adj-f-pl	Relax	مرتاحتات
356	Adj-f-pl	Cold	بردانات
358	Adj-f-pl	Thirsty	عطشانات

Animal (adjective – masculine – singular).

Number	Form	English	Arabic
2	Adj-m-sg	Confused	حيران
11	Adj-m-sg	Astonished	ذهول
274	Adj-m-sg	Weary	مرهق
279	Adj-m-sg	Happy	سعيد
287	Adj-m-sg	Fast	سريع
305	Adj-m-sg	Thirsty	عطشان

Animal (adjective – masculine – dual).

Number	Form	English	Arabic
101	Adj-m-du	Full	شعنانان
110	Adj-m-du	Sleepy	نعسانان
143	Adj-m-du	Sweet	حريان
400	Adj-m-du	Green	أخضران

Animal (adjective – masculine – plural).

Number	Form	English	Arabic
43	Adj-m-pl	Agitated	هائعون
62	Adj-m-pl	Fast	سريعون

Number	Form	English	Arabic
76	Adj-m-pl	Hungry	جائعون
78	Adj-m-pl	Dirty	وسخون
85	Adj-m-pl	Suntanned	متشمسون
91	Adj-m-pl	Quite	هادئون

Inanimate (adjective – feminine – singular).

Number	Form	English	Arabic
245	Adj-f-sg	High	عاليه
249	Adj-f-sg	Small	صغيره
346	Adj-f-sg	Round	دائريه
365	Adj-f-sg	Red	حمراء
372	Adj-f-sg	Pink	زهريه
375	Adj-f-sg	Happy	سعيده

Inanimate (adjective – feminine – dual).

Number	Form	English	Arabic
129	Adj-f-du	Rectangle	مستطيلتان
155	Adj-f-du	Ill	مریصتان
167	Adj-f-du	Sharp	حادتان
264	Adj-f-du	Pink	زهريتان
296	Adj-f-du	Open	مفتوحتان
351	Adj-f-du	Strong	قويتان

Inanimate (adjective – feminine – plural).

Number	Form	English	Arabic
203	Adj-f-pl	Green	خضراوات
216	Adj-f-pl	Orange	برتقاليات
230	Adj-f-pl	Shut	مقفولات
307	Adj-f-pl	Gray	رماديات
325	Adj-f-pl	Red	حمراوات
335	Adj-f-pl	Sleepy	نعسانات

Inanimate (adjective – masculine – singular).

Number	Form	English	Arabic
97	Adj-m-sg	Orange	برتقالي
106	Adj-m-sg	Green	أخضر
113	Adj-m-sg	Closed	مقفول
122	Adj-m-sg	Sad	حزين
126	Adj-m-sg	Yellow	أصفر

Inanimate (adjective – masculine – dual).

Number	Form	English	Arabic
54	Adj-m-du	Round	دائريان
60	Adj-m-du	Broken	مكسوران
138	Adj-m-du	Angry	غضبانان
169	Adj-m-du	Hot	حاران
275	Adj-m-du	Yellow	أصفران
285	Adj-m-du	Pink	زهريان

Inanimate (adjective – masculine – plural).

Number	Form	English	Arabic
42	Adj-m-pl	Maroon	عنايبين
46	Adj-m-pl	Sharp	حادون
50	Adj-m-pl	Blue	زرق
69	Adj-m-pl	Open	مفتوحين
71	Adj-m-pl	Happy	سعداء
191	Adj-m-pl	Spotty	متعبن

Appendix 1.1.3: Stimuli for the verb category.

Human (feminine – verb – singular).

Number	Form	English	Arabic
57	f-v-sg	Shouting	نصرخ
206	f-v-sg	Jumping	تقفز
233	f-v-sg	Showering	ستحم
251	f-v-sg	Pulling	تشد
265	f-v-sg	Sweeping	تكس
295	f-v-sg	Sitting	تجلس

Human (feminine – verb – dual).

Number	Form	English	Arabic
77	f-v-du	Pointing	تشاوران
93	f-v-du	Planting	ترعان
144	f-v-du	Blowing nose	تنفان
171	f-v-du	Writing	تكتسان
242	f-v-du	Riding	تركان
304	f-v-du	Drawing	ترسمان

Human (feminine – verb – plural).

Number	Form	English	Arabic
19	f-v-pl	Walking up	تطلعن
44	f-v-pl	Examining	تكشفن
70	f-v-pl	Reading	تقرآن
133	f-v-pl	Laughing	تضحكن
201	f-v-pl	Braking	تكسرن
334	f-v-pl	Carrying	تحملن

Human (masculine – verb – singular).

Number	Form	English	Arabic
13	m-v-sg	Banging	يدق
74	m-v-sg	Crying	يسكي
86	m-v-sg	Playing an instrument	يعزف
168	m-v-sg	Sleeping	يسام
324	m-v-sg	Climbing	يتسلق
389	m-v-sg	Watering	يسقي

Human (masculine – verb – dual).

Number	Form	English	Arabic
36	m-v-du	Eating	ياكلان
52	m-v-du	Shopping	يتسوقان
119	m-v-du	Ironing	يكويان
217	m-v-du	Running	يجريان
316	m-v-du	Cooking	يطبخان
354	m-v-du	Surrendering	يستسلمان

Human (masculine - verb - plural).

Number	Form	English	Arabic
14	m-v-pl	Ridding	يركزون
26	m-v-pl	Feeding	يرضعون
192	m-v-pl	Brushing teeth	يفرشون
288	m-v-pl	Drinking	يشربون
364	m-v-pl	Sweeping	يكنسون
376	m-v-pl	Swinging	يشرححون

Animal (feminine - verb- singular).

Number	Form	English	Arabic
5	f-v-sg	Drawing	ترسم
99	f-v-sg	Carrying	تحمل
130	f-v-sg	Resting	ترتاح
271	f-v-sg	Playing	تلعب
322	f-v-sg	Hunting	تصطاد
359	f-v-sg	Kicking	ترفس

Animal (feminine - verb- dual).

Number	Form	English	Arabic
47	f-v-du	Running	تجريان
90	f-v-du	Thinking	تفكران
117	f-v-du	Typing	تطبعان
189	f-v-du	Biting	تعضان
330	f-v-du	Eating	تاكلان
395	f-v-du	Drumming	تطبلان

Animal (feminine - verb- plural).

Number	Form	English	Arabic
56	f-v-pl	Sleeping	نمنن
73	f-v-pl	Sneaking	تسحبن
239	f-v-pl	Carrying	تحملن
311	f-v-pl	Jumping	تقفزن
332	f-v-pl	Winking	تغمزن

Animal (masculine - verb - singular).

Number	Form	English	Arabic
23	m-v-sg	Laughing	يضحك
33	m-v-sg	Sliding	يتزلق
66	m-v-sg	Smoking	يدخن
161	m-v-sg	Flying	يطير
263	m-v-sg	Sitting	يجلس
303	m-v-sg	Arranging	يرتب

Animal (masculine- verb- dual).

Number	Form	English	Arabic
39	m-v-du	Singing	يغنيان
108	m-v-du	Running	يجريان
134	m-v-du	Hiding	يختبان
149	m-v-du	Jumping	يقفزان
225	m-v-du	Playing a music	يعرفان

Number	Form	English	Arabic
		instrument	
291	m-v-du	Drawing	برسمان

Animal (masculine- verb- plural).

Number	Form	English	Arabic
35	m-v-pl	Partying	يحتفلون
58	m-v-pl	Pulling	يشدون
80	m-v-pl	Scratching	يهرشون
125	m-v-pl	Standing	يقفون
345	m-v-pl	Dancing	يرقصون
386	m-v-pl	Pointing	يشاؤون

Inanimate (feminine - verb - singular).

Number	Form	English	Arabic
247	f-v-sg	Drawing	ترسم
256	f-v-sg	Drinking	تشرب
337	f-v-sg	Playing	تلعب
373	f-v-sg	Singing	تعني
385	f-v-sg	Swimming	سبح
391	f-v-sg	Crying	تكي

Inanimate (feminine - verb - dual).

Number	Form	English	Arabic
128	f-v-du	Arranging	ترتبان
152	f-v-du	Eating	تأكلان
180	f-v-du	Running	تجريان
184	f-v-du	Flying	تطيران
260	f-v-du	Jumping	تقفزان
348	f-v-du	Sleeping	تنامان

Inanimate (feminine - verb - plural).

Number	Form	English	Arabic
53	f-v-pl	Holding up	ترفعن
89	f-v-pl	Drawing	ترسمن
95	f-v-pl	Jumping	تقفزن
103	f-v-pl	Writing	تكتبن

Inanimate (masculine - verb - singular).

Number	Form	English	Arabic
207	m-v-sg	Flying	يطير
213	m-v-sg	Jumping	يقفز
227	m-v-sg	Wiping	يمسح
241	m-v-sg	Walking	يمشي
280	m-v-sg	Crying	يبكي

Inanimate (masculine - verb - dual).

Number	Form	English	Arabic
4	m-v-du	Smiling	يتسلمان
282	m-v-du	Running	يجريان
313	m-v-du	Sliding	يتزحلقتان

Number	Form	English	Arabic
318	m-v-du	Drinking	يشربان
329	m-v-du	Standing	يقفان

Inanimate (masculine - verb - plural).

Number	Form	English	Arabic
8	m-v-pl	Singing	يغنون
20	m-v-pl	Playing an instrument	يعزفون
30	m-v-pl	Walking	يمشون
132	m-v-pl	Dripping	يتقطون
277	m-v-pl	Smiling	يتسّمون

Appendix 1.1.4: Stimuli for the collective nouns category.

Collective animal nouns (feminine – singular).

Number	Form	English	Arabic
64	n-f-sg	Ant	نملة
94	n-f-sg	Cow	بقرة
104	n-f-sg	Duck	بطة
157	n-f-sg	Mosquito	ناموسة
194	n-f-sg	Worm	دودة
310	n-f-sg	Fly	ذبابه

Collective animal nouns (feminine – plural).

Number	Form	English	Arabic
146	n-f-pl	Butterfly	فراشات
175	n-f-pl	Goose	وزات
177	n-f-pl	Bee	نحلات
254	n-f-pl	Fish	سمكات
278	n-f-pl	Duck	بطات
341	n-f-pl	Owl	برمات

Collective animal nouns (masculine – plural).

Number	Form	English	Arabic
68	n-m-pl	Grass hoper	حراد
221	n-m-pl	Pelican	جمع
281	n-m-pl	Deer	غزال
327	n-m-pl	Cheep	غسم
336	n-m-pl	Ostrich	نعام
379	n-m-pl	Pigeon	حمام

Collective inanimate nouns (feminine – singular).

Number	Form	English	Arabic
7	n-f-sg	Banana	موزة
196	n-f-sg	Egg	بيضة
223	n-f-sg	Tree	شجرة
261	n-f-sg	Water melon	بطيخه
289	n-f-sg	Feather	ريشه
397	n-f-sg	Pepper	فلفل

Collective inanimate nouns (masculine – plural).

Number	Form	English	Arabic
159	n-m-pl	Onions	بصل
273	n-m-pl	Plant	زرع
301	n-m-pl	Orange	برتقال
343	n-m-pl	Lemon	ليمون
360	n-m-pl	Flower	ورد
382	n-m-pl	Date tree	خا

Animal collective (adjective - feminine - singular).

Number	Form	English	Arabic
186	Adj-f sg	Green	خضراء
205	Adj-f sg	Shy	مكسوفه
224	Adj-f sg	Scared	خائفه
384	Adj-f sg	Yellow	صفراء
396	Adj-f sg	Happy	سعيدة

Animal collective (adjective - masculine - singular).

Number	Form	English	Arabic
162	Adj-m sg	Wicked	شرير
176	Adj-m sg	Weary	مرهق
179	Adj-m sg	Floored	طفشان
302	Adj-m sg	Shy	مكسوف
344	Adj-m sg	Puzzled	حيران
361	Adj-m sg	In a hurry	مستعجل

Inanimate collective (adjective - feminine - singular).

Number	Form	English	Arabic
212	Adj-f sg	Scared	خائفه
226	Adj-f sg	Blue	زرقاء
262	Adj-f sg	Strong	قوية
276	Adj-f sg	Fast	سريعه
298	Adj-f sg	Happy	مسرورة
367	Adj-f sg	Ill	مرصه

Inanimate collective (adjective - masculine - singular).

Number	Form	English	Arabic
22	Adj-m sg	Puzzled	حيران
116	Adj-m sg	Wicked	شرير
209	Adj-m sg	Angry	مغضب
283	Adj-m sg	Nice	ظريف
312	Adj-m sg	Happy	سعيد
320	Adj-m sg	Chopped	مقطع

Animal collective (feminine - verbs - singular).

Number	Form	English	Arabic
45	f-v-sg	Boxing	تصارع
111	f-v-sg	Running	عجري
120	f-v-sg	Flying	تطير
170	f-v-sg	Showering	تستحم
197	f-v-sg	Playing an instrument	تعزف
315	f-v-sg	Carrying	تحمل

Animal collective (feminine - verbs - dual).

Number	Form	English	Arabic
61	f-v-du	Crying	تتكلان
84	f-v-du	Kicking	تترنسان
323	f-v-du	Taking	تتكلمان
369	f-v-du	Yawning	تتثانان

383	f-v-du	Singing	تغنيان
392	f-v-du	Walking	تمشان

Animal collective (feminine – verbs – plural).

Number	Form	English	Arabic
12	f-v-pl	Looking	تظرن
79	f-v-pl	Eating	تأكلن
215	f-v-pl	Singing	تغنين
232	f-v-pl	Being dizzy	تدخن
267	f-v-pl	Drinking	تشربن
349	f-v-pl	Breathing	تنفسن

Animal collective (masculine – verb – singular).

Number	Form	English	Arabic
102	m-v-sg	Reading	يقرا
140	m-v-sg	Sliding	يتزلقن
153	m-v-sg	Showing	يستعرض
165	m-v-sg	Carrying	يحمل
258	m-v-sg	Sleeping	ينام
338	m-v-sg	Pointing	يشاور

Animal collective (masculine – verb – dual).

Number	Form	English	Arabic
27	m-v-du	Explaining	يشرحان
63	m-v-du	Dancing	يرقصان
182	m-v-du	Running	يجريان
202	m-v-du	Talking	يتكلمان
306	m-v-du	Jumping	يقفزان

Animal collective (masculine – verb – plural).

Number	Form	English	Arabic
16	m-v-pl	Running	يجرون
92	m-v-pl	Pointing	يشاورون
205	m-v-pl	Crawling	يزحفون
353	m-v-pl	Playing an instrument	يعزفون

Inanimate collective (feminine – verb – singular).

Number	Form	English	Arabic
151	f-v-sg	Dancing	ترقص
164	f-v-sg	Walking	تمشي
293	f-v-sg	Reading	تقرأ
339	f-v-sg	Blowing	تنفخ
355	f-v-sg	Smiling	تبتسم
371	f-v-sg	Winking	تغمز

Inanimate collective (masculine - verb - singular).

Number	Form	English	Arabic
172	m-v-sg	Playing an instrument	يعزف
188	m-v-sg	Watering	يسقي
218	m-v-sg	Holding	يملك
229	m-v-sg	Dancing	يرقص
234	m-v-sg	Pointing	يشاور
393	m-v-sg	Smiling	يتسمم

Appendix 1.1.5: Stimuli for the inanimate feminine nouns with no overt gender referent category.

Inanimate (feminine nouns with no overt gender) (singular).

Number	Form	English	Arabic
49	n-sg	Ear	أذن
118	n-sg	Eye	عين

Inanimate (feminine nouns with no overt gender) (plural).

Number	Form	English	Arabic
198	n-pl	Hand	أيادي
331	n-pl	Sun	شمس

Inanimate (masculine - singular).

Number	Form	English	Arabic
148	n-sg	Envelop	ظرف
160	n-sg	Pen	قلم

Inanimate (masculine - dual).

Number	Form	English	Arabic
1	n-du	Foot	قدمان
24	n-du	Fire	نيران

Inanimate (masculine - plural).

Number	Form	English	Arabic
210	n-pl	Chare	كراسي
238	n-pl	Dress	فساتين

Inanimate (feminine nouns (adjective) with no overt gender) (dual).

Number	Form	English	Arabic
350	Adj-f-du	Sad	حزينتان
368	Adj-f-du	Blue	زرقاوتان

Inanimate (feminine nouns (adjective) with no overt gender) (plural).

Number	Form	English	Arabic
181	Adj-f-pl	Sleepy	نعسات
259	Adj-f-pl	Happy	سعدات

Inanimate (feminine nouns with no overt gender) (feminine - verb - singular).

Number	Form	English	Arabic
268	f-v-sg	Laughing	تضحك
399	f-v-sg	Talking	تتكلم

Inanimate (feminine nouns with no overt gender) (feminine - verb - dual).

Number	Form	English	Arabic
131	f-v-du	Dressing	تلبسان
299	f-v-du	Crying	تنبكان

Inanimate (feminine nouns with no overt gender) (feminine - verb - plural).

Number	Form	English	Arabic
236	f-v-pl	Crying	تسكين
380	f-v-pl	Sleeping	نمن

Appendix 1.2: Comprehension results:**Appendix 1.2.1: comprehension, human and animal nouns. (Means and Std. Errors).****Animacy**

Animacy	Mean	Std. Error
h	5.04	.127
an	4.79	.129

Number

Number	Mean	Std. Error
sg	5.13	.132
du	5.04	.135
pl	4.58	.142

Age Group

Age Group	Mean	Std. Error
6	2.69	.260
8	5.12	.230
10	5.35	.216
12	5.67	.230
A	5.76	.417

Number x age Group

Age Group	Number	Mean	Std. Error
6	sg	2.78	.273
	du	3.13	.279
	pl	2.17	.294
8	sg	5.49	.241
	du	5.19	.247
	pl	4.67	.260
10	sg	5.59	.227
	du	5.26	.232
	pl	5.20	.245
12	sg	5.76	.241
	du	5.73	.247
	pl	5.52	.260
A	sg	6.00	.437
	du	5.93	.447
	pl	5.36	.472

Noun gender x number

Gender	Number	Mean	Std. Error
f	sg	5.01	.135
	du	5.17	.134
	pl	4.66	.154
m	sg	5.25	.137
	du	4.93	.152
	pl	4.51	.148

Animacy x noun gender x age Group

Age Group	Animacy	Gender	Mean	Std. Error
6	h	f	2.93	.256
		m	2.67	.292
	an	f	2.69	.284
		m	2.48	.273
8	h	f	5.42	.226
		m	5.09	.259
	an	f	4.75	.252
		m	5.22	.242
10	h	f	5.51	.213
		m	5.49	.243
	an	f	5.15	.237
		m	5.26	.227
12	h	f	5.77	.226
		m	5.75	.259
	an	f	5.58	.252
		m	5.58	.242
A	h	f	5.95	.410
		m	5.85	.469
	an	f	5.67	.456
		m	5.57	.438

Noun gender x number x age Group

Age Group	Gender	Number	Mean	Std. Error
6	f	sg	2.58	.279
		du	3.61	.277
		pl	2.22	.318
	m	sg	2.97	.283
		du	2.64	.315
		pl	2.11	.306
8	f	sg	5.30	.247
		du	5.28	.245
		pl	4.67	.281
	m	sg	5.67	.251
		du	5.11	.279
		pl	4.67	.271
10	f	sg	5.46	.232
		du	5.29	.230
		pl	5.25	.265
	m	sg	5.73	.236
		du	5.23	.262
		pl	5.15	.255
12	f	sg	5.67	.247
		du	5.72	.245
		pl	5.63	.281
	m	sg	5.85	.251
		du	5.74	.279
		pl	5.41	.271
A	f	sg	6.00	.448
		du	5.93	.444
		pl	5.50	.510
	m	sg	6.00	.454
		du	5.93	.505
		pl	5.21	.491

Animacy x noun gender x number x age Group

Age Group	Animacy	Gender	Number	Mean	Std. Error
6	h	f	sg	2.94	.279
			du	3.56	.295
			pl	2.28	.335
		m	sg	2.89	.298
			du	2.94	.357
			pl	2.17	.331

Age Group	Animacy	Gender	Number	Mean	Std. Error
8	h	f	sg	2.22	.330
			du	3.67	.327
			pl	2.17	.360
		m	sg	3.06	.294
			du	2.33	.305
			pl	2.06	.339
	an	f	sg	5.56	.246
			du	5.78	.261
			pl	4.91	.296
		m	sg	5.52	.263
			du	5.17	.316
			pl	4.57	.293
10	h	f	sg	5.04	.292
			du	4.78	.290
			pl	4.44	.318
		m	sg	5.83	.260
			du	5.04	.270
			pl	4.78	.300
	an	f	sg	5.69	.232
			du	5.54	.245
			pl	5.31	.278
		m	sg	5.56	.248
			du	5.35	.297
			pl	5.54	.276
12	h	f	sg	5.23	.274
			du	5.04	.272
			pl	5.19	.299
		m	sg	5.89	.245
			du	5.12	.254
			pl	4.77	.282
	an	f	sg	5.74	.246
			du	5.96	.261
			pl	5.61	.296
		m	sg	5.96	.263
			du	5.69	.316
			pl	5.61	.293
A	h	f	sg	5.61	.292
			du	5.48	.290
			pl	5.65	.318
		m	sg	5.74	.260
			du	5.78	.270
			pl	5.22	.300
	an	f	sg	6.00	.447
			du	6.00	.472
			pl	5.86	.536
		m	sg	6.00	.477
			du	6.00	.572
			pl	5.57	.531
A	f	sg	6.00	.529	
		du	5.86	.525	
		pl	5.14	.577	
	m	sg	6.00	.472	
		du	5.86	.490	
		pl	4.86	.544	

Appendix 1.2.2: comprehension, Adjectives. (Means and Std. Errors).

Animacy

Animacy	Mean	Std. Error
h	.80	.023
an	.78	.024
in	.56	.022

Gender

Gender	Mean	Std. Error
f	.74	.021
m	.68	.022

Number

Number	Mean	Std. Error
sg	.75	.023
du	.74	.023
pl	.65	.023

Age Group

Age Group	Mean	Std. Error
6	.37	.043
8	.66	.038
10	.78	.036
12	.87	.038
A	.89	.069

Animacy x age Group

Age Group	Animacy	Mean	Std. Error
6	h	.42	.047
	an	.39	.049
	in	.28	.045
8	h	.79	.042
	an	.75	.043
	in	.45	.040
10	h	.88	.039
	an	.84	.041
	in	.61	.037
12	h	.94	.042
	an	.94	.043
	in	.72	.040
A	h	.97	.076
	an	.97	.079
	in	.75	.072

Animacy x gender

Animacy	Gender	Mean	Std. Error
h	f	.83	.023
	m	.77	.024
an	f	.79	.025
	m	.77	.024
in	f	.62	.022
	m	.51	.025

Gender x number		Number	Mean	Std. Error
Gender	f	sg	.78	.025
		du	.78	.023
		pl	.67	.025
m		sg	.74	.023
		du	.69	.025
		pl	.63	.025

Animacy x number x age Group				
Age Group	Animacy	Number	Mean	Std. Error
6	h	sg	.45	.053
		du	.51	.053
		pl	.32	.056
	an	sg	.44	.055
		du	.42	.058
		pl	.34	.056
	in	sg	.26	.056
		du	.36	.052
		pl	.21	.049
8	h	sg	.88	.047
		du	.80	.047
		pl	.69	.049
	an	sg	.84	.049
		du	.77	.051
		pl	.65	.049
	in	sg	.53	.050
		du	.39	.046
		pl	.41	.043
10	h	sg	.92	.044
		du	.87	.044
		pl	.86	.046
	an	sg	.87	.046
		du	.84	.048
		pl	.82	.046
	in	sg	.69	.047
		du	.59	.043
		pl	.56	.041
12	h	sg	.97	.047
		du	.97	.047
		pl	.87	.049
	an	sg	.94	.049
		du	.95	.051
		pl	.92	.049
	in	sg	.80	.050
		du	.76	.046
		pl	.61	.043
A	h	sg	.97	.084
		du	1.00	.085
		pl	.93	.090
	an	sg	.99	.088
		du	1.00	.092
		pl	.92	.089
	in	sg	.81	.090
		du	.83	.084
		pl	.61	.078

Appendix 1.2.3: comprehension, Verbs. (Means and Std. Errors).

Animacy

Animacy	Mean	Std. Error
h	.75	.022
an	.74	.023
ln	.54	.022

Gender

Gender	Mean	Std. Error
f	.65	.022
m	.69	.021

Number

Number	Mean	Std. Error
sg	.77	.022
du	.74	.022
pl	.52	.025

Age Group

Age Group	Mean	Std. Error
6	.36	.042
8	.61	.037
10	.73	.035
12	.83	.037
A	.86	.068

Animacy x age Group

Age Group	Animacy	Mean	Std. Error
6	h	.38	.046
	an	.40	.047
	ln	.29	.045
8	h	.73	.041
	an	.70	.042
	ln	.41	.040
10	h	.81	.038
	an	.82	.039
	ln	.55	.037
12	h	.88	.041
	an	.89	.042
	ln	.71	.040
A	h	.93	.074
	an	.91	.076
	ln	.73	.072

Number x age Group

Age Group	Number	Mean	Std. Error
6	sg	.41	.046
	du	.42	.047
	pl	.26	.052
8	sg	.76	.040
	du	.71	.041
	pl	.38	.046
10	sg	.82	.038
	du	.77	.039
	pl	.59	.043

Age Group	Number	Mean	Std. Error
12	sg	.90	.040
	du	.89	.041
	pl	.68	.046
A	sg	.95	.073
	du	.92	.075
	pl	.71	.083

Animacy x gender

Animacy	Gender	Mean	Std. Error
h	f	.74	.023
	m	.76	.024
an	f	.69	.025
	m	.79	.023
in	f	.54	.025
	m	.54	.023

Animacy x number

Animacy	Number	Mean	Std. Error
h	sg	.87	.025
	du	.78	.026
	pl	.59	.028
an	sg	.84	.024
	du	.81	.027
	pl	.58	.029
in	sg	.59	.029
	du	.63	.022
	pl	.39	.028

Gender x Number

Gender	Number	Mean	Std. Error
f	sg	.77	.023
	du	.75	.023
	pl	.45	.030
m	sg	.77	.023
	du	.73	.025
	pl	.59	.025

Animacy x gender x age Group

Age Group	Animacy	Gender	Mean	Std. Error
6	h	f	.41	.047
		m	.36	.049
	an	f	.38	.051
		m	.423	.048
	in	f	.25	.051
		m	.34	.047
8	h	f	.70	.042
		m	.76	.044
	an	f	.63	.045
		m	.77	.043
	in	f	.38	.046
		m	.43	.042
10	h	f	.81	.039
		m	.82	.041
	an	f	.76	.042
		m	.87	.040
	in	f	.57	.043
		m	.53	.039
12	h	f	.86	.042
		m	.89	.044

Age Group	Animacy	Gender	Mean	Std. Error
A	an	f	.84	.045
		m	.93	.043
	in	f	.72	.046
		m	.69	.042
	h	f	.91	.075
		m	.96	.079
	an	f	.87	.081
		m	.96	.078
	in	f	.76	.082
		m	.71	.076

Animacy x number x age Group

Age Group	Animacy	Number	Mean	Std. Error	
6	h	sg	.496	.051	
		du	.371	.054	
		pl	.280	.058	
	an	sg	.439	.049	
		du	.497	.056	
		pl	.266	.061	
	in	sg	.283	.059	
		du	.386	.046	
		pl	.219	.058	
	8	h	sg	.898	.045
			du	.804	.048
			pl	.492	.051
an		sg	.891	.043	
		du	.792	.050	
		pl	.416	.054	
in		sg	.476	.053	
		du	.519	.041	
		pl	.229	.051	
10	h	sg	.943	.042	
		du	.831	.045	
		pl	.668	.048	
	an	sg	.913	.041	
		du	.859	.047	
		pl	.680	.051	
	in	sg	.605	.049	
		du	.625	.038	
		pl	.426	.048	
	12	h	sg	.987	.045
			du	.928	.048
			pl	.730	.051
an		sg	.957	.043	
		du	.950	.050	
		pl	.751	.054	
in		sg	.763	.053	
		du	.809	.041	
		pl	.548	.051	
A		h	sg	1.000	.082
			du	.986	.087
			pl	.811	.093
	an	sg	1.000	.078	
		du	.950	.090	
		pl	.793	.098	
	in	sg	.850	.095	
		du	.821	.074	
		pl	.521	.093	

Gender x number x age Group

Age Group	Gender	Number	Mean	Std. Error
6	f	sg	.38	.047
		du	.42	.047
		pl	.24	.062
	m	sg	.44	.047
		du	.42	.051
		pl	.27	.051
8	f	sg	.75	.042
		du	.70	.042
		pl	.27	.054
	m	sg	.76	.041
		du	.71	.045
		pl	.49	.045
10	f	sg	.83	.039
		du	.79	.039
		pl	.51	.051
	m	sg	.81	.039
		du	.75	.042
		pl	.67	.042
12	f	sg	.91	.042
		du	.93	.042
		pl	.59	.054
	m	sg	.89	.041
		du	.87	.045
		pl	.77	.045
A	f	sg	.97	.076
		du	.93	.075
		pl	.63	.099
	m	sg	.93	.075
		du	.91	.082
		pl	.79	.081

Animacy x gender x number

Animacy	Gender	Number	Mean	Std. Error
h	f	sg	.864	.025
		du	.828	.027
		pl	.520	.034
	m	sg	.866	.026
		du	.740	.029
		pl	.673	.030
an	f	sg	.820	.027
		du	.803	.029
		pl	.461	.035
	m	sg	.860	.023
		du	.816	.029
		pl	.701	.031
in	f	sg	.615	.029
		du	.631	.025
		pl	.362	.037
	m	sg	.576	.033
		du	.633	.029
		pl	.416	.030

Appendix 1.2.4: comprehension, Collective nouns. (Means and Std. Errors).

Word type

Word type	Mean	Std. Error
n	.79	.024
adj	.76	.024
v	.62	.023

Animacy

Animacy	Mean	Std. Error
an	.72	.021
in	.74	.022

Gender

Gender	Mean	Std. Error
f	.71	.023
m	.74	.022

Age Group

Age Group	Mean	Std. Error
6	.36	.043
8	.73	.038
10	.79	.036
12	.85	.038
A	.91	.070

Word type x age Group

Age Group	W type	Mean	Std. Error
6	n	.32	.048
	adj	.39	.050
	v	.37	.050
8	n	.59	.043
	adj	.79	.044
	v	.83	.045
10	n	.71	.040
	adj	.79	.042
	v	.87	.042
12	n	.74	.043
	adj	.88	.044
	v	.94	.045
A	n	.78	.077
	adj	.99	.081
	v	.95	.081

Animacy x age Group

Age Group	Animacy	Mean	Std. Error
6	an	.33	.043
	in	.39	.046
8	an	.70	.038
	in	.76	.041
10	an	.76	.036
	in	.81	.038
12	an	.85	.038

Age Group	Animacy	Mean	Std. Error
	in	.85	.041
A	an	.92	.068
	in	.89	.074

Gender x age Group

Age Group	Gender	Mean	Std. Error
6	f	.38	.047
	m	.35	.046
8	f	.71	.042
	m	.76	.041
10	f	.75	.039
	m	.83	.038
12	f	.84	.042
	m	.88	.041
A	f	.91	.076
	m	.90	.074

Word type x animacy

W type	animacy	Mean	Std. Error
n	an	.65	.024
	in	.60	.025
ad	an	.73	.024
	in	.80	.026
v	an	.77	.025
	in	.81	.027

Word type x gender

W type	Gender	Mean	Std. Error
n	f	.63	.029
	m	.61	.032
adj	f	.71	.025
	m	.83	.026
an	f	.79	.025
	m	.78	.026

Word type x animacy x age Group

Age Group	W type	Animacy	Mean	Std. Error
6	n	an	.31	.051
		in	.33	.052
	adj	an	.34	.050
		in	.45	.055
	v	an	.35	.052
		in	.39	.055
8	n	an	.61	.045
		in	.57	.046
	adj	an	.72	.045
		in	.86	.048
	v	an	.79	.046
		in	.87	.049
10	n	an	.71	.042
		in	.70	.043
	adj	an	.76	.042
		in	.81	.045
	v	an	.83	.043
		in	.91	.046
12	n	an	.80	.045
		in	.67	.046

Age Group	W type	Animacy	Mean	Std. Error
A	adj	an	.83	.045
		in	.92	.048
	v	an	.92	.046
		in	.96	.049
	n	an	.82	.081
		in	.75	.083
	adj	an	.986	.081
		in	.99	.087
	v	an	.97	.083
		in	.93	.089

Word type x animacy x gender

W type	Animacy	Gender	Mean	Std. Error
n	an	f	.66	.031
		m	.64	.033
	in	f	.61	.034
		m	.59	.036
adj	an	f	.63	.024
		m	.83	.027
	in	f	.79	.029
		m	.82	.027
v	an	f	.79	.026
		m	.74	.030
	in	f	.79	.028
		m	.83	.028

Appendix 1.2.5: comprehension, Inanimate feminine nouns with no overt gender referent. (Means and Std. Errors).

Word type

W type	Mean	Std. Error
adj	1.21	.060
v	1.01	.060

Number

Number	Mean	Std. Error
du	1.31	.056
pl	.91	.061

Age Group

Age Group	Mean	Std. Error
6	.53	.103
8	.90	.091
10	1.13	.086
12	1.38	.091
A	1.61	.165

Word type x number

W type	Number	Mean	Std. Error
adj	du	1.30	.076
	pl	1.11	.075
v	du	1.31	.075
	pl	.77	.078

Appendix 2: Production.

Appendix 2.1 Production Stimuli.

Appendix 2.1.1: Stimuli for the human and animal nouns category.

Human nouns (feminine – singular).

Number	Form	English	Arabic
12	n-f-sg	Queen	ملكة
109	n-f-sg	Graduate	خريجه
217	n-f-sg	Nurse	ممرضة
298	n-f-sg	Singer	مغنيه
331	n-f-sg	Painter (artist)	رسامه
369	n-f-sg	Sails woman	سباعه

Human nouns (feminine – dual).

Number	Form	English	Arabic
33	n-f-du	Soldier	حديتان
38	n-f-du	Teacher	معلمتان
55	n-f-du	Bride	عروستان
197	n-f-du	Chemist	كيميائتان
235	n-f-du	Broadcaster	مذيعتان
357	n-f-du	Fire fighter	اطفائون

Human nouns (feminine – plural).

Number	Form	English	Arabic
27	n-f-pl	Doctor	طبيبات
42	n-f-pl	Instrument player	عازفات
123	n-f-pl	Witch	ساحرات
176	n-f-pl	Teacher	علميات
309	n-f-pl	Architect	مهندسات
389	n-f-pl	Boxer	ملاكمات

Human nouns (masculine – singular).

Number	Form	English	Arabic
11	n-m-sg	Baker	خباز
182	n-m-sg	Carpenter	نجار
204	n-m-sg	Chemist	كيميائي
294	n-m-sg	Cook	طباخ
378	n-m-sg	Doctor	طبيب
390	n-m-sg	Broadcaster	مذيع

Human nouns (masculine – dual).

Number	Form	English	Arabic
78	n-m-du	Swimmer	ساحان
131	n-m-du	Plumbers	ساكان
132	n-m-du	Divers	غطاسان

Number	Form	English	Arabic
156	n-m-du	Boxers	مصارعان
195	n-m-du	Photographers	مصوران

Human nouns (masculine – plural).

Number	Form	English	Arabic
62	n-m-pl	Player	لاعبون
86	n-m-pl	Singer	مغنون
207	n-m-pl	Pirate	قراصنة
257	n-m-pl	Fire fighter	اطفاةيون
322	n-m-pl	Student	طلاب
361	n-m-pl	Pilot	طيارون

Animal (feminine nouns – singular).

Number	Form	English	Arabic
129	n-f-sg	Penguin	بطريقه
234	n-f-sg	Shark	قرشه
256	n-f-sg	Parrot	مغناةه
310	n-f-sg	Bat	وطواطه
355	n-f-sg	Elephant	فيله
388	n-f-sg	Falcon	صقره

Animal (feminine nouns – dual).

Number	Form	English	Arabic
8	n-f-du	Spider	عنكروتان
96	n-f-du	Turtle	سلحفتان
117	n-f-du	Bat	وطاطان
188	n-f-du	Octopus	أخطوطان
291	n-f-du	Mouse	فارتان
306	n-f-du	Dinosaur	ديناصورتان

Animal (feminine nouns – plural).

Number	Form	English	Arabic
10	n-f-pl	Bird	عصفورات
89	n-f-pl	Crocodile	تمساحات
121	n-f-pl	Wolf	ذئبات
194	n-f-pl	Monkey	قرودات
258	n-f-pl	Fox	ثعلبات
336	n-f-pl	Octopus	أخطوطات

Animal (masculine nouns – singular).

Number	Form	English	Arabic
22	n-m-sg	Tiger	مر
25	n-m-sg	Eagle	سر
118	n-m-sg	Frog	صمصع
245	n-m-sg	Chick	كنكوت
274	n-m-sg	Elephant	فيل
307	n-m-sg	Scorpion	عقرب

Animal (masculine nouns – dual).

Number	Form	English	Arabic
61	n-m-du	Fox	ثعلبان
85	n-m-du	Bear	دباز
108	n-m-du	Dog	كلبان
177	n-m-du	Penguin	طريقان
216	n-m-du	Rabbit	أرنبان
278	n-m-du	Parrot	ضفدئان

Animal (masculine nouns – plural).

Number	Form	English	Arabic
37	n-m-pl	Whale	حيتان
153	n-m-pl	Dragon	تنانين
237	n-m-pl	Spider	عناكب
293	n-m-pl	Peacock	طراويس
321	n-m-pl	Turtle	سلاحف
368	n-m-pl	Donkey	حمير

Appendix 2.1.2: Stimuli for the adjective category.

Human (adjective – feminine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
100	Adj-f-sg	Woman	In a hurry	سيده	مستمحله
113	Adj-f-sg	Woman	Late	سيده	متنطره
128	Adj-f-sg	Woman	Old	سيده	محرزه
200	Adj-f-sg`	Woman	Hot	سيده	حرانه
311	Adj-f-sg	Woman	Proud	سيده	فخوره
376	Adj-f-sg	Woman	Sleepy	سيده	نعسانه

Human (adjective – feminine – dual).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
158	Adj-f-du	Clown	Overtuned	مهرجتان	معكروستان
239	Adj-f-du	Girl	Frozen	بنتان	مفرزتان
266	Adj-f-du	Girl	Poor	بنتان	مسكينتان
313	Adj-f-du	Woman	Upset	سدتان	متصاقتان
323	Adj-f-du	Woman	Ill	سيدتان	مرصتان
374	Adj-f-du	Woman	Tied	سدتان	مربوطتان

Human (adjective – feminine – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
44	Adj-f-pl	Girl	Shy	بنات	خجولات
184	Adj-f-pl	Woman	With pain	سيدات	مصدمات
284	Adj-f-pl	Girl	Punished	بنات	معاقيات
364	Adj-f-pl	Woman	Scared	سيدات	مرعوبات
393	Adj-f-pl	Woman	Pregnant	سدات	مولامل
400	Adj-f-pl	Woman	Fast	سيدات	صربات

Human (adjective – masculine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
39	Adj-m-sg	Man	Puzzled	جل	حيران
56	Adj-m-sg	Man	Strong	جل	قوي
82	Adj-m-sg	Man	Angry	جل	غصان
143	Adj-m-sg	Man	Ill	جل	مرض
220	Adj-m-sg	Man	Upset	جل	متصايق
333	Adj-m-sg	Man	Frozen	جل	متجمد

Human (adjective – masculine – dual).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
14	Adj-m-du	Man	Terrified	رجلان	مزعومان
48	Adj-m-du	Man	Broke	رجلان	معلسان
90	Adj-m-du	Man	Late	رجلان	متظران
262	Adj-m-du	Man	Bored	رجلان	ضفشانان
297	Adj-m-du	Boy	Cold	ولدان	مردانان
330	Adj-m-du	Man	Exhausted	رجلان	مزعفان

Human (adjective – masculine – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
114	Adj-m-pl	Director	Happy	مخرجون	فرحون
190	Adj-m-pl	Man	Old	رجال	عجائز
209	Adj-m-pl	Man	Fat	رجال	سمان
241	Adj-m-pl	Clown	Sad	مخرجون	حزينون
248	Adj-m-pl	Man	Hot	رجال	حراون
338	Adj-m-pl	Man	Hungry	رجال	جائعون

Animal (adjective – feminine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
16	Adj-f-sg	Shark	Wicked	قرشه	شريره
45	Adj-f-sg	Cat	Elegant	قطه	متأنده
145	Adj-f-sg	Dog	Wet	كله	مبلوله
169	Adj-f-sg	Bear	Sad	دب	شيره
198	Adj-f-sg	Turtle	Sleepy	سلحفاه	نعسانه

Animal (adjective – feminine – dual).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
101	Adj-f-du	Elephant	Big	فيلتان	كسرتان
116	Adj-f-du	Monkey	Tired	قردتان	مزعفان
210	Adj-f-du	Frog	In a shock	ضفصفتان	مذهولتان
334	Adj-f-du	Giraffe	High	زرافتان	عاليتان
343	Adj-f-du	Dog	Tied	كلتان	مربوطتان
379	Adj-f-du	Tiger	Fast	فرتان	سريعتان

Animal (adjective – feminine – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
70	Adj-f-pl	Dog	Sleepy	كلات	نعسانات
215	Adj-f-pl	Cat	Red	سبات	حمرات
250	Adj-f-pl	Bird	Cold	عصفريات	بردات
263	Adj-f-pl	Elephant	Arrogant	فيلات	معدورات
269	Adj-f-pl	Elephant	Tied	فيلات	مربوطات
380	Adj-f-pl	Elephant	Broken	فيلات	حطمت

Animal (adjective – masculine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
63	Adj-m-sg	Mouse	Late	فأر	متأخر
159	Adj-m-sg	Dog	Ill	كلب	مريض
212	Adj-m-sg	Elephant	Scared	فيل	خائف
267	Adj-m-sg	Mouse	Hungry	فأر	جائع
335	Adj-m-sg	Frog	Blue	صعصع	أزرق
394	Adj-m-sg	Penguin	Sad	بطريق	حزين

Animal (adjective – masculine – dual).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
17	Adj-m-du	Monkey	Thirsty	قردان	عطشانان
57	Adj-m-du	Bear	Cold	دببان	بردانان
92	Adj-m-du	Tiger	Caged	فيران	محصوران
181	Adj-m-du	Eagle	Strong	نسران	قويان
270	Adj-m-du	Cat	Dizzy	قطان	دائبان
285	Adj-m-du	Dog	Wicked	كلبان	شريران

Animal (adjective – masculine – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
18	Adj-m-pl	Snake	Rapt around	ثعابين	مفترقه
19	Adj-m-pl	Rabbit	Wet	ارانب	مبلوله
93	Adj-m-pl	Mouse	In a hurry	فيران	مستعجله
191	Adj-m-pl	Elephant	Sad	فيله	حزبه
224	Adj-m-pl	Dog	Hungry	كلاب	جائع

Inanimate (adjective – feminine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
72	Adj-f-sg	Ball	On fire	كره	مشتمله
88	Adj-f-sg	Paper	Scared	ورقه	خائفه
126	Adj-f-sg	Car	Exhausted	سياره	مرهفه
172	Adj-f-sg	Spoon	Full	ملعنه	ممتلئه
327	Adj-f-sg	Lamp	Broken	لمبه	مكسوره
337	Adj-f-sg	Roller	Black	مسطره	سوداء

Inanimate (adjective – feminine – dual).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
46	Adj-f-du	Soup	Hot	شربتان	ساخشان
137	Adj-f-du	Sharpener	Green	مرابشان	خضراوتان
162	Adj-f-du	Car	In love	سيارتان	محبشان
164	Adj-f-du	Present	Open	هديتان	مفتوحتان
244	Adj-f-du	Faucet	Angry	حفتان	مغصشان

Number	Form	English	Arabic
272	Adj-f-du	Candle	شمعاتان

Inanimate (adjective – feminine – plural).

Number	Form	English	Arabic		
		Noun	Adjective / target		
		Noun	Adjective / target		
174	Adj-f-pl	Faust	Broken	حقيبات	خرابانه
252	Adj-f-pl	Watch	Tired	ساعات	مرهقه
299	Adj-f-pl	Receiver	Hot	ساعات	حرايه
381	Adj-f-pl	Ship	Happy	سفن	سعيده

Inanimate (adjective – masculine – singular).

Number	Form	English	Arabic		
		Noun	Adjective / target		
		Noun	Adjective / target		
161	Adj-m-sg	Computer	In a hurry	حاسب	مستعجل
201	Adj-m-sg	Television	Ill	تلفزيون	مرضى
271	Adj-m-sg	Microphone	Angry	مكرفون	مغضب
289	Adj-m-sg	Drawer	Open	درج	مفتوح
324	Adj-m-sg	Notebook	Sad	دفتر	حزين
385	Adj-m-sg	'Tea pot	Hot	براد	حار

Inanimate (adjective – masculine – dual).

Number	Form	English	Arabic		
		Noun	Adjective / target		
		Noun	Adjective / target		
179	Adj-m-du	Microphone	Happy	مكروفونان	انسجيد
199	Adj-m-du	Ladder	High	سلمان	عالان
236	Adj-m-du	Plug	Red	فبشان	حمران
251	Adj-m-du	Scissor	Closed	مقصان	مغفلان
325	Adj-m-du	Pen	Broken	قلمان	مكسوران
345	Adj-m-du	Pen	Frozen	قلمان	مشلحان

Inanimate (adjective – masculine – plural).

Number	Form	English	Arabic		
		Noun	Adjective / target		
		Noun	Adjective / target		
21	Adj-m-pl	Teeth	Decay	اسان	مسرجه
119	Adj-m-pl	Heart	Puzzled	قلوب	مذبوله
273	Adj-m-pl	Star	Blue	نجوم	زرقاء
275	Adj-m-pl	Computer	Upset	كمبيوترات	منصايقه
340	Adj-m-pl	Sword	Angry	سيوف	غاصه
346	Adj-m-pl	Television	Happy	تلفزيونات	سعيده

Appendix 2.1.3: Stimuli for the verb category.

Human (feminine – verb – singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
30	f-v-sg	Woman	Smelling	سيده	تشم
49	f-v-sg	Girl	Reading	بنت	تقرأ
107	f-v-sg	Woman	Swimming	سيده	تسبح
246	f-v-sg	Woman	Thinking	سيده	تفكر
281	f-v-sg	Woman	Raiding	بنت	تركب
344	f-v-sg	Woman	Sleeping	سيده	تنام

Human (feminine – verb – dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
1	f-v-du	Woman	Carrying	سيدتان	تحملان
64	f-v-du	Woman	Planting	سيدتان	تزرعان
135	f-v-du	Girl	Pushing	فتاتان	تدفعان
314	f-v-du	Girl	Sawing	بنتان	تخيطان
318	f-v-du	Woman	Crying	سيدتان	تنبهان
341	f-v-du	Woman	Eating	سيدتان	تأكلان

Human (feminine – verb – plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
24	f-v-pl	Woman	Working	سيديات	تعملن
68	f-v-pl	Woman	Pulling	سيديات	يخرجن
254	f-v-pl	Woman	Photographing	سيديات	يصورن
276	f-v-pl	Woman	Talking	نساء	تتحدثن
279	f-v-pl	Woman	Sliding	بنات	تتزلجن
351	f-v-pl	Woman	Hanging	سيديات	تشنرن

Human (masculine – verb – singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
69	m-v-sg	Boy	Drawing	ولد	يرسم
95	m-v-sg	Boy	Watering	ولد	يسقي
139	m-v-sg	Man	Caring	رجل	يحمل
185	m-v-sg	Boy	Writing	ولد	يكتب
277	m-v-sg	Man	Looking	رجل	يظر
365	mf-v-sg	Man	Paying	رجل	يدفع

Human (masculine – verb – dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
170	m-v-du	Man	Peeling	رجلان	يقشران
213	m-v-du	Man	Hiding	رجلان	يختبئان
218	m-v-du	Man	Singing	رجلان	يغنون
230	m-v-du	Man	Showering	رجلان	يتحشمان
282	m-v-du	Man	Driving	رجلان	يسوقان
316	m-v-du	Doctor	Examining	طيسان	يكشفان

Human (masculine - verb - plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
60	m-v-pl	Man	Hammering	رجال	بمقرن
105	m-v-pl	Man	Cleaning	رجال	بنظفون
120	m-v-pl	Man	Falling	رجال	بهمرون
168	m-v-pl	Man	Calling	رجال	بنادون
211	m-v-pl	Boy	Raiding	أولاد	بركعون
226	m-v-pl	Man	Talking	رجال	بتكلمون

Animal (feminine - verb - singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
50	f-v-sg	Turtle	Walking	سلحماه	مشي
98	f-v-sg	Cat	Playing an instrument	قطه	تعرف
122	f-v-sg	Chick	Sleeping	كتكوتنه	تنام
140	f-v-sg	Elephant	Pointing	فيله	تشارر
265	f-v-sg	Mouse	Holding	فاره	تسك
347	f-v-sg	Frog	Swimming	صنصنه	يسبح

Animal (feminine - verb - dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
41	f-v-du	Cat	Dancing	قطتان	ترقصان
146	f-v-du	Horse	Flying	فرستان	تطيران
295	f-v-du	Turtle	Laughing	سلحفتان	تضحكان
317	f-v-du	Bear	Smelling	دبتاز	تشمان
326	f-v-du	Penguin	Skating	بطريقتان	تزلجان
370	f-v-du	Bear	Showering	دبتاز	تتحمان

Animal (feminine - verb - plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
142	f-v-pl	Bird	Yawning	عصفورات	تثابت
148	f-v-pl	Monkey	Covering	قردات	تغطي
178	f-v-pl	Cat	Running	بسات	يجري
192	f-v-pl	Dog	Eating	كلبات	تأكلن
359	f-v-pl	Cat	Sleeping	بسات	تنام
395	f-v-pl	Bear	Singing	دبات	تغني

Animal (masculine - verb - singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
2	m-v-sg	Monkey	Carrying	قرد	يحمل
52	m-v-sg	Crocodile	Crying	تمساح	يبكي
77	m-v-sg	Bull	Driving	ثور	يسوق
283	m-v-sg	Crocodile	Opening	تمساح	يفتح

Animal (masculine - verb - dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
110	m-v-du	Donkey	Shouting	عماران	يهتجان

Number	Form	English	Arabic
173	m-v-du	Monkey Boxing	قردان برنون
186	m-v-du	Rabbit Holding	لوزيان بسكان
228	m-v-du	Mouse Eating	فاران باكلان
303	m-v-du	Frog Running	صمصمان بحريان
392	m-v-du	Mouse Hiding	فاران بختيان

Animal (masculine - verb - plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
133	m-v-pl	Bear	Riding	ديبا	ترك
136	m-v-pl	Mouse	Sliding	فزان	تفزلح
160	m-v-pl	Frog	Composing	صفاصع	تريف
180	m-v-pl	Turtle	Sitting	صلاحف	لجلس
183	m-v-pl	Rabbit	Shopping	اران	تتسوق
366	m-v-pl	Cat	Swinging	قطط	تترجح

Inanimate (feminine - verb - singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
125	f-v-sg	Receiver	Running	سماعة	عجري
259	f-v-sg	Ball	Jumping	كرة	تقفز
305	f-v-sg	Car	Standing	سيارة	تقف
396	f-v-sg	Airplane	Smiling	طائرة	تبتسم

Inanimate (feminine - verb - dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
76	f-v-du	Brush	Walking	فرشان	تشان
102	f-v-du	Airplane	Smiling	طائرتان	تبتسمان
112	f-v-du	Lamp	Pointing	لمعان	تشران
202	f-v-du	Feeding bottle	Going out	وصاعتان	تخرجان
348	f-v-du	Drum	Drumming	طبلتان	تطلان
360	f-v-du	Paper	Running	ورقتان	تجريان

Inanimate (feminine - verb - plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
4	f-v-pl	Star	Shooting	نجوم	تطلقن
5	f-v-pl	Fork	Walking	شوك	تمشي
34	f-v-pl	Handbag	jumping	حقائب	تقفز
75	f-v-pl	Hat	Crying	تبعات	تبكي
83	f-v-pl	Lamp	Running	لمبات	عجري
319	f-v-pl	Airplane	Screaming	طائرات	تصرخ

Inanimate (masculine - verb - singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
28	m-v-sg	Sword	Walking	سيف	تمشي
32	m-v-sg	Tooth	Brushing	سن	يبرش
231	m-v-sg	Hart	Eating	قلب	ياكل

Number	Form	English		Arabic	
268	m-v-sg	Finger	Pressing	اصبع	مصط
286	m-v-sg	Computer	Explaining	كمبيوتر	شرح
367	mf-v-sg	Microphone	Dancing	مكرفون	برقص

Inanimate (masculine - verb - dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
53	m-v-du	Scissor	Cutting	مقصان	يقصان
59	m-v-du	Pen	Writing	قلمان	يكتبان
79	m-v-du	Pen	Dancing	قلمان	يرقصان
147	m-v-du	Notebook	Jumping	دفتران	يقفزان
287	m-v-du	Box	Carrying	صندوقان	يحملان
300	m-v-du	Computer	Thinking	كمبيوتران	يفكران

Inanimate (masculine - verb - plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
225	m-v-pl	Phone	Ringing	هواتف	رن
288	m-v-pl	Book	Flying	كتب	تطير
328	m-v-pl	Screwdriver	Turning	مفكات	تلك
349	m-v-pl	Scissor	Standing	مقصات	تقف
372	m-v-pl	Radio	Dancing	وادي	ترقص

Appendix 2.1.4: Stimuli for the collective nouns category.

Collective animal nouns (feminine – singular).

Number	Form	English	Arabic
94	n-f-sg	Swan	حمامة
106	n-f-sg	Chicken	دجاج
203	n-f-sg	Owl	بومة
214	n-f-sg	Bee	نحلة
222	n-f-sg	Deer	غزاله
229	n-f-sg	Butterfly	فراشه

Collective animal nouns (masculine – plural).

Number	Form	English	Arabic
31	n-m-pl	Duck	بط
54	n-m-pl	Fly	فناير
150	n-m-pl	Ant	نمل
243	n-m-pl	Cow	بقرة
264	n-m-pl	Worm	دود
377	n-m-pl	Fish	سمك

Collective inanimate nouns (feminine – singular).

Number	Form	English	Arabic
40	n-f-sg	Orange	برتقاله
84	n-f-sg	Date tree	نخلة
292	n-f-sg	Plant	زرعه
304	n-f-sg	Lemon	ليمونه
320	n-f-sg	Watermelon	بطيخه
386	n-f-sg	Apple	تفاحه

Collective inanimate nouns (masculine – plural).

Number	Form	English	Arabic
7	n-m-pl	Egg	بيض
144	n-m-pl	Tree	شجر
163	n-m-pl	Carrot	جزر
223	n-m-pl	Flower	ورد
255	n-m-pl	Banana	موز
354	n-m-pl	Feather	ريش

Animal collective (adjective – feminine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
154	Adj-f sg	Bee	Sad	نحلة	حزينه
166	Adj-f sg	Cow	Dirty	بقرة	وسخه
280	Adj-f sg	Owl	Upset	بومة	فاسده
342	Adj-f sg	Butterfly	Puzzled	فراشه	متفاجئه
352	Adj-f sg	Deer	Tired	غزاله	تعبانه
356	Adj-f sg	Worm	Happy	دود	سعيد

Animal collective (adjective – masculine – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
29	Adj-m-pl	Cow	Puzzled	بقرة	حيران
47	Adj-m-pl	Bee	Nice	حل	ظريف
67	Adj-m-pl	Bee	Angry	حل	فصيان
81	Adj-m-pl	Butterfly	Happy	فراش	سعيد
138	Adj-m-pl	Duck	Wet	بط	مبلول
387	Adj-m-pl	Fish	Strong	سمك	قوي

Inanimate collective (adjective – feminine – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
9	Adj-f sg	Candle	Puzzled	شمعة	حيرانه
167	Adj-f sg	Banana	Sad	بروزة	حزينة
206	Adj-f sg	Candle	Burning	شمعة	متشعله
253	Adj-f sg	Apple	Rotten	تفاحة	خرابه
315	Adj-f sg	Flower	Happy	وردة	سعيدة
350	Adj-f sg	Flower	Scared	وردة	خائفه

Inanimate collective (adjective – masculine – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
20	Adj-m-pl	Apple	Happy	تفاح	سعيد
91	Adj-m-pl	Limon	Sad	ليمون	حزين
130	Adj-m-pl	Apple	Eaten	تفاح	مأكول
152	Adj-m-pl	Apple	Hot	تفاح	حار
165	Adj-m-pl	Egg	Happy	بيض	سعيد
193	Adj-m-pl	Egg	Broken	بيض	مكسور

Collective animal (feminine – verb – singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
36	f-v-sg	Bee	Smelling	نحلة	تشم
115	f-v-sg	Duck	Reading	بطة	تقرأ
233	f-v-sg	Cow	Jumping	بقرة	تقفز
240	f-v-sg	Owl	Writing	بومة	تكتب
339	f-v-sg	Sheep	Driving	غمة	تسوق
397	f-v-sg	Fish	Fishing	سمكة	تصطاد

Collective animal (masculine – verb – plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
73	m-v-pl	Fish	Screaming	سمك	يصرخ
149	m-v-pl	Butterfly	Standing	فراش	يقف
301	m-v-pl	Duck	Skating	بط	يتزلج
302	m-v-pl	Sheep	Jumping	غمة	يقفز
383	m-v-pl	Sheep	Sitting	غمة	يجلس

Collective inanimate (feminine – verb – singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
65	f-v-sg	Apple	Singing	تفاحة	تغني
74	f-v-sg	Banana	Dancing	بندوة	ترقص
227	f-v-sg	Egg	Turning	بيضة	تثقل
290	f-v-sg	Apple	Smiling	تفاحة	تسبح
373	f-v-sg	Egg	Sleeping	بيضة	تنام

Collective inanimate (masculine – verb – plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
175	m-v-pl	Banana	Running	موز	يجري
363	m-v-pl	Apple	Climbing	تفاح	يطلع
375	m-v-pl	Cloud	Blowing	سحاب	يصف
384	m-v-pl	Candle	Singing	شمع	يجني
398	m-v-pl	Flower	Laughing	ورد	يضحك

Appendix 2.1.5: Stimuli for the quantified nouns category.

Quantified human feminine nouns (3 – 10)

Number	Form	English	Arabic
87	Num – n-f-pl	9 painters	٩ رسامات
141	Num – n-f-pl	10 composers	١٠ عازفات
155	Num – n-f-pl	5 brides	٥ عرائس
232	Num – n-f-pl	4 queens	٤ ملكات

Quantified human feminine nouns (11+)

Number	Form	English	Arabic
26	Num – n-f	11 girls	١١ بنات
157	Num – n-f	13 photographer	١٣ مصورة
189	Num – n-f	12 teacher	١٢ معلمة
332	Num – n-f	17 singers	١٧ مغنية

Quantified human masculine nouns (3 – 10)

Number	Form	English	Arabic
15	Num – n-m	3 fire fighters	٣ اطفائيين
80	Num – n-m	7 photographers	٧ مصورون
111	Num – n-m	6 boys	٦ اولاد
219	Num – n-m	8 officers	٨ عسكريين
371	Num – n-m	5 divers	٥ غواصين

Quantified human masculine nouns (11+)

Number	Form	English	Arabic
43	Num – n-m	15 painters	١٥ رسام
127	Num – n-m	12 composers	١٢ عازف
205	Num – n-m	16 clowns	١٦ مهرج
247	Num – n-m	14 cook	١٤ طباخ

Quantified animal feminine nouns (3 – 10)

Number	Form	English	Arabic
35	Num – n-f-pl	3 octopuses	٣ أحطوطات

Quantified animal feminine nouns (11+)

Number	Form	English	Arabic
51	Num – n-f	17 Giraffes	١٧ زرافة

Quantified animal masculine nouns (3 – 10)

Number	Form	English	Arabic
104	Num – n-m-pl	9 birds	٩ عصافير
187	Num – n-m-pl	7 donkeys	٧ حمير
196	Num – n-m-pl	6 whales	٦ حيتان
362	Num – n-m-pl	8 dogs	٨ كلاب
208	Num – n-m-pl	4 sheep	٤ خراف

Quantified animal masculine nouns (11+)

Number	Form	English	Arabic
3	Num - n-f	11 dinosaurs	١١ ديناصور
97	Num - n-f	12 spiders	١٢ عنكبوت
124	Num - n-f	14 elephants	١٤ فيل
238	Num - n-f	18 chicks	١٨ كتكوت
261	Num - n-f	20 rabbits	٢٠ أرنب

Quantified inanimate feminine nouns (3 - 10)

Number	Form	English	Arabic
296	Num - n-f-pl	4 umbrellas	٤ شمسات
358	Num - n-f-pl	6 faucets	٦ حفيات
382	Num - n-f-pl	10 lamps	١٠ لمبات

Quantified inanimate feminine nouns (11+)

Number	Form	English	Arabic
58	Num - n-f	11 cameras	١١ كاميرا
249	Num - n-f	20 glasses	٢٠ نظارة
312	Num - n-f	18 sharpeners	١٨ رايه

Quantified inanimate masculine nouns (3 - 10)

Number	Form	English	Arabic
13	Num - n-m	5 bells	٥ أجراس
308	Num - n-m	9 television	٩ تلفزيونات
391	Num - n-m	5 books	٥ كتب

Quantified inanimate masculine nouns (11+)

Number	Form	English	Arabic
99	Num - n-m	15 boxes	١٥ صندوق
134	Num - n-m	17 scissors	١٧ مقص
171	Num - n-m	13 rings	١٣ خاتم

Appendix 2.1.6: Stimuli for the inanimate feminine nouns with no overt gender referent category.

Inanimate (feminine nouns with no overt gender) (adjective – singular).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
23	Adj-f-sg	Earth	Exhausted	الأرض	مرهقه
329	Adj-f-sg	Earth	Rapt	الأرض	مليفة

Inanimate (feminine nouns with no overt gender) (adjective – dual).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
71	Adj-f-du	Foot	Red	قدمان	حمراوان
151	Adj-f-du	Fire	Happy	ناران	سعيدتان

Inanimate (feminine nouns with no overt gender) (adjective – plural).

Number	Form	English		Arabic	
		Noun	Adjective / target	Noun	Adjective / target
66	Adj-f-pl	Hand	Green	أيادي	خضراء
103	Adj-f-pl	Eye	Angry	أعين	غضابه

Inanimate (feminine nouns with no overt gender) (feminine – verb - singular).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
6	f-v-sg	Sun	Dressing	شمس	تلبس
242	f-v-sg	Hand	Writing	يد	تكتب

Inanimate (feminine nouns with no overt gender) (feminine – verb - dual).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
221	f-v-du	Earth	Walking	ارضان	تمشيان
399	f-v-du	Fire	Running	ناران	تجريان

Inanimate (feminine nouns with no overt gender) (feminine – verb - plural).

Number	Form	English		Arabic	
		Noun	Verb / target	Noun	Verb / target
260	f-v-pl	Foot	Crying	اقدام	تبكي
353	f-v-pl	Sun	Showering	شموس	تستحم

Appendix 2.1.7: The story used for the (nouns and verbs) novel nouns

category.

The story used for this task starts with (I will need you to help me to complete some of the blanks ... the astronaut did not write, so the story started when a space shuttle left earth to explore the wide space, after a long time in space the astronaut saw a strange planet, so he landed the shuttle on that planet, and went down to explore the place, and there he saw a very strange creature, and that creature was dahshur²⁰ دحشور and then he saw dahshurah دحشوره then dahshurat دحشورات , and dahshuran دحشوران , and dahashir دحاشير , then dahshuratan دحشورتان , after that he saw dahshur cooking يطبخ and dahshuratan running دحشورتان تجريان , while dahshuran are playing a musical instrument دحشوران يعزفان and dahshurat whistling دحشورات تصفرن , and dahashir riding bikes دحاشير يركبون , but when he was leaving that part of the planet he saw dahshura crying دحشوره تبهكي , after that he saw rakah and rak راک then he saw rakatan راکتان and rakarik راکارک , and rakat راکات and rakan راکان . And when he was walking he saw another strange creature and that was zaruq زروق and zaruqah زروقه and zaruqan زروقان and zaruqat زروقات , and zarariq زارریق and zaruqatan زروقتان , then he saw zaruqah driving زروقه تسوق and zarariqat playing زارریقات تلعب and zarariq running زارریق يجرى while zaruqatan are carrying زروقتان محملان , then when the astronaut was leaving that part of the planet he saw zaruqan crying زروقان يبكيان , after that he saw qurah and qur قور , and quratan قورتان , and qararir قرارير , and qurat قورات , and quran قرارير بطلعون , then he saw qurat sleeping قورات تنمن and qararir sting tong out قرارير بطلعون , then he saw tarimah طاريمه and tarim طاريم , and fakur, and fakurah فکور , he also saw allunah and allun ألون , then he saw allun screaming ألون يصرخ and allunan waving ألون يرتص . while allun is dancing ألون يرقص , while allun is dancing ألون يرقص and allunatan drinking ألونتان يشاوران . And the last group of creatures the astronaut saw were qit and qitah قيته , and qitatan قيتاتان where cooking قيتاتان تطبخان , and qiyatah eating قيتاتان ياكلون قيته , and qitah sliding قيتاتان تسبحن قيتاتان , while qitan drumming قيتان يطبلان , and qitat swimming قيتاتان تسبحن قيتاتان and qit playing a musical instrument قيت يعزف . After that the astronaut left that strange planet and returned to earth with the pictures of the things he saw on his journey in space).

²⁰ All the words in the story used to test the novel words production that are underlined are the novel words the experimenter will produce in front of the child, and the bold words are the words expected from the child to produce.

Appendix 2.2: Production results:**Appendix 2.2.1: Production, human and animal nouns. (Means and Std. Errors).****Animacy**

Animacy	Mean	Std. Error
h	.70	.02
an	.48	.02

Noun Gender

Gender	Mean	Std. Error
f	.52	.02
m	.65	.01

Number

Number	Mean	Std. Error
sg	.713	.021
du	.600	.026
pl	.453	.020

Age Group

Age Group	Mean	Std. Error
6	.31	.03
8	.56	.03
10	.63	.03
12	.71	.03
A	.72	.06

Animacy x age Group

Age Group	Animacy	Mean	Std. Error
6	h	.38	.03
	m	.24	.03
8	h	.67	.03
	m	.45	.0
10	h	.75	.03
	m	.51	.03
12	h	.83	.03
	m	.59	.03

A	h	.86	.06
	m	.57	.06

Noun gender x age group

Age Group	Gender	Mean	Std. Error
6	f	.24	.03
	m	.38	.03
8	f	.53	.03
	m	.59	.03
10	f	.57	.03
	m	.70	.03
12	f	.68	.03
	m	.73	.03
A	f	.60	.06
	m	.84	.06

Number x age group

Age Group	Number	Mean	Std. Error
6	sg	.45	.03
	du	.32	.04
	pl	.15	.03
8	sg	.73	.03
	du	.59	.04
	pl	.35	.03
10	sg	.75	.03
	du	.68	.04
	pl	.47	.03
12	sg	.78	.03
	du	.76	.04
	pl	.58	.03
A	sg	.83	.07
	du	.64	.08
	pl	.68	.06

Animacy X noun gender

Animacy	Gender	Mean	Std. Error
h	f	.67	.02
	m	.72	.02
an	f	.37	.02
	m	.57	.02

Animacy x number

Animacy	Number	Mean	Std. Error
h	sg	.85	.02
	du	.66	.03
	pl	.58	.02

an	sg	.57	.02
	du	.53	.02
	pl	.31	.02

Noun gender x number

Gender	Number	Mean	Std. Error
f	sg	.60	.02
	du	.50	.02
	pl	.47	.02
m	sg	.82	.02
	du	.69	.03
	pl	.43	.02

Animacy x number x age Group

Age Group	Animacy	Number	Mean	Std. Error
6	f	sg	.55	.04
		du	.39	.05
		pl	.18	.04
	m	sg	.35	.05
		du	.25	.05
		pl	.12	.04
8	f	sg	.89	.04
		du	.64	.05
		pl	.47	.04
	m	sg	.58	.05
		du	.54	.05
		pl	.23	.04
10	f	sg	.88	.04
		du	.73	.05
		pl	.64	.04
	m	sg	.61	.04
		du	.62	.05
		pl	.30	.03
12	f	sg	.92	.04
		du	.80	.05
		pl	.75	.04
	m	sg	.64	.05
		du	.71	.05
		pl	.41	.04
A	f	sg	.98	.07
		du	.73	.10
		pl	.87	.08
	m	sg	.68	.09
		du	.55	.09
		pl	.50	.07

Animacy x noun gender x number

Animacy	Gender	Number	Mean	Std. Error
h	f	sg	.84	.02
		du	.58	.04
		pl	.59	.03
	m	sg	.85	.02
		du	.74	.03
		pl	.58	.03
an	f	sg	.36	.03
		du	.42	.03
		pl	.34	.03

m	sg	.78	.03
	du	.65	.03
	pl	.28	.02

Appendix 2.2.2: Production, Adjective. (Means and Std. Errors).**Animacy**

Animacy	Mean	Std. Error
h	.51	.015
an	.39	.016
in	.50	.014

Gender

Gender	Mean	Std. Error
f	.42	.013
m	.52	.015

Number

Number	Mean	Std. Error
sg	.83	.016
du	.25	.024
pl	.33	.015

Age group

Age Group	Mean	Std. Error
6	.31	.023
8	.42	.023
10	.48	.022
12	.55	.023
A	.6	.042

Animacy x age group

Age Group	Animacy	Mean	Std. Error
6	h	.34	.028
	an	.24	.030
	in	.33	.026
8	h	.46	.028
	an	.36	.029
	in	.45	.026
10	h	.56	.026
	an	.39	.027
	in	.49	.024
12	h	.62	.028
	an	.47	.029
	in	.55	.026
A	h	.59	.050
	an	.51	.053
	in	.69	.047

Number x age group

Age Group	Number	Mean	Std. Error
6	sg	.71	.030
	du	.06	.045
	pl	.15	.029
8	sg	.88	.029
	du	.18	.044
	pl	.21	.028
10	sg	.84	.027
	du	.28	.042
	pl	.31	.026
12	sg	.86	.029

Age Group	Number	Mean	Std. Error
A	du	.39	.044
	pl	.39	.028
	sg	.86	.053
	du	.32	.080
	pl	.59	.051

Animacy x gender

Animacy	Gender	Mean	Std. Error
h	f	.45	.016
	m	.58	.020
an	f	.34	.019
	m	.44	.018
in	f	.47	.016
	m	.53	.017

Animacy x number

Animacy	Number	Mean	Std. Error
h	sg	.89	.020
	du	.27	.028
	pl	.37	.023
an	sg	.71	.022
	du	.21	.027
	pl	.26	.020
in	sg	.89	.021
	du	.25	.027
	pl	.36	.020

Animacy x number x age group

Age Group	Animacy	Number	Mean	Std. Error
6	h	sg	.81	.037
		du	.06	.053
		pl	.16	.043
	an	sg	.57	.042
		du	.05	.051
		pl	.01	.037
	in	sg	.75	.040
		du	.07	.051
		pl	.18	.038
8	h	sg	.95	.037
		du	.15	.052
		pl	.29	.043
	an	sg	.76	.041
		du	.20	.050
		pl	.12	.036
	in	sg	.95	.039
		du	.19	.050
		pl	.21	.037
10	h	sg	.89	.034
		du	.33	.049
		pl	.44	.040
	an	sg	.71	.039
		du	.24	.047
		pl	.20	.034
	in	sg	.90	.037
		du	.25	.047
		pl	.31	.035
12	h	sg	.94	.037
		du	.43	.052
		pl	.49	.043
	an	sg	.75	.041
		du	.34	.050
		pl	.32	.036
	in	sg	.89	.039

Age Group	Animacy	Number	Mean	Std. Error
A	h	du	.39	.050
		pl	.36	.037
		sg	.88	.066
		du	.40	.094
		pl	.48	.077
		sg	.76	.075
	an	du	.23	.090
		pl	.54	.066
		sg	.97	.072
		du	.34	.090
		pl	.77	.067
		sg		

Animacy x gender x number

Animacy	Gender	Number	Mean	Std. Error	
h	f	sg	.86	.028	
		du	.27	.029	
		pl	.22	.029	
	m	sg	.93	.022	
		du	.28	.036	
		pl	.52	.036	
	an	f	sg	.59	.027
			du	.18	.028
			pl	.25	.024
m		sg	.82	.032	
		du	.25	.031	
		pl	.26	.025	
in	f	sg	.89	.027	
		du	.19	.028	
		pl	.33	.027	
	m	sg	.89	.027	
		du	.31	.036	
		pl	.39	.025	

Appendix 2.2.3: Production, Verb. (Means and Std. Errors).

Animacy

Animacy	Mean	Std. Error
h	.51	.012
an	.35	.013
in	.48	.015

Gender

Gender	Mean	Std. Error
f	.38	.010
m	.52	.014

Number

Number	Mean	Std. Error
sg	.85	.014
du	.19	.023
pl	.30	.013

Age Group

Age Group	Mean	Std. Error
6	.32	.021
8	.39	.020
10	.44	.019
12	.50	.020
A	.59	.037

Animacy x age group

Age Group	Animacy	Mean	Std. Error
6	h	.39	.024
	an	.22	.024
	in	.33	.028
8	h	.48	.023
	an	.31	.023
	in	.38	.028
10	h	.50	.022
	an	.34	.022
	in	.49	.026
12	h	.57	.023
	an	.43	.023
	in	.51	.028
A	h	.61	.042
	an	.46	.043
	in	.72	.050

Gender x age group

Age Group	Gender	Mean	Std. Error
6	f	.27	.019
	m	.36	.026
8	f	.33	.019
	m	.46	.025
10	f	.36	.018
	m	.52	.024
12	f	.42	.019
	m	.59	.025
A	f	.50	.034
	m	.69	.046

Number x age group

Age Group	Number	Mean	Std. Error
6	sg	.75	.028
	du	.03	.044
	pl	.16	.025
8	sg	.87	.027
	du	.11	.043
	pl	.19	.024
10	sg	.84	.025
	du	.24	.040
	pl	.25	.023
12	sg	.85	.027
	du	.32	.043
	pl	.33	.024
A	sg	.94	.049
	du	.27	.078
	pl	.58	.044

Animacy x gender

Animacy	Gender	Mean	Std. Error
h	f	.39	.011
	m	.64	.018
an	f	.27	.016
	m	.45	.015
in	f	.48	.015
	m	.49	.019

Animacy x number

Animacy	Number	Mean	Std. Error
h	sg	.93	.021
	du	.21	.026
	pl	.39	.019
an	sg	.73	.020
	du	.15	.022
	pl	.18	.015
in	sg	.89	.019
	du	.23	.029
	pl	.33	.022

Gender x number

Gender	Number	Mean	Std. Error
f	sg	.79	.017
	du	.15	.019
	pl	.18	.013
m	sg	.91	.016
	du	.24	.029
	pl	.42	.019

Gender x number x age group

Age Group	Gender	Number	Mean	Std. Error
6	f	sg	.65	.033
		du	.03	.036
		pl	.12	.025
	m	sg	.86	.031
		du	.03	.056
		pl	.19	.036
8	f	sg	.81	.032
		du	.07	.035
		pl	.08	.024
	m	sg	.92	.030
		du	.15	.055

Age Group	Gender	Number	Mean	Std. Error
10	f	pl	.30	.035
		sg	.77	.030
		du	.17	.033
	m	pl	.15	.023
		sg	.91	.028
		du	.30	.051
12	f	pl	.36	.033
		sg	.83	.032
		du	.24	.035
	m	pl	.19	.024
		sg	.88	.030
		du	.41	.055
A	f	pl	.48	.035
		sg	.89	.058
		du	.24	.064
	m	pl	.39	.044
		sg	.98	.054
		du	.31	.099
		pl	.78	.064

Animacy x gender x number

Animacy	Gender	Number	Mean	Std. Error
h	f	sg	.95	.021
		du	.15	.025
		pl	.06	.014
	m	sg	.91	.026
		du	.27	.035
		pl	.73	.037
an	f	sg	.51	.035
		du	.11	.018
		pl	.15	.017
	m	sg	.94	.017
		du	.19	.032
		pl	.22	.023
in	f	sg	.91	.022
		du	.19	.029
		pl	.34	.026
	m	sg	.87	.026
		du	.26	.035
		pl	.33	.025

Appendix 2.2.4: Production, Collective nouns. (Means and Std. Errors).

Animacy

Animacy	Mean	Std. Error
an	.50	.011
in	.55	.012

Gender

Gender	Mean	Std. Error
f	.85	.012
m	.20	.018

Age Group

Age Group	Mean	Std. Error
6	.47	.018
8	.49	.018
10	.54	.017
12	.56	.018
A	.57	.033

Gender x age group

Age Group	Gender	Mean	Std. Error
6	f	.72	.023
	m	.23	.034
8	f	.85	.023
	m	.13	.033
10	f	.89	.021
	m	.19	.031
12	f	.89	.023
	m	.24	.033
A	f	.91	.041
	m	.23	.061

Word type x animacy

W type	Animacy	Mean	Std. Error
n	an	.52	.013
	in	.56	.014
adj	an	.52	.013
	in	.56	.015
v	an	.47	.012
	in	.53	.015

Word type x gender

W type	Gender	Mean	Std. Error
n	f	.83	.015
	m	.26	.020
adj	f	.83	.015
	m	.25	.020
v	f	.90	.015
	m	.10	.020

Animacy x gender

Animacy	Gender	Mean	Std. Error
an	f	.86	.014
	m	.14	.017
in	f	.84	.015
	m	.26	.023

Word type x animacy x gender

W type	Animacy	Gender	Mean	Std. Error
n	an	f	.86	.017
		m	.18	.021
	in	f	.80	.020
		m	.33	.025
v	an	f	.86	.017
		m	.18	.021
	in	f	.80	.021
		m	.36	.025
adj	an	f	.86	.018
		m	.07	.019
	in	f	.93	.017
		m	.13	.026

Appendix 2.2.5: Production, Quantified nouns. (Means and Std. Errors).

Animacy

Animacy	Mean	Std. Error
h	.63	.019
an	.67	.022
in	.74	.020

Number

Number	Mean	Std. Error
3 to 10	.74	.025
11+	.62	.017

Age group

Age Group	Mean	Std. Error
6	.43	.030
8	.57	.030
10	.74	.028
12	.77	.030
A	.89	.054

Animacy x age group

Age Group	Animacy	Mean	Std. Error
6	h	.34	.035
	an	.44	.042
	in	.51	.039
8	h	.49	.035
	an	.55	.041
	in	.67	.038
10	h	.66	.033
	an	.77	.038
	in	.79	.036
12	h	.77	.035
	an	.76	.041
	in	.78	.038
A	h	.90	.063
	an	.82	.074
	in	.96	.068

Number x age group

Age Group	Number	Mean	Std. Error
6	3 to 10	.59	.047
	11+	.27	.032
8	3 to 10	.57	.046
	11+	.55	.032
10	3 to 10	.76	.043
	11+	.71	.030
12	3 to 10	.82	.046
	11+	.72	.032
A	3 to 10	.94	.083
	11+	.85	.057

Animacy x gender

Animacy	Gender	Mean	Std. Error
h	f	.59	.022
	m	.67	.022
an	f	.68	.032
	m	.66	.021
in	f	.74	.025
	m	.74	.021

Animacy x number

Animacy	Number	Mean	Std. Error
h	3 to 10	.63	.031
	11+	.64	.020
an	3 to 10	.80	.028
	11+	.53	.032
in	3 to 10	.78	.030
	11+	.70	.024

Gender x number x age group

Age Group	Gender	Number	Mean	Std. Error
6	f	3 to 10	.58	.054
		11+	.29	.042
	m	3 to 10	.60	.048
		11+	.29	.034
8	f	3 to 10	.53	.053
		11+	.61	.041
	m	3 to 10	.64	.047
		11+	.50	.033
10	f	3 to 10	.75	.049
		11+	.69	.039
	m	3 to 10	.76	.045
		11+	.73	.031
12	f	3 to 10	.82	.053
		11+	.71	.041
	m	3 to 10	.82	.047
		11+	.74	.033
A	f	3 to 10	.91	.095
		11+	.81	.075
	m	3 to 10	.96	.086
		11+	.89	.060

Animacy x gender x number

Animacy	Gender	Number	Mean	Std. Error
h	f	3 to 10	.599	.036
		11+	.589	.026
	m	3 to 10	.663	.036
		11+	.682	.025
an	f	3 to 10	.833	.041
		11+	.525	.050
	m	3 to 10	.774	.030
		11+	.540	.026
in	f	3 to 10	.724	.036
		11+	.754	.032
	m	3 to 10	.833	.030
		11+	.647	.027

Appendix 2.2.6: Production, Inanimate feminine nouns with no overt gender referent. (Means and Std. Errors).

Number

Number	Mean	Std. Error
sg	1.6	.057
du	.24	.040
pl	.81	.060

Age group

Age Group	Mean	Std. Error
6	.54	.065
8	.62	.064
10	.90	.060
12	1.1	.064
A	1.3	.116

Number x age group

Age Group	Number	Mean	Std. Error
6	sg	1.30	.108
	du	.09	.076
	pl	.32	.114
8	sg	1.40	.106
	du	.11	.075
	pl	.33	.112
10	sg	1.69	.100
	du	.27	.070
	pl	.75	.105
12	sg	1.78	.106
	du	.50	.075
	pl	.89	.112
A	sg	1.93	.192
	du	.21	.136
	pl	1.78	.203

Appendix 2.2.7: Production, Novel words. (Means and Std. Errors).

Word type

W type	Mean	Std. Error
n	.63	.023
v	.49	.018

Gender

Gender	Mean	Std. Error
f	.54	.019
m	.58	.020

Number

Number	Mean	Std. Error
sg	.79	.021
du	.45	.027
pl	.43	.017

Age group

Age Group	Mean	Std. Error
6	.50	.036
8	.54	.035
10	.63	.033
12	.65	.035
A	.47	.063

Word type x age group

Age Group	W type	Mean	Std. Error
6	n	.53	.044
	v	.47	.034
8	n	.62	.043
	v	.46	.033
10	n	.72	.040
	v	.54	.031
12	n	.75	.043
	v	.54	.033
A	n	.51	.078
	v	.44	.060

Word type x gender

W type	Gender	Mean	Std. Error
n	f	.70	.025
	m	.55	.025
v	f	.37	.018
	m	.60	.021

Word type x number

W type	Number	Mean	Std. Error
n	sg	.79	.030
	du	.68	.031
	pl	.41	.022
v	sg	.80	.021
	du	.22	.033
	pl	.44	.017

Gender x number

Gender	Number	Mean	Std. Error
f	sg	.83	.025
	du	.47	.027
	pl	.31	.020
m	sg	.75	.024
	du	.43	.033
	pl	.54	.022

Word type x gender x number

W type	Gender	Number	Mean	Std. Error
n	f	sg	.83	.029
		du	.73	.034
		pl	.55	.031
	m	sg	.74	.036
		du	.62	.039
		pl	.27	.024
v	f	sg	.84	.030
		du	.21	.031
		pl	.07	.019
	m	sg	.77	.028
		du	.24	.041
		pl	.81	.028