The Acquisition of Thai classifiers in bilingual children:

A longitudinal study

By

Jaruluck Ngamluck

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This candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

To Dad and Mum

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Abstract

This project will focus on an acquisition of the Thai classifiers in a simultaneous bilingual Thai child living in the UK, whose age is approximately three years old. This child will be observed for a whole year to see her development in acquiring Thai numeral classifiers, and see whether bilingualism does affect her learning of the Thai classifier system. A comparison will be made with two control subjects, one is a three-year old monolingual Thai child and the other is an English-Thai bilingual child who lives in Thailand, in order to determine to what extent the degree of exposure to Thai affects the process of classifier acquisition in the bilinguals.

Findings from the research confirm that the sequence of the classifier acquisition between the monolingual subject and the bilingual subjects are generally the same. The frequency of input bears a significant role in the speed of the classifier acquisition as the bilingual subject (TH), who apparently receives more Thai language input than his counterpart, shows relatively more development than the bilingual subject (UK) from the start. The finding supports Gathercole (2002a,b) regarding the importance of the frequency of input in language acquisition of bilingual children.

The data obtained from this research also demonstrate that young children use perceptual properties, especially shape, when generalising words. All subjects of this research tended to overextend classifiers with countable nouns, or nouns which they are not familiar with, according to their shape. Overextensions occurred when children attempted to use a classifier which denotes some salient properties to

classify nouns which appear in similar shapes. Children also produced a great deal of overgeneralisations when they acquired a new classifier. Data from this research support the emergentists' competition hypothesis that irregulars and regularised nouns can appear randomly when children are in the stage of 'reorganisation' or 'competition period'. It takes time to pass through this process to reach the stage where they can use classifiers like adults.

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Chapter 1 Introduction

1.1 Classifiers, bilingualism and the acquisition of linguistic categories

This research deals with two topics: classifiers and bilingualism. Its aims are to investigate how bilingualism affects children's classifier acquisition, which has implications for how they acquire noun classes in general, and to investigate acquisition of object names in monolinguals and bilinguals.

In this research, the progress of classifier acquisition of two bilingual Thai-English children and one monolingual Thai child was continuously observed for a period of 12 months. The study of the monolingual child as a control subject was made in parallel with that of the bilingual children during the course of their classifier acquisition processes. The longitudinal nature of the research enabled the researcher to collect data on the monolingual and bilingual children's progress continuously. The nature of the children's first attempts to use classifiers will be examined, and any occurrences of the different types of errors they made at various points in the study will be explored. The results will reflect how monolingual and bilingual children make sense of linguistic categories. The results will also assist us in determining what kind of knowledge children need in order to classify and categorise objects around them, and how the relationship between words and things in their conception changes with time, over a period of one year. A comparison between the monolingual child and the bilingual children will then be made, in order to determine the differences in the processes of their classifier acquisition.

It is hoped that, in discovering differences between the classifier acquisition processes of the monolingual child and the bilingual children over a period of 12 months, the effect of bilingualism on acquiring noun classes will be made visible. If the bilingual children follow the same stages of classifier acquisition, in the same sequence and time-scale as the monolingual child does, it suggests that bilingualism has no effect on children in acquiring noun classes. On the contrary, if the results show that the sequence or time scale of the bilingual children's classifier acquisition is different from the monolingual child's, it may be concluded that bilingualism does affect the process of acquiring noun classes as observed in children in some way. The cause and nature of these differences will be analysed in detail.

In this research, in order to examine how bilingual children acquire the classifier system, several aspects of bilingualism and the classifier system must be explored first. Therefore, in this chapter, I will begin with an overview of the Thai classifier system and some related theories about bilingualism in general. Some previous studies on classifier acquisition in children will be included in this chapter. In Chapter 2, findings about classifiers and categories will be discussed in order to understand how semantic categories are closely connected with the Thai classifier system. In Chapter 3, the methodology and hypotheses of this research will be discussed. In Chapter 4, the general results of the twelve-month elicitation sessions conducted for this research will be presented and in Chapter 5, the results concerning how children acquire novel word classifiers will be considered. In Chapter 6, I will examine in detail how my results apply to some specific issues in bilingualism and classifier acquisition, and conclusions based on my findings and previous works of other researchers in the same field.

1.2 Classifiers

1.2.1 Classifiers: An Overview

There are a number of languages in the world which have similar systems of classifiers although they are geographically and culturally unrelated. Over fifty classifier languages from Africa, the Americas, Southeast Asia, and Oceania have been investigated by Allen (1977), who has found remarkable similarities between their classifier systems. Allen (1977:285) defines classifiers on two main criteria. He proposes that firstly, 'a classifier must occur as a morpheme in surface structures under a specific condition', and secondly, 'a classifier must have meaning, in the sense that a classifier denotes some characteristics of the entity to which an associated noun refers (or may refer)'. It can be said that every language has classifiers, but not every language can be called a classifier language. For example, Thai is a classifier language, whereas English is not, although English possesses some nouns with similar meanings to the Thai lexemes which everyone agrees are classifiers, but those nouns in English do not signify a characteristic of the words to which they refer.

According to Allen (1977), seven universal categories of classifiers can be identified. He argues that every classifier in any classifier language in the world is composed of one or more of seven categories of classification (Allen 1977:286): 1) material, 2) shape, 3) consistency, 4) size, 5) location, 6) arrangement, and 7) quanta. Allen proposes that 'arrangement' and 'quanta' appear in languages like English, which is not a classifier language, while the first five occur only in classifier languages. In other words, the first five categories classify nouns on the basis of the inherent characteristics of the referents, whereas the last two do not (Gandour *et al.* 1984:456).

According to Allen (1977), categories of classification can be generally sub-categorised as follows: the material category is divided into three sub-categories: animacy, abstract and verbal nouns, and inanimacy. The shape category is divided into three subcategories: long, flat, and round, or in other words: one-dimensional, two-dimensional, and three-dimensional. The consistency category has three sub-categories: flexible, hard or rigid, and non-discrete. The fourth category of classification is size, which is sub-categorised into big and small. The fifth category is location, which has a number of sub-categories for inherently locative nouns e.g. countries, fields, towns, villages. The sixth category of classification is arrangement, which is sub-categorised into three kinds. First are those which identify an object or objects in some specific and non-inherent configuration, second are those classifiers which identify an object or objects in a specific position, and third are those classifiers which identify an object or objects in some kind of specific non-inherent distribution. Finally, quanta, has eight subcategories. They are collection (piece, pair), volume (handful, basketful), instance (kind, sort), partitive, and the measure sub-categories of dimension, volume, height, and time.

1.2.2 Thai classifiers

Thai, the national language of Thailand, is an archetypical numeral classifier language (Gandour *et al.*. 1984:455). It has one of the most elaborate classifier systems in the world (Carpenter 1986:34). Nouns in Thai cannot be quantified directly. In English, there are two major classes of nouns, with respect to quantification. First, those which can be counted by placing them directly after numerals, as in 'two books' and 'eight girls', and second, those that need a unit to accompany them when they are counted, as in 'two glasses of water' and 'eight herds of cattle'. But in Thai, nouns like 'books' or 'girls' cannot be quantified directly; in fact, all Thai nouns require a numeral classifier when they are counted.

(1) Nung-sue song *lem*
book two classifier
'Two books'

(2) Dek-pu-ying paed *kon*
girl eight classifier
'Eight girls'

(3) Nam song *kaew*
water two classifier
'Two glasses of water'

Lem, *kon*, and *kaew* are used as classifiers since the normal word order for the Thai quantifier noun phrase is Noun – Numeral – Classifier.

Thai possesses over 100 numeral classifiers, and over 40 of them are frequently used in everyday life (Haas, 1942). These classifiers classify nouns according to the inherent characteristics of the entities to which they refer; some have a transparent semantic relationship with the nouns they refer to, others with a more seemingly arbitrary connection. For example, Thai has the classifier, *fong*, which indicates an oval shape of the head noun, and it is normally used to classify 'egg' (*kai*). But the usage of Thai classifiers may be unpredictable, for example, the usage of the classifier *lem* for 'knife' (*miid*). 'Knife' (*miid*) is an object with a handle, but instead of occurring with *khan*, the classifier for objects with handles, it is used with the classifier *lem* instead. And although *khan*, generally denotes objects with handles such as 'umbrella' (*rom*), 'spoon' (*chon*), it is unexpectedly used to classify objects in the vehicle category such as 'bicycle' (*rod-jakkayan*), 'car' (*rod-yon*), and 'truck' (*rodkraba*). Also, 'candle' (*tian*), instead of being coupled with *taeng*, the classifier denoting the form of a solid stick, is instead classified with *lem*.

(4) Rom song *khan*
Umbrella two classifier
'Two umbrellas'

(5) Chon song *khan*
spoon two classifier
'Two spoons'

(6) Jak-ka-yan song *khan*
bicycle two classifier
'Two bicycles'

(7) Rod song *khan*
car two classifier
'Two cars'

(8) Rod-bun-tuk song *khan*
truck two classifier
'Two trucks'

In terms of both the syntactic and semantic properties of classifiers, Thai has one of the most developed classifier systems (Conklin, 1981). Haas (1942) comments on the Thai classifier system that 'it is impossible to devise rules which will serve as an infallible guide in choosing a proper classifier to be employed with any given noun. For this reason it is desirable to memorise the classifier to be used with a noun at the same time that one learns the noun, just as in French and German one must memorise the gender of each noun' (Haas 1942:201).

In addition to the universal categories of classifiers identified by Allen, Uppakitsilapasarn (1981) classifies Thai classifiers according to their usage into five groups, namely unit classifiers, collective classifiers, perceptive classifiers, quantitative classifiers, and repetitive classifiers. The unit classifiers are those used to show a particular type of noun, e.g.

(9) Pu-chai sam *khon*
man three classifier
'Three men'

(10) Dek sam *khon*
child three classifier
'Three children'

(11) Ma sam *tua*
dog three classifier
'Three dogs'

(12) Ton-mai sam *ton*
tree three classifier
'Three trees'

(13) Dok-mai sam *dok*
flower three classifier
'Three flowers'

The collective classifiers are those used to indicate a collective number of nouns, e.g.

(14) Ped si *foong*
duck four classifier
'Four flocks of ducks'

(15) Kra-dad si *tang*
paper four classifier
'Four piles of paper'

(16) Ka-ya si *kong*
garbage four classifier
'Four piles of garbage'

The perceptive classifiers are generally used with reference to a particular size or shape of noun, e.g. a circle, a house, a rope:

(17) Wong-klom ha *wong*
circle five classifier
'Five circles'

(18) Waen ha *wong*
ring five classifier
'Five rings'

(19) Ban ha *lung*
house five classifier
'Five houses'

(20) Kra-tom ha *lung*
cottage five classifier
'Five cottages'

The quantitative classifiers are used to mark a number of things being put together or being made into a certain form, and to specify the quantity or volume of some nouns, e.g.

a) things being put together

(21) Dok-mai hok *chor*
flower six classifier
'Six bunches of flowers'

(22) Pha hok *muan*
cloth six classifier
'Six rolls of cloth'

b) things made into a certain form

(23) Kha-nom-jin song *jub*
thai noodle two classifier
'Two spoonfuls of noodles'

(24) Phlu song *jeeb*
betal-leaf two classifier
'Two bunches of betal leaves'

c) quantity and volume

(25) Nam song *tum*
water two classifier
'Two jars of water'

(26) Din-so song *lo*
pencil two classifier
'Two dozen pencils'

(27) Rong-tao song *khu*
shoes two classifier
'Two pairs of shoes'

And finally, the repetitive classifiers are identical forms of the noun used as classifiers for a certain group of nouns, usually denoting with locations and human organs, e.g.

(28) Mu-ban sam *mu-ban*
village three classifier
'Three villages'

(29) Muang sam *muang*
Town three classifier
'Three towns'

(30) Ta song *ta*
eye two classifier
'Two eyes'

(31) New ha *new*
finger five classifier
'Five fingers'

It is interesting that even native Thai adults sometimes have difficulties in classifying nouns. For example, the researcher and a native Thai friend disagree about how an orange should be classified. The researcher believes that 'orange' (*som*) should be classified with *luk* in terms of its round shape, but the researcher's friend argues that it should be classified with *phon* because *phon* is the classifier that denotes the offspring of plants. Regarding this sort of discrepancy, Carpenter (1987: 146) explains that *luk* is a mixed taxonomic (botanical), function (edible) and shape (roundish) classifier. Round edible objects, like 'egg' (*kai*) and 'coffee bean' (*med kafae*) are more likely to be classified with *luk* rather than are inedible round objects such as 'light bulb' (*lodfai*) and 'soap' (*sabu*). However, *phon* is also an appropriate classifier for nouns referring to roundish objects, especially fruits, when the classifier is used in a formal context or in written language. Also, no round object that is not of botanical origin is used with *phon* because *phon* is almost entirely a fruit classifier. Therefore, according to Carpenter, both *luk* and *phon* are acceptable for classifying an orange, depending on context and situation, and on the speaker's conception of the noun they want to classify. This research will consider several nouns where more than one classifier can be used, in which case both classifiers will be counted as correct.

1.2.3 Previous studies on the acquisition of Thai numeral classifiers

Several researchers have analysed in some detail the syntax and semantics of numeral classifier use by native Thai adults, considering either the Thai language alone (Haas 1942; Hiranburana 1979; Hundius and Kolver 1983; Lehman 1979) or examining the subject from a cross-linguistic perspective (Adams *et al.* 1975; Adams and Conklin 1973; Allen 1977; Conklin 1981; Goral 1978; Jones 1970). No reports on the acquisition of numeral classifiers have been published in Thai language, however.

In the area of the acquisition of numeral classifiers by native Thai children, there have been three published studies so far. Tuaycharoen (1984) aims to describe how Thai children acquire classifiers, and to suggest some developmental strategies which might explain the use of classifiers by Thai children from the age of 24 months to the age of five. Gandour *et al.* (1984), on the other hand, try to find out specifically the sequence of children's classifier acquisition and of the types of errors children make, as well as the significance of their use of overextensions. Carpenter's (1987) research focuses on whether children acquire the syntactic pattern of the classifier system first, before they begin mapping linguistic patterns onto the salient cognitive categories (Form First), or whether the semantic meanings of the classifiers help children to acquire the classifier system before they acquire the syntactic forms (Meaning First).

The Form First or Meaning First hypotheses are clarified by Carpenter as follows,

> 'The Form First view of language acquisition, holding that the acquisition of syntactic categories is essentially a language-specific process drawing only on language-specific talents and abilities, predicts that the meanings of those forms are irrelevant to their acquisition, since meaning makes reference to extralinguistic entities and patterns. The Meaning First view, on the other hand, holds that

different syntactic categories will be more or less difficult to learn, depending on their relationship to extralinguistic entities and patterns. This second view of language learning falls under what is loosely termed the functionalist approach to language and linguistics, holding that linguistic phenomena can be explained in terms of the communicative functions of language, rather than the properties of innate biological structures' (Carpenter 1987:72).

In other words, do children learn the semantic relationship between classifiers and head nouns before applying them, or do they connect classifiers to head nouns without realising the semantic relationships between classifiers and nouns? For example, Carpenter designs her experiments to find out whether the conventionality of the noun-classifier pairings is relatively more important than the salient attributes of the referent, so that different nouns would be classified differently even when they refer to the same thing. She also tries to determine whether a single noun will change classifier if the noun referent changes identity or configuration, and to determine whether perceptual attributes (shape) or functional attributes (e.g. vehicle for transportation) is more important in children's assigning of classifiers. Carpenter also tries to determine which features are more important in assigning classifiers, for example, shape and animacy; intrinsic and extrinsic characteristics; formal devices and semantic cues, actions and objects; and finally disjunctive and coherent classes.

In this section, I will consider the results of these three previous studies and compare them in the concluding analysis. Regarding methodologies, Tuaycharoen kept a written record of the classifiers used in the spontaneous speech of two Thai children in the same family - a girl aged 3;0-5;0, and a boy aged 2;6-4;0, whose data were supplemented with earlier tape recordings made from age three months to two years. According to Tuaycharoen's results, there are five distinct strategies in classifier acquisition occurring in more or less consecutive stages. The first stage is that of 'the early attempt strategy' (2;0). The first sign of classifiers in the children's speech appeared at the age of 24 months, when their use of numerals was followed by hesitation. Tueycharoen attributes the children's hesitation to their perception that a classifier might be required, coupled with an uncertainty regarding how to produce it. The second stage is that of 'the noun identification strategy' (2;0-2;6). During this stage, the children began to use nouns as their own classifiers. Between the ages of 2;0 and 2;6, according to Tuaycharoen's records, the children's indication of the presence of a classifier appeared in a use of a noun form. The children used a noun followed by a number and added the same noun to indicate the unit classifier. It is acceptable in Thai adult speech that some Thai nouns for body parts, locations, and certain abstractions can be used as their own classifiers in this way but it was difficult for the children to use the appropriate form at this stage. Thus the strategy of noun identification was attempted in place of the correct classifier. For example,

(32) Kai song *kai*
chicken two classifier
'Two chickens'
(The adult classifier for chicken is *tua*)

(33) Nok sam *nok*
bird three classifier
'Three birds'
(The adult classifier for bird is *tua*)

Tuaycharoen noted that when the children interacted with the adult members of the family, the adults usually did not make a point of correcting the children's use of noun identification. Instead, they were more likely to repeat the children's utterances, substituting the correct classifiers. Tuaycharoen suggests that the adult's behaviour allowed children to gradually perceive the classifying form in the adult utterances, and eventually try to match their forms with the adults'. She also asserts that before the matching could be done correctly the children had to get another stage, the identical noun deletion strategy.

The third stage is that of 'identical noun deletion strategy' (2;6-3;0). In this stage the children omitted the classifier altogether, always when its form was identical to the head noun. Tuaycharoen reports that this strategy was used when the children's classifiers were questioned by adults. For example, in the following dialogue, the adult used *tua*, the correct classifier for 'bird' (*nok*), in asking the children how many there were in a tree. At this point, the child was using 'bird' (*nok*) as its own classifier. When the adult repeated the question, the child simply quantified the head noun and did not use anything in the classifier position:

(34)	Adult :	Bon ton-mai mi nok ki *tua* luk? on tree have bird how many classifier child? 'How many birds are there on the tree, child?'
	Child:	Sam *nok* three bird (with bird incorrectly used as its own classifier) 'Three birds'.
	Adult:	Thaw-rai na luk? how many please child? 'How many please, child?'
	Child:	Nok sam bird three 'Birds three.'

Tuaycharoen comments that the deletion strategy was practiced at this stage when the children appeared to realise that the form of the classifier should be different from the noun form. This occurred prior to the period when different forms of classifiers were widely used by the children.

Tuaycharoen calls the fourth strategy 'the over-extension strategy' (3;0-5;0). By this age, the children were reported to have greatly increased their overall use of classifiers, and the classifying forms were used extensively. Tuaycharoen claims that there are two kinds of overextensions:

a) 'Generic to specific'

The children used the classifiers with reference to the general form when specifying parts or objects which have perceptual or functional similarities, e.g.

(35) Mau-chao nu kep ma-li song *ton* pai-fak kru
This morning I pick jasmine two <u>tree</u> for teacher
'I picked two jasmines for a teacher this morning'

In this sentence, *ton* is used inappropriately. The classifier for 'flower' (*dokmai*) is *dok*, whereas *ton* is the classifier for 'tree' (*ton-mai*).

(36) nu jak-dai kradad song *lem*
I would like paper two <u>book</u>
'I would like two pieces of paper.'

Again, regarding this sentence, *lem* is the classifier for 'book' (*nungsu*). The classifier for 'paper' (*kradad*) should be *phaen*.

b) 'Major classification to its component'

At this stage, the children were able to use some classifiers for machines appropriately. However, the classifiers of some other objects with mechanical components appear to be over-extended, e.g.

Noun	Numeral	Child classifier	Adult classifier
Ironing board	1	kruang	an
Motorcycle	1	kruang	khan
Refrigerator	1	kruang	tu
Alarm clock	1	kruang	ruen

Table 1: Tuaycharoen's report on children's use of classifiers for mechanical objects

Kruang is used by adults with some machines and some electronic equipment such as computers, washing machines, etc., but not with every object with mechanical components.

However, Tuaycharoen's analysis of these errors is confusing. She illustrates this strategy by referring to the children's use of the machine classifier *kruang* with other objects that have, or are perceived as having, mechanical components. How this differs from overextension on the basis of perception is not clear. Although she claims this as a general strategy, in fact all of these are instances of a particular case of overextension with the same classifier *kruang*.

The final strategy Tuaycharoen calls 'trial-and error' (4;6-5;0); at this stage the self-correction of classifier usage began to appear in the children's speech. However, they continued to overextend classifiers, and the term 'trial and error' seems to refer to the process of self-correction that occurs when the child is dissatisfied with his own choice of classifiers, but still does not know what the correct classifier should be. Trial and error draws upon the three previously developed strategies of 'noun identification', 'deletion' and 'overextension'. As the child grew more confident in their use of classifiers, they shifted from one strategy to another when they were unsure of the adult form. The change of classifiers is restricted to the four strategies the children were using in the earlier stages.

On the basis of the results of her observations, Tuaycharoen claims that the five strategies she has defined are used until elementary school, but they do not occur in children over the age of five. She re-interviewed her male subject when he was 10, and reported that he never overextended, although he made other sorts of errors, which she unfortunately does not describe.

Tuaycharoen's longitudinal study is complemented by Gandour *et al.*'s (1984) experiments regarding classifier acquisition by native Thai children aged between five and ten years old. Gandour and his associates questioned the children on 80 nouns using a picture identification and sentence completion task. In their analysis, using Allen's categories of classification, they separated the experimental items into three types: arrangement and quanta (e.g. roll of toilet paper, pair of shoes), configurational (e.g. lump of ice, strand of hair), and animate. In general, their results suggested that the acquisition of classifiers is very slow. The five-year-old's responses averaged no more than 15% correct, and even the ten-year-olds were only 89% correct. Gandour *et al.* reported that animate classifiers, especially humans and animals, were acquired earliest, arrangement and quanta were acquired next, and configurational categories were acquired last.

The children's classifier errors fell into four main types. Firstly, overgeneralisation, where the classifier *an* was heavily used for most nouns. In informal spontaneous conversation among adults, it is acceptable to use *an* instead of a number of other classifiers as *an* may be used 'loosely as a substitute for almost any other classifier' (Palakornkul 1976: 176), therefore it is possible that the children overused *an*, not knowing about the more specific classifiers. Secondly, repeaters and partial repeaters, which occur frequently in children aged 5-6 years, e.g.

(37) Dao si *dao*
star four star → incorrect
'Four stars'

Dao si *duang*
star four classifier → correct
'Four stars'

The children tended to use the noun repeater *dao* as a classifier, which is inappropriate; the appropriate classifier for a star is *duang*. Thirdly, they substituted an individual classifier for a collective classifier (e.g. five bananas instead of five bunches of bananas), and finally, they used noun substitutions (i.e. they used nouns that are not classifiers, e.g. towel three blankets). Of these four types of errors, the most common, made by all age groups, was the overuse of the general classifier *an*. This overuse ranged from 77.6% among the five-year-olds, to 24.2% by the ten-year-olds. According to Gandour *et al.*, all the children continued making a significant number of errors, even in the oldest age group. The slow rate of acquisition of Thai classifiers may be attributed to the lack of isomorphism between the semantics of some classifiers and the cognitive categorisation children are most likely to impose on the categories named (Gandour *et al.* 1984:460).

The work of Gandour *et al.* and Tuaycharoen raises many questions. Tuaycharoen's results suggest that children begin making semantically based classifier overextensions as young as three, but in Gandour *et al.*'s study, over 75% of the five-year-old children's usage of classifiers consisted of the uninteresting usage of the general classifier *an.* On the other hand, Gandour *et al.*'s ten-year-old children still made overextension errors, while Tuaycharoen claims that school age children do not overextend. While Gandour *et al.*'s results suggest that the usage of configurational classifiers is harder to grasp than that of arrangement and quanta classifiers, Tuaycharoen's children made roughly equal numbers of mistakes with arrangement and quanta and configurational classifiers, while of their correct spontaneous usage, only around 26% were of arrangement and quanta classifiers. While some discrepancy between experimental and spontaneous data are to be expected, more explanation is needed of both studies' methodologies and theories. Regarding the methodologies used in each study, Gandour *et al.* used only flash cards as an elicitation method. Pictures contain little actual information about the properties of an object and may not elicit the various kinds of linguistic knowledge that children have about the real objects. Also, asking the children to look at a set of 80 pictures without a break was likely to make them tired and frustrated and therefore to cause them to lose their concentration on the task. Moreover, Gandour *et al.*'s task demanded that the children count the objects on the cards. The number of the objects in the pictures varied between 2 to 5, and the children's attention may have been focused on giving the correct number rather than stating the correct classifier of the object. While varying the number of objects may have helped the children remain alert, it increased the overall difficulty of the task demands.

Tuaycharoen's longitudinal study is also open to criticism on methodological grounds. Her two subjects, followed when they were 2;6-4;0 and 3;0-5;0 years old, came from the same family, and her methods show an inability to control properly the linguistic context. She does not say how often her records were made but there seem to be large gaps. For example, the 'noun identification strategy' is supposed to take place between the ages 2;0 and 2;6, but in fact she had no data for this period, because her tape-recordings stopped at the age 2;0, and her written records started at the age 2;6. In addition, many of her examples are not true to life because they were elicited just by asking the child 'what's this?' and expected the subjects to reply with 'noun + classifier'. These kinds of questions are not spontaneous and the children would be unlikely to answer readily with a classifier.

While Gandour *et al.* propose that configurational classifiers are the hardest to grasp because they depend on some inherent perceptual features of the referent, it seems that this cannot be the critical factor because arrangement and quanta classifiers also frequently depend on inherent perceptual features of the referent. In Thai, 'kluai nueng *wii*' (a bunch of bananas) and 'angoon nueng *puang*' (a bunch of grapes) require different classifiers because of the different inherent perceptual features of bananas and grapes. Also 'tube' (of toothpaste), 'box' (of matches), and 'carton' (of milk) might all be marked as 'container', but differences in their perceptual features require different classifiers.

Although Gandour *et al.* claim that animate classifiers are acquired earlier than configurational classifiers because they do not rely on inherent perceptual features, they offer no proof to support this assumption, and although they report that general classifier use declines with age, they do not mention which nouns are more or less likely to be used with the general classifier at different ages. Tuaycharoen's study, like that of Gandour *et al*, also did not discuss which nouns were more likely to be used with the general classifier.

Now let us consider Carpenter's (1987) study in order to compare to Tuaycharoen (1984) and Gandour *et al.* (1984). It is clear that Carpenter tends to agree with Gandour *et al.* that the acquisition of the Thai numeral classifier system is a slow process. The study's two-year-olds produced only 10% correct responses, and although performance improved steadily with age, even the nine-year-olds did not perform better than 80% on the experimental items. However, there are several differences between Carpenter's findings and those of Tuaycharoen and Gandour *et al.*; these differences are described below.

In terms of methodology, Carpenter designed an experiment that was suited to the child's world of make-believe. She designed a protocol in which children were shown an object, and were instructed to ask for two of them. Her subjects ranged in age from 2;3 to 11;3. To begin each experiment, she introduced the child to two American hand puppets, saying they were sisters who were inseparable and refused to do anything alone. So when the 'older' puppet was offered anything, she would refuse, saying that playing alone is not fun; she would then ask for two objects, and the children were asked to put a classifier after the noun in question. There were 102 nouns altogether, including some novel nouns which the children had never seen before. All the sessions were tape-recorded, and later scored.

One advantage of using this method is the relaxed atmosphere. Using a game-like pattern makes it fascinating and the children are usually very keen to cooperate. Moreover, Carpenter had the additional linguistic advantage that made the children feel at ease. They did not worry about giving a wrong answer, and as a result would find the tasks easy and fun.

However, there is a potentially disastrous methodological problem in using this procedure. First of all, Carpenter is a non-native speaker of Thai, as many as 18 objects were introduced to the children under their English names. For example, totally unfamiliar words like 'gag', 'test tube', 'moose', 'mug', 'pumpkin' and 'paddle' were used in the experiments, and some words denoting objects alien to the Thai way of life were also included, such as 'oak tree', 'petri', 'tiddle', 'funnel', 'jack o'lantern' or 'coyote'. Since these words were quite new to the children, and since they did not know the function of the objects, almost all of them used the general classifier *an* with this category of words.

Like Tuaycharoen's and Gandour *et al.*'s results, those of Carpenter showed that types of errors made by the children changed over time, reflecting their preference for different word choices at different ages. However, Carpenter reported categories of errors different from those mentioned by Tuaycharoen and Gandour *et al.* The main errors made by the children in the experimental tasks fell into seven categories. First, across the board, when the children picked one classifier and used it consistently for all nouns. Second, general classifier, when the children used *an* both correctly and incorrectly. Third, repeaters, when the children used the head noun as its own classifier. Fourth, referent-based, when the wrong choice of classifier depended on the salient characteristics of the referent. Fifth, arbitrary, when the motivation of erroneous responses could not be found. Sixth, normal states, when the use of a classifier signified a common state for a head noun that did not coincide with the state of the item as presented, and seventh, non-classifier, when responses involved the usage of a noun which is never conventionally used as a classifier. The results showed that the overuse of *an*, a general classifier, was overwhelmingly found in the children of all ages, although it was not the major error found in the older children. General classifier overuse was the most frequent error type for four-year-olds and six-year-olds, and the second most frequent error for three-year-olds and five-year-olds. This is not surprising because the elicitation method of using small objects and toys was likely to influence the children to use *an*, as I mentioned earlier.

It can be observed that the results of these three studies are not completely similar. The data are not at all directly comparable because of the different methodologies and the different age groups studied, as well as how the data were reported. Tuaycharoen used longitudinal observation of the subjects in everyday life, while Gandour *et al.* and Carpenter carried out more systematic experiments with larger numbers of subjects. Gandour *et al.*'s youngest age group had an average age of 5;1, so they conclude that overuse of repeaters is an early stage in classifier acquisition. In contrast, Tuaycharoen and Carpenter both began with much younger children, and conclude that the use of repeaters is an intermediate stage, occurring only after children have learned a great number of classifiers. The seeming discrepancy is only a consequence of the different ages tested, and it is explicable since repeaters were most used in Carpenter's study of five-year-olds, who were the youngest children tested by Gandour *et al.*

However, the results of the three studies can be integrated into a coherent description of the development of classifier acquisition. Although they were not mutually exclusive, and there was much overlap, the developmental preferences for the response types found in the three studies can be ordered chronologically according to Carpenter's summarisation as below:

1) <u>Blank attempt (approximate age 2;0)</u> this stage is marked by hesitation after numerals, and a pause marking the classifier position, although no classifier is actually produced. This is a very early response type, reported only by Tuaycharoen.

2) <u>Across-the-board use of single classifier (approximate age 2;8 –3;6)</u> this error type consists of the use of a single classifier in all post-numeral positions, regardless of head nouns. These responses were very common in Carpenter's data.

3) General classifier overuse (all ages, but declining with age) this consists of overuse of the general classifiers resulting in some classifications that are inappropriate and unacceptable under any circumstances. All three studies observed overuse of a general classifier.

4) Repeaters (approximately 2;0 –3;0 according to Tuaycharoen, and ages 4;5–6;5 according to Carpenter) this error type consists of use of the head noun as its own classifier, and was reported by Tuaycharoen, Gandour *et al.*, and Carpenter.

5) Over-extension (approximately 3; 0-5; 0 according to Tuaycharoen, all ages up to 11; 3 according to Carpenter, and up to and including ten-year-olds according to Gandour *et al.*) This error type is characterised by the use of a semantically specific classifier with nouns which are not conventionally classified with it.

In this research, discussion of classifier acquisition development in monolingual Thai children will therefore refer to the stages established by Carpenter, based on the integration of the three studies. Since no research has hitherto been conducted on classifier acquisition in bilingual Thai children, it would be interesting to explore whether a bilingual Thai child acquires classifiers differently from a monolingual Thai child. Are the developmental stages of classifier acquisition in the bilingual child always the same as those in the monolingual children? Does the bilingual child's other language (English) influence her classifier acquisition in her second language (Thai)? How significant is the role of language input to the bilingual children in acquiring noun classes? Finally, how do bilingual children learn the concepts of word meaning and its categorisation, in comparison to the monolingual children, and how does this shed light on the hypotheses concerning language acquisition by bilingual children?

1.3 Bilingualism

1.3.1 Language acquisition in a bilingual child

It is arguable if bilingualism causes differences in language acquisition. It has been an issue of debate during the past two decades in the field of bilingual language acquisition whether or not bilingual children separate the two linguistic systems from each other at the earliest stages of their speech production. It must be made clear, from the beginning, that this research has no intention to support either of the hypotheses of how bilingual children started acquiring languages, since all three subjects on this study were over three years of age when the study started and it was impossible to determine if they had previously acquired languages according to the unitary system hypothesis or the dual system hypothesis. However, it is nonetheless necessary to bring up some brief foundations regarding these controversial hypotheses which are still contentiously debated among linguists. This background knowledge of how young bilingual children acquire languages can be compared to how monolingual children acquire language, and if the process causes any difference or delay of language acquisition in the bilinguals.

Previous studies explored the impact of bilingualism in children's language acquisition but the outcome remained debatable. There have been two conventional opposing theories regarding the language acquisition in young bilingual children:

'the unitary hypothesis' or 'the single or initial one-system hypothesis', and 'the dual system hypothesis' or 'the independent development or autonomous hypothesis'.

The unitary hypothesis states that when children learn two languages simultaneously during infancy, they will go through stages when they do not differentiate their two languages. In addition, the elements of the two languages are mixed. On the other hand, the dual system hypothesis holds that young bilingual children are psycholinguistically able to differentiate the two languages from the earliest stages of bilingual development and that they can use their languages in functionally differentiated ways.

1.3.2 Comparison with monolingual children

An important point is whether language is organised and processed in a bilingual's brain differently than in a monolingual's. Although it has been found that bilinguals can be influenced by their dominant language, in the most general terms it appears that 'the development of a bilingual system taps the same basic developmental processes utilised in monolingual development' (Kessler 1984:38), and that 'bilingual first language acquisition does not differ in substantial ways from monolingual development' (Meisel 1990c:17). Taeschner (1987) has also claimed that the bilingual acquisition process is essentially the same as the monolingual one, and Li Wei (2000) states that 'Bilinguals do not seem to vary from monolinguals in neurological processes; the lateralisation of languages in the brains of the two groups of speakers is similar' (Li Wei 2000:15).

In discussing the processes of language acquisition in bilingual children, there are three aspects to be considered: 1) sound system processing, 2) lexical processing, and 3) syntactic processing. Findings agree that bilingual children's development in these three aspects is not very different from that of monolingual children. Padilla and Liebman (1975:51) conclude their study of the language development of three English-Spanish bilingual children in the following way:

> In spite of the linguistic 'load' forced on to them due to their bilingual environments, [the children] were acquiring their two languages at a rate comparable to that of monolingual children.

Also, Mclaughlin (1978:91) remarks:

> In short, it seems that the language acquisition process is the same in its basic features and in its developmental sequence for the bilingual child and the monolingual child. The bilingual child has the additional task of distinguishing the two language systems, but there is no evidence that this requires special language processing devices.

Given that 'there is no reason to believe that the underlying principles and mechanisms of language development (in bilinguals) are qualitatively different from those used by monolinguals' (Meisel 1986:64), it appears that bilingual children go through exactly the same stages as monolinguals; the babbling stage, followed by the one word stage, the two word stage, the multiword stage, and the multi-clause stage. However, more detailed and precise comparisons of bilingual and monolingual children's language development are unfortunately few. Part of the reason for this is the lack of comparable data for monolingual and bilingual acquisition. Garcia (1983) collected data for English-speaking monolingual and Spanish-English bilingual children that he then compared. He found no systematic differences between English monolingual and bilingual data in the use of English morpheme categories (Garcia 1983:49).

1.3.3 Language transference in bilingual children

Since the data of this research were collected when all subjects were over three years of age, which is a critical period to observe language dominance, it is therefore not possible for this research to measure how one language has a dominance over the other language as we have no information about the bilingual subjects' command of English prior to the study. Although it cannot be assumed to what extent one language dominated the other, it is still necessary to observe the use of mixed language in our bilingual subjects over the period of this longitudinal study to notice the intervention between two languages in the bilingual subjects.

Many studies of bilingualism have reported that a great deal of variation in the amount of cross-linguistic influence occurs at various stages, depending on the child's acquisition pattern. There are four types of transferences in bilingualism: syntactic, semantic, lexical and phonological. According to Romaine (1989), there is much less influence at the phonological level than at any others, and semantic transference also appears distinctively before syntactic transference.

1.3.3.1 Syntactic transference

Syntactic transference is defined by Clyde (1967) as 'the taking over by the language of a sentence pattern or system of inflections of the other language' (Clyde 1967:112). Examples of this category can be seen in Saunders's (1982) research on the transference of word order, case and gender, and plurals in the language of his sons, German-English bilingual children aged four and six years. The syntactic rules of German and English differ in many respects, so it was evident that one interfered with the other.

1.3.3.2 Semantic transference

This term refers to the transfer of a word in one language related in origin and meaning to one in the other. Saunders (1982) observed three types of semantic transference in the speech of his four and six-year old sons.

The first type involves 'loan translation', where a word in one language is used to replace a word in the other language. For example, one of his sons said 'The peppermint is all'; here 'all' is used as its equivalent 'alle' in German, which means 'all gone' or finished'.

The second type is a 'loan shift' where the meaning of a word in one language is transferred to a word in another which is sometimes an equivalent. For example, one of Saunder's sons used the English word 'cards' to refer to 'tickets' (German 'Karte' can mean 'card', 'ticket' and 'map').

The third type is the transference of the meaning of a word in one language to a word form in the other language which sounds the same or similar but which is not an equivalent. According to Saunders, this type of transference rarely occurs. For example, his son said 'I like this bread *while* it's very nice' (from German 'weil', which means 'because', the sense intended in this sentence).

1.3.3.3 Lexical transference

Lexical transference is, according to Clyne (1967), the transference of both the form and meaning of a word from one language to another. According to Saunders (1982), while lexical transfers are not frequent in the children's speech, they occur under the following circumstances.

Firstly, the child may have acquired words for a particular concept in only one language, or have acquired words denoting the same concept in both languages but can recall only one and so is forced to use it in the other language at the moment of speaking. Saunders points out that this kind of transfer is done consciously, and the child usually indicates that he is using a lexical transfer by pausing slightly before using the word.

Secondly, the child acquires a word for a particular concept in one language but assumes that the word acquired is also used with the same meaning in the other language. According to Saunders, this type of transfer can be seen in young bilingual children, but also appears randomly in later years.

Thirdly, a lexical transfer may be used by the bilingual child in order to emphasise the meaning of the word in a particular sense. In fact, this can be a useful way to ensure that the listener (at least a bilingual) understands which sense is intended.

Finally, a lexical transfer is used when the child is confronted by new concepts he has not encountered in his other language. Clyne (1967) explains that this type of lexical transference was often used in the German of German-speaking immigrants in Australia when confronted in their new country with concepts they had not encountered in their homeland (Clyne 1967:207).

1.3.3.4 Phonological transference

Phonological transference means that a sound in one language is identified with and pronounced like the closest available sound in another language (Saunders 1982:201). However, as Saunders points out, this type of problem is usually confined to people who become bilingual after the age of twelve. This type of transfer does not usually occur in the speech of children who acquire two languages simultaneously from birth.

In this research, the focus will be made on interference, transference or cross-linguistic influence of English and Thai on two bilingual children's speech. Various types of transference, especially the syntactic, semantic and lexical types, will be noted and consequently analysed in the discussion chapter of this research, in comparison with the speech of the control subject, a monolingual Thai child of the same age.

1.4 The importance of frequency of input

Some recent studies (Gathercole, 1997, Gathercole, 2002a) have discussed the influence of bilingualism on language acquisition with regard to the role of frequency of input. It is proposed that differences between the monolinguals and the bilinguals in patterns and rates in language acquisition are not necessarily caused by one language interfering with the other, but rather caused by frequency of input such as instructional methods in the school (IMS), social-economic status (SES) and language spoken in the home (LSH). Gathercole conducts three experiments on 2nd grade and 5th grade Spanish-English bilinguals and their monolingual counterparts, in order to find out whether there are differences in bilinguals' abilities in acquiring the mass/count distinction in English, gender in Spanish, and 'that-trace' phenomena in English. Three variables IMS: instruction methods at school, SES: social-economic status, and LSH: language spoken at home, are tested to find out how they affect bilingual language acquisition. The results from these three experiments are thought provoking. Gathercole discovers that there is no difference in the sequence of linguistic development between the monolinguals and the bilinguals, as they followed the same routes on the structures tested, but there is a lag in development among the bilinguals relative to the monolinguals. The bilingual children initially lagged behind the monolingual peers in their linguistic development but they somehow caught up with the monolinguals in their 5th grade. Gathercole also discovers that factors such as instructional methods in the school, social economic status, and language spoken at home have effects on linguistic development in young bilingual children. Regarding the variables tested, it was predicted that bilingual children who come from two-ways schools (schools where two individual languages are used as instructional methods), and speak both languages at home, and have had advantages that high social economic status affords might have had advantages in both languages. It becomes apparent that evidence from the experiments did not support such a prediction. Instead, amount of exposure to each language is the main reason why bilingual children have advantages in linguistic development. For example, those who come from low social economic status can perform better in Spanish language because they tend to have greater exposure to Spanish at home, while bilingual children who come from high social economic status, and have more access to urban facilities and broadcasting in English, can perform better in English than in Spanish.

It is evident that the lag of linguistic development between the bilinguals and their monolingual peers decreased as they grew older. The closing of the gap, according to Gathercole, is because a 'critical mass' of data in young bilinguals has been reached. The critical mass is the cumulative amount of input children acquire, and the advantage of this frequency of input is greatest at the early stages of development. Gathercole suggested that bilingual children take time to gather 'critical mass' and when it has built up, the frequency of input effects are diminished or absent.

In summary, it is worth considering that differences or delays in linguistic development are not necessarily caused by the language interfering with the other. Gathercole (2002b) emphasises the importance of frequency of input as a major role for bilingual children to acquire a variety of linguistic structures, especially at the early stages of linguistic development up to the point where a 'critical mass' of data has been accumulated.

Therefore, in this research, I will attempt to find out whether there are any differences in the sequence of acquisition and the time scale with respect to bilingual and monolingual acquisition of Thai and English. The role of frequency of input will be addressed, as two bilingual subjects with different amounts of input will be compared and observed to see if they have different linguistic development of sequence and time-scale. The acquisition of classifiers in the Thai language of these two bilingual children and a monolingual child will be discussed at length. Since Thai is a classifier language but English is not, it will be interesting to see how bilingual children learn to use two languages with different syntactic rules for forming noun phrases.

Chapter 2 Classifiers and categories: an overview

This chapter discusses classifiers and categories in general. It begins with some approaches to the definition of numeral classifier categories, and then considers various theories regarding the organisation of linguistic categories. Some contemporary theories about overgeneralisation in children's speech are discussed, as well as categorisation and naming in children, with special reference to word meaning biases. Later in the chapter, the relationship between overextensions in children and categorising classifier systems will be analysed, and finally, some theories about the acquisition of classifiers for novel words will be reviewed in detail.

2.1 How are numeral classifier categories to be defined?

Many researchers have proposed that shape is an important criterion used to define numeral classifier categories. From a traditional perspective, Whorf (1941) states that the primacy of shape is inherent in the function of classifiers. Friedrich (1970) also suggests that shape should be considered a basic grammatical category, of a linguistic status similar to that of person, number, voice, case, tense and aspect. Greenberg (1972) points out that shape provides the broadest possibilities for generalisation because it is the only thing that otherwise heterogeneous physical objects have in common. However, shape is not the only factor concerned in categorising the classifier systems. In this section, the work of Adams and Conklin (1973), Conklin (1981), Allan (1977), and Placzek (1983a, 1991) will be discussed, especially their theories regarding a classification of the Thai classifier system.

According to their research investigating the classifier systems of 37 Asian languages, Adams and Conklin (1973) present a taxonomy of classification systems by proposing that objects can be hierarchically classified under two main criteria: animate and inanimate. The animate category is subdivided into human and non-human while the inanimate category can be divided into 'long' and 'round'. The 'long' and 'round' categories can be subdivided further into one dimensional and two-dimensional. These one and two-dimensional objects can be subcategorised into more detailed features including 1) rigidity vs. flexibility, 2) size, 3) full vs. empty, 4) regularity vs. irregularity (in shape), 5) part vs. whole, 6) horizontal vs. vertical, and 7) 'edgeness'. Another feature of inanimate nouns, which is excluded from this hierarchical structure is function. Jaturongkachoke (1995) defines the function criterion as a residual category which encompasses classifiers whose properties do not fit the categories proposed in Adams and Conklin's hierarchical model.

Adams and Conklin point out that there are two levels of semantic features that appear consistently in most Asian languages: primary features and secondary features. Primary features can be the sole basis of defining a class. Secondary features, which cannot be the sole basis of defining the class, can help the primary criteria define a class in more detail, dividing it into further classes. The primary or salient features fall under the headings of animacy, shape, and function, while 'rigid' and 'flexible' are examples of the secondary features of the shape criterion. For instance, no language has a category for all flexible things, but many languages have a category for either long, flexible things or flat, flexible things (Carpenter 1987:11).

The hierarchical structure of Adams and Conklin's classification is revealed by Carpenter's diagrams below:

Figure 1: Adams and Conklin's primary and secondary shape criteria (Carpenter 1987:12)

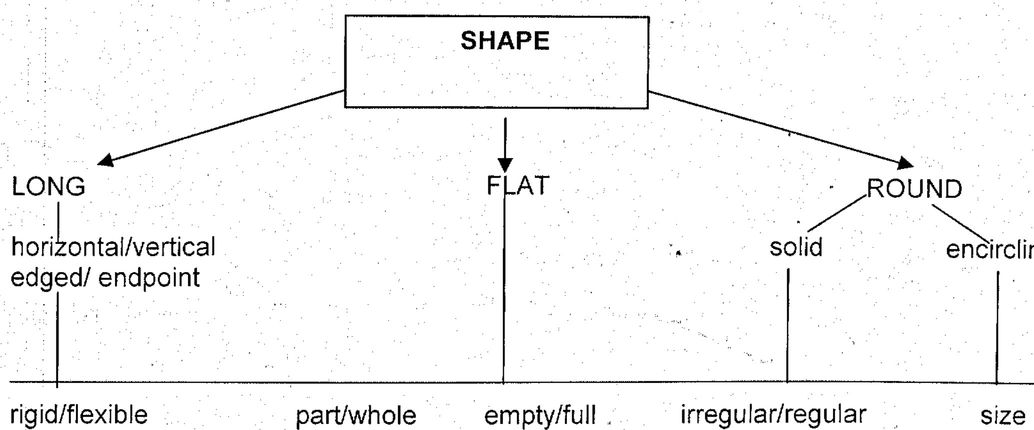


Figure 2: Adams and Conklin's primary and secondary function criteria (Carpenter 1987: 12)

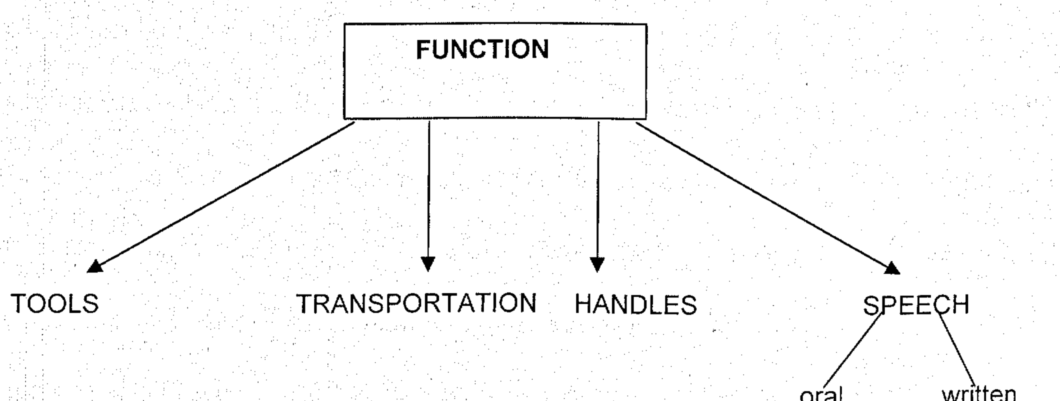
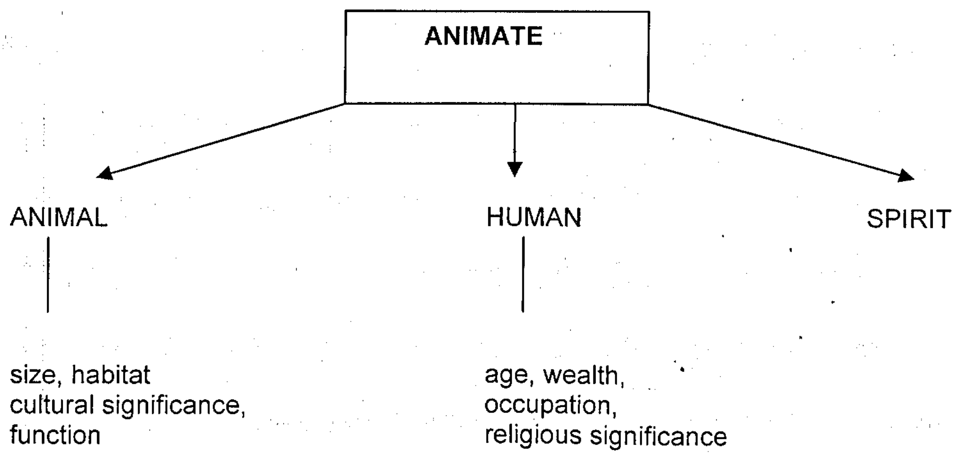


Figure 3: Adams and Conklin's primary and secondary animacy criteria (Carpenter 1987: 13)



2.1.1 The Thai classifier system according to Adams and Conklin's approach

Adams and Conklin's taxonomy of classification systems may be applied to illustrate the structure of the Thai classifier system. In the animate category, two main classifiers are used in Thai: *kon* for human and *tua* for non-humans (animals and spirits). However, in the human category, Thai classifiers can be used variously according to secondary features such as wealth, occupation, and cultural significance. For example, while ordinary people are classified with *kon*, priests are normally classified with *ong* or *roop*. The King and certain other members of the royal family such as the Queen are classified with *pra-ong*. In modern spoken Thai, there is a tendency to classify wealthy or highly respected people with *than* rather than *kon*. For example,

(1) a-jarn tang song *than* tang-kor pen pu mee kwam-ru
lecturer both two *classifier* each are people have knowledge
'Both lecturers are knowledgeable people'

It is also acceptable to use *kon* in this context, since *than* is used only to imply the respect of the speaker for the classifier's head noun, *ajarn*.

Although nouns in the human category can be used with different classifiers according to age, wealth, occupation, etc., the Thai classifier system does not seem to subcategorise the use of classifiers for animals according to their secondary features. Most animals, regardless of their size, shape, habitat, (as well as imaginary animals in fairy tales) are classified with *tua*. However, there is an exception in 'elephant' (*chang*), which can be classified with *chuak* (literally meaning 'rope'). It is assumed that the reason why the elephant is classified differently from other animals is the cultural significance it possessed in the past. According to Thai history, the elephant had a crucial role in royal battles as the most impressive of the king's mounts, and has been regarded more highly than any other animal. Even now, white elephants are regarded as royal animals. Some of them are even given titles and ranked as if they are noblemen.

The use of classifiers for objects in the inanimate category is much more complicated than their use for animate objects. Thai has a number of classifiers to use with objects of different shapes and different functions. With reference to Adams and Conklin's hierarchical structure of classification, inanimate objects can be subcategorised according to their secondary features such as 'rigid/flexible' or 'empty/full'. In Thai, primary features of shape, namely long, flat, and round, can be divided into many subcategories as discussed below.

There are a few classifiers which are used with objects having a long shape. Vertical and horizontal long objects are classified separately. Even though objects may share similarities in vertical features, sharp-ended objects and bar-like objects are classified differently. Long, vertical, sharp-ended objects like 'needle' (*khem*), 'knife' (*meed*) and 'pen' (*pakka*) are classified with *lem*, while long, vertical, bar-like objects like 'pole' (*sao*), 'pencil' (*dinso*), and 'ruler' (*mai-bantad*) are classified with *taeng* (although there is physically or functionally little difference between 'pen' and 'pencil'). There are also different classifiers for horizontal long objects. Long, continuous, horizontal objects such as 'river' (*mae-nam*) and 'road' (*thanon*) are classified with *sai* while long horizontal objects with a definite end like 'belt' (*khemkud*), 'noodle' (*kuaytiew*) and 'necklace' (*soi*) are classified with *sen*.

Objects with a round shape are subdivided into solid, round objects and encircling, round objects. Solid, round, radiating objects such as 'lamp' (*khomfai*), 'sun' (*duang-artit*), and 'moon' (*duang-chan*) are classified with *duang* while encircling, round objects such as 'ring' (*waen*) and 'bracelet' (*kumlai*) are classified with *wong*. There are also sub-divisions according to the secondary features of round objects. Smooth, regular round objects like 'orange' (*som*) and 'balloon' (*lug-pong*) are classified with *lug*, while irregular-surfaced round objects such as 'marble' (*kon-hin*) and 'cake' (*cake*) are classified with *kon*. Very small round objects like 'bean' *(med-tua)*, 'candy' (*lug-om*) and 'sand' (*med-sai*) have *med* as the classifier.

Flat objects, on the other hand, can be classified according to their rigidity or flexibility. Some flexible, cloth-like objects such as 'cloth' (*pa*), 'blanket' (*pa-hom*) and 'carpet' (*prom*) are classified with *phun,* whereas more rigid, brittle flat objects like 'paper' (*kradad*), 'cement block' (*phaen-cement*) and 'compact disc' (*phaen-disc*) are classified with *phaen.*

The primary and secondary features of objects with respect to the criterion of function are worth looking at. The primary features can be categorised as tools, speech, handles, and transportation. According to Carpenter's diagram, the only secondary features in the criterion of function fall within the category of speech: oral speech and written speech. Objects in the categories of tools, handles and transportation have no secondary features, although one could argue that there are subcategories of tools and transportation as well. The secondary features of tools can be subdivided according to their power source and their size, and the secondary features of transportation according to their manner of motion.

Objects in the tool category are classified differently in Thai according to the source of their power and the size. Large domestic electrical tools such as 'vacuum cleaner' (*kruang-dud-fun)*, 'computer' (*computer*) and 'electric blender' (*kruang-pasom-ahan*) are classified with *kruang*, while non-electrical, smaller tools such as 'screwdriver' (*kaikuang*), 'cutter' (*cutter*) and 'stapler' (*stapler*) are classified with the general classifier *an.*

Nouns in the speech category can be divided into oral and written. (Oral) speech is classified with *kam*, while writing is classified with *tua*. It should be noted that *kam* as used as the classifier for oral speech can be a noun itself, literally meaning ‘word’. So *kam* is a type of classifier called a ‘repeater’ as it is used as a classifier for ‘word’ or ‘speech’. For example,

(2) mee kam-pood song-sarm *kam* ja pood hai fung’
have spoken word a few *classifier* to say for listen
‘(I) have a few words to say’

A spoken word (*kam-pood*) is classified with *kam*. *Kam* in fact functions as a noun and a classifier in this phrase, so it is a repeater.

Objects with salient handles are classified with *khan*. Examples of nouns in this category are ‘spoon’ (*chon*), ‘bicycle’ (*rod-jakkayan*), ‘umbrella’ (*rom*), ‘motorcycle’ (*rod-jakkayan-yon*), ‘bus’ (*rod-bus*), and ‘car’ (*rod-yon*). It is noticeable that there is an overlap in the use of *khan* between objects in the handle category and objects in the transportation category. ‘Car’ (*rod-yon*), ‘motorcycle’ (*rod-jakkayan-yon*), and ‘bicycle’ (*rod-jakkayan*) as well as other vehicles can be considered as nouns in the transportation category, yet they fall within the handle category. According to Thai history, the first human-powered form of transportation, introduced to Thailand in 1871, was the rickshaw, an object with two or four long handles. The second vehicle of this type, introduced in the twentieth century, was the bicycle, which also has long handles for steering. Therefore, it can be assumed that other vehicles introduced later were classified with *khan* following the pattern initiated by rickshaws and bicycles, although some of them no longer have handles.

Khan is not the only classifier for objects in the transportation category. There are two subcategories under this heading, distinguished by their manner of motion.

While *khan* is used with objects which are driven on the road such as 'bicycle' (*rod-jakkayan*), 'motorcycle' (*rod-jakkayan-yon*), 'bus' (*rod-bus*), and 'car' (*rod-yon*), the second subcategory, classified with *lam*, consists of objects which can float or fly, such as 'boat' (*rua-bai*), 'ship' (*rua-yon*) and 'airplane' (*kruang-bin*).

2.1.2 Conklin's plant parts metaphor

Exploring Adams and Conklin's hierarchical taxonomy of classification structure, Conklin (1981) has proposed that the observation of different plant parts has given rise to primary distinctions of shape between long, flat, and round (one-dimensional, two-dimensional, and three dimensional), which appear in many Austronesian classifier systems. Jaturongkachoke (1995) notes that according to Conklin (1981), "these classifications derived from the fact that many morphemes used in referring to plant parts are also used as classifiers. Conklin therefore suggested that classifiers categorise objects on the basis of the physical attributes of the plant parts to which the morphemes refer" (Jaturongkachoke 1995: 26). Conklin's plant parts classification falls under the following categories:

1) Stick-based classification
2) Seed-based classification
3) Fruit-based classification
4) Leaf-based classification
5) Flower-based classification

Conklin's theory may help to explain the occurrence of plant parts classifiers in Thai. Morphemes denoting plant parts in Thai are also used as classifiers, suggesting that they have metaphorical meaning, as shown in Table 2 below:

Plant part classification	**Thai morpheme**	**Meaning**	**Linguistic distinction**	**Thai classifier**	**Semantic reference**
Stick-based	ton	stick	long, (one-dimensional)	ton	long
Seed-based	med	seed	round, small (three-dimensional)	med	round, small
Fruit-based	lug	fruit	round (three-dimensional)	luk	round
Leaf-based	bai	leaf	flat (two-dimensional)	bai	flat
Flower-based	dok	flower	star-shaped (three-dimensional)	dok	star-shaped

Table 2: Conklin's plant parts metaphor

In Thai, all objects used with classifiers derived from plant parts seem to be perceived according to this plant metaphor. *Ton,* which denotes an upright, one-dimensional feature, is used to classify objects with a similar shape like 'pillar' (*sao*) and 'post' (*sao*). *Med* is the classifier for small, round objects (which resemble the shape of a plant's seed) such as 'pill' (*ya-med)*, 'gem' (*ploy*), 'button' (*kradum*) and 'bean' (*med-tua*). *Lug* is the classifier for larger (more or less) round objects like 'orange' *(som)*, 'ball' (*lug-ball*), 'mountain' (*phukao*), 'wave' (*kluen*), 'key' (*khunjae*) and 'bullet' (*krasun*). *Bai* (*leaf*) classifies two-dimensional flat objects such as 'ticket' (*tua*), 'certificate' (*bai-prakard*), 'receipt' (*bai-sed*) and 'playing card' (*pai*). And finally, *dok* is used to classify objects with shapes analogous to a flower or a star such as 'dart' (*lug-dok*), 'fire cracker' (*plu-fai*), 'incense' (*thoop*), 'arrow' (*thanu*) and 'key' (*khunjae*).

Apart from *ton, med, luk, bai,* and *dok,* which use the plant parts metaphor according to Conklin's classification, there are a few more Thai classifiers which are derived from other parts of plants, namely tubers and lumps; cloth and board based classification; and other well-defined semantic domains. Conklin concedes that not all classifier languages contain all these classifications while some have more. In Thai, apart from the five plant parts classification illustrated above, there are some lump-based classification such as 'head' (*hua*) and 'stem' (*nor*). These morphemes, when used as classifiers, metaphorically connote their original meanings as parts of plants.

2.1.3 Allan's seven criteria of classification

Although Adams and Conklin's hierarchical taxonomy of classification is widely accepted as one of the most appropriate ways to illustrate the Thai classifier system, not every linguist agrees. Allan (1977) proposes that shape is not a primary criterion in defining categories. In his view, shape is merely one of the many criteria we consider when assigning objects into categories. Allan's taxonomy of classification structure is based on seven criteria: 1) material, 2) shape, 3) consistency, 4) size, 5) location, 6) arrangement and 7) quanta. According to his theory, material is the only primary criterion because it defines the essence of what the object really is. Other secondary features develop later on to help determine which category the object should belong to. Allan's theory is applicable to the classification of many Asian languages including Thai, in which most categories are structured in terms of family resemblance rather than defined by a single criterion (Carpenter 1987:14). However, Allan's taxonomy cannot answer the question why shape seems to be the criterion most frequently used to define categories.

2.1.4 Placzek's theory of classification

Placzek (1983a) is another linguist who criticises Adams and Conklin's taxonomy. He is opposed to the idea that classifiers group nouns into classes, arguing that classifiers do not form categories. Instead, he suggests that objects classified by the same classifier are not necessarily seen by Thai speakers as belonging to the same category (Placzek 1990:1). According to his comparative study on the use of the classifier *lem* between standard Thai and North-eastern dialect Thai, Placzek found that in North-eastern Thai the classifier *lem* does not denote the upright, sharp-edged properties of the head nouns. Indeed, the classifier *duang* (which denotes round, radiating properties in standard Thai) is frequently used by North-easterners to classify long, sharp-edged objects. Placzek also discovered that certain objects which are classified with *lem*, such as 'tooth' (*fun*) are not classified with *lem* in standard Thai (the classifier for 'tooth' (*fun*) in standard Thai is *si*). It is clearly seen that the classifier *duang* in North-eastern Thai is used to classify long, sharp-edged objects but *lem* is not. In fact, Placzek argues that North-eastern Thai has a clear-cut boundary between the usages of *duang* and *lem*. While *duang* is used to classify long, sharp-edged objects, *lem* is used to classify other objects with other semantic features, such as oxcart (*kwian*), book (*nungsu*), etc. Standard Thai, however, does not have an obvious boundary between sharp-edged objects and all other objects which are classified with *lem,* which means that there is no discernable relationship among nouns having the same classifier. Placzek concludes, "The fact that two nouns are classified by the same classifier has no implications for a lexical, conceptual, or categorical relationship between the two objects" (Placzek 1983b:16).

Placzek's theory that objects classified by *lem* have no relationship to one another is debatable. Jaturongkachoke (1995) notes that Placzek's theory has some major weaknesses. She points out that, although objects sharing the classifier *lem* do not seem to share common properties (sharp-edged, long, and vertical), it does not mean that those objects are unrelated in all other ways. She further argues that Placzek's research fails to explain how this group of nouns came to be used with the same classifier if nouns are never categorised by classifiers (Jaturongkachoke 1995:36).

In an attempt to answer the question of what principle speakers use to assign specific classifiers to certain objects, Placzek proposes two kinds of criteria which people employ: 'generic' criteria and 'perceptual' criteria (Placzek 1992:154). In accordance with these two criteria, three types of classifiers can be said to exist: generic classifiers, perceptual classifiers, and ambiguous classifiers. A generic classifier is derived from the generic criteria. His example is the classifier *kon,* which is used to classify human beings regardless of specific attributes. The only quality objects need to possess in order to fit into this category is 'humanness'. The second type, the perceptual classifier, results from the second criterion. The use of this type of classifier is based on the perceptual similarities of the head nouns. The example given is the classifier *sen*, which is used with various objects such as 'blood vessel' (*sen-luad*), and 'route' (*sen-tang*). The only feature used to group them together is their common 'long and flexible' shapes (Placzek 1992:156). The third kind of classifier is called 'an ambiguous classifier' because it functions as both 'generic' and 'perceptual'. Placzek's explanation of this type of classifier is unclear. He gives the example of the classifier *tua*, which is used variously with nouns in different domains ranging from animate objects to inanimate objects, and argues that it should be classed as an ambiguous classifier. Placzek explains that *tua* can be generic because it is used with all animals regardless of shape and form, but it could as well be perceptual because it is used with a wide range of inanimate objects from furniture to items of clothing (Placzek 1992:157). However, in the end, Placzek concludes that *tua* should be considered as a perceptual classifier because it cannot stand alone without a noun, while generic classifiers can stand alone in phrases (Placzek 1992:158).

Placzek's model has drawn criticism from Jaturongkachoke (1995). First of all, she argues that *tua* can also stand alone in the sentence, suggesting that *tua* is a generic classifier. Secondly, she argues that human beings could be assigned *kon* as a classifier because of their 'two-legged, erect being' apart from their 'humanness', so *kon* is not necessarily a generic classifier. Thirdly, she makes the point that Placzek's theory does not clarify how an abstract entity can be classified, since it is obviously neither 'generic' nor 'perceptual'.

In spite of the many deficiencies in Placzek's theories, one cannot deny that some of his underlying concepts of classification are somewhat similar to Adams and Conklin's approaches. Placzek divides objects into animate and inanimate. The inanimate objects are then subdivided according to their shapes (one-dimensional, two-dimensional, and three-dimensional). He even agrees that those shapes derive from many plant metaphors.

It can be concluded that shape is a universal criterion in defining numeral classifier categories. Although there is disagreement about the ways in which the numeral classifier may be categorised, the backbone of these theories nevertheless points to the importance of shape in classification. Carpenter suggests "Given the near-universality of shape as an organising principle in classifier systems, it is likely that this is not only because of the universality of shape in objects, but also to some human predisposition to use shape linguistically. The predisposition to use shape linguistically shows up not only in classifier systems, but also extends to other linguistic domains as well" (Carpenter 1981:15).

2.2 How are linguistic categories organised?

The ways that humans categorise information are fundamental to all their interactions with the world (Carpenter 1987:15). Classifier systems are an example of the way humans gain information from a number of sources and organise it into classes according to their similarities. Organisation is a necessary requirement for learning, and it is believed that humans are born into the world with a predisposition to organise information in certain ways (Clark, 1977). In this section, the ways human beings organise the structure of the numeral classifier system in Thai will be discussed. In doing so, it is hoped that the knowledge of how we construct the numeral classifier system will shed light on how we categorise the information we gain from the world and how we map this information into linguistic forms.

Four possibilities have been suggested for category structure: a chained model (Vygotsky, 1934), a checklist model (Locke, 1706; Katz, 1972), a prototype model (Rosch, 1975), and finally, a radial structure model (Lakoff, 1987a, 1987b). Each model will be examined and discussed later in this section, assessing their validity as designs for the internal structures of classifier categories.

2.2.1 The chained model

Vygotsky first introduced the chained model in 1934. The central thesis of this model is that objects in the same group are related to each other disjunctively, sharing some similar features with their consecutive members. Consequently, two members of the same category that resemble each other may not share any similarity with the other members of the group. An example of the chain category structure is illustrated by Carpenter's diagram (1987:17) below:

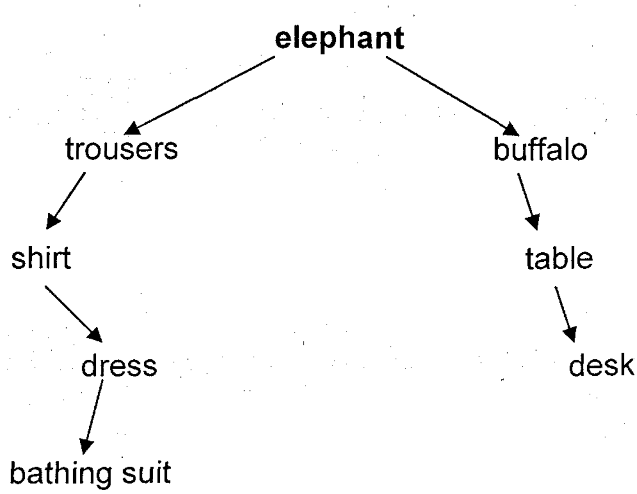


Figure 4: Chain category structure

The items in the diagram above are some of the nouns classified by *tua*. The relationship between the items can be explained by the chained structure. To begin with, 'trousers' (*kangkeng*) resembles 'elephant' (*chang*) in that both of them have legs. Then, 'shirt' (*sua*) resembles 'dress' (*chud*), and 'bathing suit' (*chud-wainam*) resembles 'dress' (*chud*) in that they are all items of clothing. At the same time, one can say that 'buffalo' (*kwai*) resembles 'elephant' (*chang*) in that they are both animals. 'Table' (*toh*) resembles 'buffalo' (*kwai*) in that both of them have quadruped forms, and 'desk' (*toh-tumngan*) resembles 'table' *(toh)* in that they are pieces of furniture. Because these objects relate to one another in the chained structure, it is not essential for 'bathing suit' (*chud-wainam*) to share features with 'elephant' (*chang*) or for 'dress' (*chud*) to resemble 'buffalo' (*kwai*) in any way.

It is noticeable that the chained model links members of the category by local resemblance between individual members. There is no general theme tying all the category members together; therefore, they appear disjunctive. According to Carpenter, the chained model explains how young children organise objects, such as blocks of different colours and shapes. Carpenter claims that when adults are asked to group blocks with different shapes and colours together, they tend to put ones with the same shape together. Young children, however, will probably match a blue square with a blue circle because they are both blue, then add a red circle because it goes with a blue circle, then possibly add a red triangle because it goes with the red circle, and so on (Carpenter 1987:16).

2.2.2 The checklist model

The checklist model requires every member of the same category to possess specific and sufficient features for category inclusion (Locke 1706, Katz 1972). Since the checklist structure predicts clear-cut boundaries between categories, objects that are (+ animate, - human) appear in one category, and objects that are (- animate, + round, - flexible) go in another category. An example of the checklist model by Carpenter (1987:17) is shown below:

+ animate
- human

- elephant
- buffalo
- cat
- snake
- fish
- worm

Figure 5: Checklist category structure

The diagram above shows some of the nouns classified with *tua*. From the diagram, it can clearly be seen that 'elephant' (*chang*), 'buffalo' (*kwai*), 'cat' (*maew*), 'snake' (*ngu*), 'fish' (*pla*), and 'worm' (*norn*) must meet the specification of (+ animate, - human) in order to be enlisted as members in the same group. Unlike the chained structure, in which members of the same category are not required to share common features, possible members of the checklist model are compared against a set of criteria.

2.2.3 The prototype model

Rosch (1975) proposed the prototype theory, arguing that categories in general have 'best examples' called prototypes. These prototypes relate to every member in their category by means of family resemblance. In other words, it can be said that in any category, there exists a prototype member, which represents the best example of the group. Since there is only one prototype in each group, all other members are called non-prototypes. These non-prototypes must share some more or less similar features with the prototype. Some non-prototypes may differ more from the prototype than others, but they are still contained within the same group. An example of the prototype model is illustrated by Carpenter's diagram (1987:17) below:

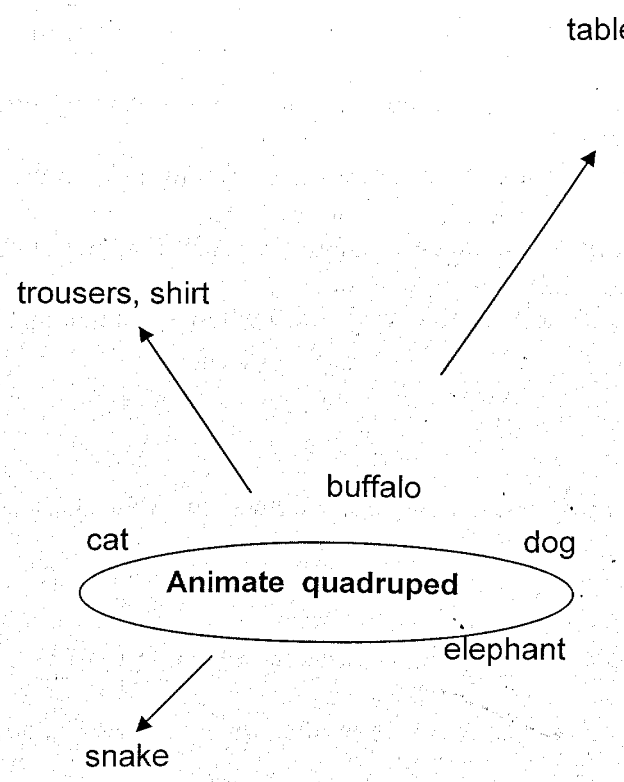


Figure 6: Prototype category structure

Although objects in this group seem extremely disconnected at first glance, all of them are classified with *tua*. If we assume that the prototype of this group is an 'animate quadruped', it can be said that objects in the group have different degrees of resemblance to the prototype. 'Dog' (*ma*), 'cat' (*maew*), and 'buffalo' (*kwai*) undoubtedly match the prototype because of their 'animate, quadruped' features. 'Snake' (*ngu*) is included in this group because of animacy, 'table' *(toh)* because of its quadrupal form, and finally 'trousers' (*kangkeng*) and 'shirt' *(sua)* because of their animal-like 'limbs'.

A striking feature which differentiates the prototype model from the checklist model is that members of a given category do not gain membership by possessing every feature of the criteria. On the contrary, a member can be a member provided that it has sufficient similarities or resemblances to the prototypes. According to Rosch (1975:532), "prototypes serve as cognitive reference points of a category, that is, it is a member to which other members are seen 'in relation' ". In other words, non-prototype members need not share attributes with one another, and they are 'graded', i.e. they do not all have to share the same degree of relationship with the prototype.

2.2.4 Jaturongkachoke's views on Thai classifier structure

Jaturongkachoke (1995) proposes that the Thai classifier system is best described from the prototypical point of view, although she does not deny that prototypes and non-prototypes are always linked together by means of the 'chaining principle'. Taking the argument further, she suggests that the 'chaining principle' is based on culture-specific experiential domains, idealised models of the world (myth, belief, etc.) or the image schema association (Jaturongkachoke 1995:127). Therefore, objects linked together by the chain principle need not share visible common properties, though they may do so. Jaturongkachoke's study of the semantics of the Thai classifier system will be discussed as follows:

By interviewing 75 native Thais in detail about the use of eighteen Thai classifiers (*ton, tua, lung, lem, khan, dok, luk, lam, dam, phun, bai, phaen, duang, taeng, sen, kon, med*, and *an*), Jaturongkachoke found that noun classes in the Thai classifier system have prototype effects. To clarify, there exist best examples of prototypical members as well as non-prototypical members in each noun class, thus resulting in graded members. On the surface, one can say that what she discovered seems to be little different from Carpenter's study, but Jaturongkachoke interestingly points out that a classifier may have more than one prototype, because what one person conceptualises as a prototype for one classifier could be different from another person's conceptualisation. For example, one person might think that 'book' (*nungsu*) is a prototype for the classifier *lem*, but the other person might conceptualise 'candle' (*tian*) as a prototype for the same classifier. Therefore, a prototype for a classifier is not fixed but changeable, depending on one's knowledge and experience. As Jaturongkachoke states, "The fact that some informants gave different prototypes in most of the classes suggests that the class content is not universal and that each speaker has different ways of conceptualising noun classes" (Jaturongkachoke 1995:246).

Jaturongkachoke found that there were only two out of the eighteen classifiers for which all informants gave a single prototype; i.e., *tua* and *ton*. 'Animal' (*sud*) was accounted the prototype of the classifier *tua*, and 'tree' (*ton-mai*) that of the classifier *ton*. Apart from these, more than one prototype was named, and some of the classifiers were assigned a greater number of prototypes than others. It appeared that the classifier *an* had the greatest number of prototypes, presumably because the informants had a greater number of different views regarding the conceptualisation of this noun class.

By analysing the prototypes/ non-prototypes of Thai classifiers, Jaturongkachoke also found an overlap of prototypes between some noun classes. This means that there are nouns which can be named as prototypes for two or more classifiers. For example, 'pebble' (*lug-hin*) can be a prototype for the classifiers *kon* and *med*, 'eraser' (*yanglop*) can be a prototype for *kon* and *taeng*, and almost any small object can also be a prototype of the classifier *an*, as well as their own typical classifiers. According to Jaturongkachoke, this phenomenon proves that the Thai classifier system is not a neatly defined one, and that the Thai noun classification system does not consist of clear-cut classes. This leads Jaturongkachoke to conclude that it is therefore impossible to assign the meanings of classifiers in a traditional way, as, for example, 'x means y'.

Jaturongkachoke states that the prototypes and non-prototypes in each noun class link together according to the chain principle. In a few noun classes, with classifiers like *tua* and *phaen*, there are clear links between prototypes and non-prototypes: 'animal' is linked with *tua*, and 'flat' is linked with *phaen* respectively. For example, 'buffalo' (*kwai*), 'blouse' (*sua*) and 'table' (*toh*) are all non-prototypes related to the prototype 'animal' because they refer to aspects of 'animal' as a whole conceptualisation ('buffalo' = type of animal, 'blouse' = body of animal, 'table' = limbs of animal). However, while there are many noun classes in which many chain principles are applied, most of the chain principles are seen as "physical attribute features" (Jaturongkachoke 1995:163). The fact that different people identified different chaining principles for the prototype/non-prototype pairs leads Jaturongkachoke to conclude that, although people may place particular objects in the environment in the same class, they are likely to have different views of those objects. Since there are many aspects to an object, it is individual cognition that causes people to focus on different aspects of the objects.

As mentioned earlier, it is not necessary for the chain principles to link visibly common properties between prototypes and non-prototypes. Jaturongkachoke suggests that the 'invisible' links such as 'metaphor', 'metonymy', 'image schemata', and 'propositions' are equally important. These cognitive models are generated and implanted in Thai culture, so native Thais will understand and conceptualise in the same direction. For example, *lug*, which literally means offspring of animate objects, was used as a classifier for round objects, but was later expanded to other categories of nouns such as 'fruit' perhaps because of shape, or probably because *lug* can be seen as a metaphorical extension of 'fruit' since the archaic Thai word for fruit is '*lug*-mai'. Therefore, the Thai classifier system depends largely on people's cognition. Drawing on cultural knowledge, on which this cognition is built, people select certain aspects of objects in the environment and use these aspects as their principles of classification (Jaturongkachoke 1995:254).

According to Jaturongkachoke, cognitive models are essential in the structuring of the Thai classifier since the system is based significantly on conceptualisation and is culturally-based. These claims bring a theory of Lakoff's radial structure model to our attention. In the following section, the radial structure model of Lakoff (1987) will be discussed, along with an example of the Dyirbal classifier language, which is also a culture-based classifier language particularly relevant to the Thai classifier system.

2.2.5 Lakoff's Radial Structure Model

Lakoff (1986,1987) proposed radial structures, which are based on the theory of cognitive models. According to Lakoff, prototype effects are real, but superficial (1987:66). Lakoff argues that the prototype theory is sometimes thought of as involving only linear representativeness structures. The representativeness structures are linear because they concern nothing but closeness to the prototypical case, so they do not show most of the rich properties in the structure which exist in the cognitive models that characterise the category (Lakoff 1987:74). In this section, Lakoff's radial structure model, and the examples of radial categories which are particularly relevant to the classifier languages, will be discussed.

A radial structure is a model where there is a central case and conventionalised variations on it that cannot be predicted by general rules. Lakoff discusses the radial categories using the word "mother" as an example. According to Lakoff, "mother" is radially structured with respect to a number of its subcategories. There are several subcategories of 'mother', depending on each person's perspectives. The central case of 'mother' includes a mother who is and always is female, and who gives birth to a child, nurtures the child, and is the child's legal guardian. On the other hand, there are also 'step mother', 'adoptive mother', 'birth mother', 'natural mother', 'foster mother', 'biological mother', 'surrogate mother', etc. where the word "mother" can also be applied and understood. These subcategories of 'mother' are deviations from the central case, but not all variations exist as categories. For example, there is no category for women who give birth to children then have a transsexual operation afterwards, there is also no category for working women who give birth but have no time to nurture their children. Lakoff points out that the central case, therefore, does not generate all of these subcategories. In contrast, the subcategories are defined by convention as variations on the central case. There is no general rule for generating kinds of mothers. Its scope of meaning must be culturally defined and therefore has to be learned individually. The subcategories of 'mother' which cannot be predicted by general rules are examples of what Lakoff calls 'a radial structure'.

It is noticeable that the radial structure within a category is another source of prototype effects. 'Birth mother' and 'foster mother' are therefore understood via their relationship to the central model of 'mother'. Lakoff (1987:82) summarises the properties of the radial categories as follows:

1. There can be no single cognitive model that represents the entire category.
2. There is a central submodel characterizing a central subcategory.
3. Representations for noncentral subcategories cannot be predicted either by rule or by a general principle such as similarity.
4. There are nonarbitrary *links* between the central and noncentral subcategories. These links are other cognitive models existing independently in the conceptual system.
5. Though the noncentral subcategories cannot be predicted from the central subcategory, they are *motivated* by the central subcategory plus other, independently existing cognitive models.

6. Motivated subcategories can be learned, remembered, and used more efficiently than arbitrary, unmotivated subcategories.

In classifier languages, the structure of conceptual categories is apparent. Lakoff's discussion of the Dyirbal classifier system reveals a great deal about the radial structure model.

Dyirbal, an aboriginal language of Australia, is a classifier language. Whenever a Dyirbal speaker uses a noun in a sentence, one of the four words: *bayi*, *balan*, *balam*, and *bala* must precede a noun as appropriate. These words classify all objects in Dyirbal, and one must learn to use the right classifier correctly before each noun. According to Dixon (1982), a brief version of the Dyirbal classification is as follows:

I. *Bali*: men, kangaroos, possums, bats, most snakes, most fishes, some birds, most insects, the moon, storms, rainbows, boomerangs, some spears, etc.

II *Balan*: women, bandicoots, dogs, platypus, echidna, some snakes, some fishes, most birds, fireflies, scorpions, crickets, the hairy mary grub, anything connected with water or fire, sun and stars, shields, some spears, some trees, etc.

III. *Balam*: all edible fruit and the plants that bear them, tubers, ferns, honey, cigarettes, wine, cake.

IV *Bala*: parts of the body, meat, bees, wind, yamsticks, some spears, most trees, grass, mud, stones, noises and languages, etc.

Dixon (1982) proposes basic principles to explain how nouns in Dyirbal are classified into four classes: Class I (*Bali*) are for (human) males; animals, Class II (*Balan*) are for (human) females; water; fire; fighting, Class III (*Balam*) are for non-flesh food, edible plants and finally Class IV (*Bala*) are for everything not in the other classes. On the surface, this schema seems to fit well with the categorisations of the Dyirbal classifier system. However, Lakoff argues that the Dyirbal classifier system is significantly based on the 'domain-of-experience principle' (Lakoff 1987:93). For example, fish are in class I (*bali*) because they are animate. Fishing equipment (fishing spears, fishing lines, etc.) should be expected to be in class IV (*bala*) since they are neither animals nor plants, and are also in class I (*bali*) because they are connected to 'fish'. Light and stars, which are in the same domain of experience as fire, are in class II (*balan*) with fire. Fighting spears and fighting ground are in the same domain of experience of fighting, therefore are in class II (*balan*). Dixon also notes that the Dyirbal classifier system is based on the myth and beliefs of their culture. For example, although birds are animals, they cannot be classified in class I (*bali*) like other animals because it is believed that birds are spirits of dead human females, and so birds are in class II (*balan*). According to myth, the moon and the sun are husband and wife, therefore the moon is in class I (*bali*) with other human males, while the sun is in class II (*balan*) with other human females. Another aspect to be considered within the Dyirbal classifier system is the domain of 'harmfulness'. Fishes are mostly in the class I (*bali*) with other animals, but the stone fish and gar fish are harmful, so they are in class II (*balan*). Trees, bushes, vines and grasses with no edible parts are in class IV (*bala*) but two stinging trees and the stinging nettle vine are in the class II (*balan*) with other harmful things.

Therefore, Dixon (1982) proposes the principles of human categorisation which analyse the Dyirbal classifier system into radial categories. The classification consists of several domains, *e.g Centrality*, where the basic members of the category are called, *Chaining*, where central members are linked to other members, *Experimental domains*, *Idealised models*, *i.e.* myths and beliefs, *Specific knowledge*, etc. Dixon's analysis explains why the Dyirbal system is the system that human beings can function with. For example, fish live in the water, and fish are in class I, but that does not make water class I with fish, or make fish class II with water. Dixon points out that the domain of habitation is not important to the Dyirbal system. So Dyirbal speakers must learn which domain of experience and which domain of myths and beliefs matter for the classification (Lakoff 1987:96).

Lakoff (1987) summarises the structure of the Dyirbal classifier system into the following figure. The system is divided into four clearly defined mutually exclusive domains, represented by the boxes. This form is called a base model. Three base models have an internal structure, with elements at the centre. The centres are indicated by squares in the diagram. The centres (the most typical) of the three base models are human males, human females, and edible plants respectively. Members of each domain are connected to each other on the basis of chaining principles, in this case the domain-of-experience principle together with a list of domains relevant for categorisation; among such domains are myth, fishing, danger, etc. The fourth has no internal structure and therefore has no centre because it is made up from the left over of the three.

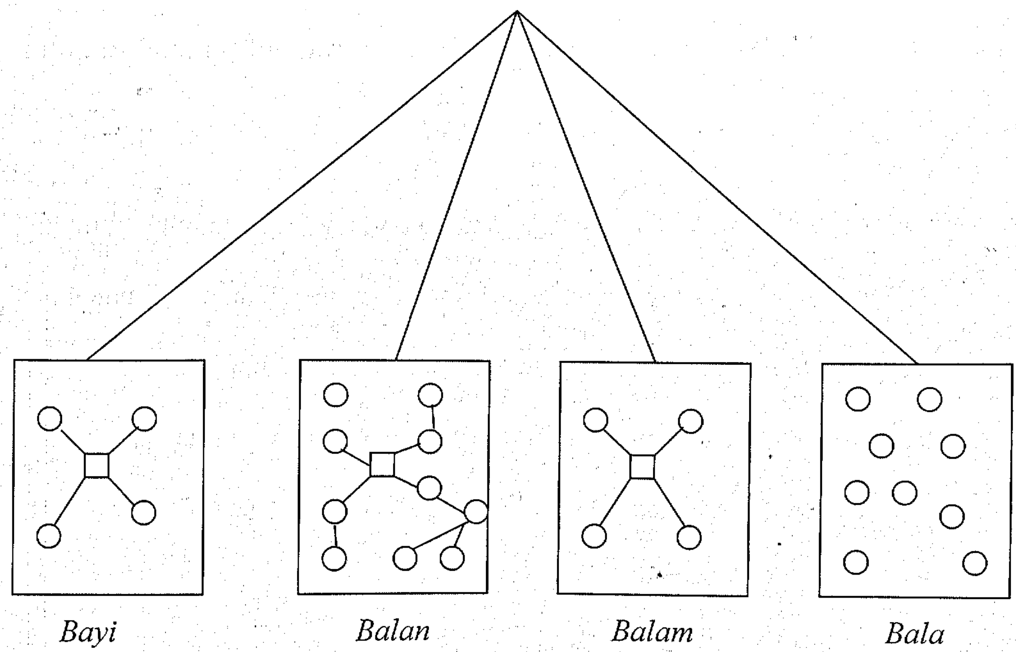


Figure 7: Lakoff's analysis of Dyirbal classifier system using base models (Lakoff 1987:103)

In comparing the Dyirbal classifier system and the Thai classifier system, many similarities can be noticed. Both are culturally-based systems which exhibit certain basic mechanisms used in human categorisation. The Thai system consists of several more classifiers than Dyirbal, but the classification of nouns is also based on centrality, chaining, domain of experience, myths and beliefs, and some specific knowledge.

In using Lakoff (1987) as a starting point, Ingris (2003) illustrates further about the radial category system in the Thai classifier system. He uses two Thai classifiers, *bai* and *luk*, as the examples to specify their central members, distinguish important contrast among these central members, and provide semantically motivated links between these central members of the category (Ingris 2003:223).

According to Ingris, *Bai*, for example, functions as a classifier and a class term but not a noun (Ingris, 2003). In Thai *bai-mai* literally means 'leaf-tree'. Therefore, 'two leafs' are classified as *bai-mai song bai* (literally, leaf-tree 2 leaf-like thing) where *bai* is a classifier meaning leaf-like thing. Examples below represent *bai* as their classifier with the prototypical members in the 'leaf-like' category.

a) bai- cha	b) *bai tong*	3) *yaa*
leaf tea	leaf-banana wrap	'grass'
'tea leaf'	'banana leaf'	

There are other kinds of flat, thin objects which also classified with *bai* which share the same flatness as leaf, but are different in the degree of the rigidity and the shape of leaf. E.g.

a) pai	*b) tua*	*c) jan*	*d) tangmo*	*e) rakam*
'card'	'ticket'	'plate'	'watermelon'	'a kind of Thai fruit'

'card' and 'ticket' share the flat characteristics and therefore belong to the leaf-like category due to their flat and thin relation to 'leaf'. They are similar only in that they are flat but totally different in regards to shape. 'Plate' is also flat and thin, but the difference is in the rigidity because it is made of inflexible material. 'Watermelon' and 'rakam', however, do not share the flat and thin characteristics, but they are rather connected to each other according to their 'fruit bearing' characteristics.

Another extension of 'leaf' according to Lakoff's radial category can be seen in nouns in the following group.

a) bai-rua	*b) ekkasan*	*c) bai-set*	*d) bai-song-kong*
leaf-boat	'document'	leaf-finished	leaf-send-thing
'sail'		'receipt'	'invoice'

'Sail' reflects the flatness and thinness, therefore forming a radial category of Lakoff. However, 'sail' is differred in terms of its materials since it is made of cloth-like material. 'Document', 'receipt' and 'invoice' are also thin and flat like 'leaf'; but they differ conceptually by making salient the type of written content of the paper. As a lexical set, their semantic meaning rests in this difference of written content (Ingris 2003:225).

Two radial extensions from 'plate' can also be noticed. According to Ingris, 'plate' as a flat and round shape motivates a semantic iconic link with objects such as propellers, bai-pat [leaf-blow] 'airplane prop' and bai-jak [leaf-wheel] 'boat prop', which are also flat, round, and rigid. We can notice at this point that the flat, thin shape becomes a more general broad shape.

A second radial extension from 'plate' according to Ingris, is observed in the lexical set of kitchen utensils, where *tuay* 'cup', *kaew* 'glass', and *cham* 'bowl' all share *bai* as their classifier. The members in this set do not have the conception of flateness but rather receive an association via the plate to now include other kitchen utensils. Ingris also points out that these small beverage containers then extend to include larger liquid containers such as *kraboknam* 'thermos' and *kratiknam* 'canteen'. The extension also includes other types of water containers such as *yuak* 'jug' and *jaekun* 'jar', and extending to more general containers such as klong 'box', and other storage containers such as *krasop* 'sack' and *lang* 'crate'.

This radial complex is thus constituted by several chains such that the peripheral members deviate quite drastically from the central members of the category.

Since Thai classifiers are culturally-based, some of them have changed over time and some have not. There are many novel objects which have recently been introduced into the Thai language and which have been assigned classifiers. In the next section, the change and productivity of Thai classifiers will be discussed.

2.2.6 Change and Productivity of Thai classifiers

There are three types of change in the Thai classifier system which should be mentioned: first, the disappearance of some obsolete classifiers; second, the introduction of new classifiers to use with novel objects; and third, the adaptation of existing classifiers to technological and cultural changes.

Certain classifiers are becoming obsolete as they are rarely employed in spoken Thai. Examples are given below:

Noun	Obsolete classifiers	Substituted classifiers
Match box *(klong-mai-kid)*	klug	klong
Rice noodle *(ka-nom-jeen)*	jub	tua
Saw *(leoi)*	phun	an
Palm-leaf book *(bai-lan)*	phuug	lem
Fishing net *(hae)*	paag	an

Table 3: Obsolete classifiers in modern Thai

Some classifiers, such as *phuug* or *paag* are rarely used now probably because one does not find a 'palm-leaf book' or a 'fishing net' in everyday life anymore. Some classifiers which are rarely used have been replaced with the general classifier *an* for the sake of convenience. Therefore, the number of objects classified by general classifiers appears to be increasing while some ancient classifiers are gradually declining in use.

Indeed, recent research has found that some ancient classifiers are gradually being replaced by general classifiers. Sunkaburanuruk (1999) attempts to examine the variation of the classifiers used by two groups of standard Thai speakers, those whose age is under 25 years old and those over 40 years old. The data were collected from observing TV talk shows for 50 hours and from direct interviews. Sunkaburanuruk claims that the younger generation of standard Thai speakers (under 25 years old) tends to use general classifiers and repeaters more often than the older generation (over 40 years old). Sunkaburanuruk also reports that general classifiers are coming to replace the specific classifiers and 'proper classifiers' suggested by the

Royal Thai Language Institute (1998), which are gradually being omitted more frequently in casual conversation.

Technical innovation has led to the introduction of some new classifiers. It is worth noting that most modern words brought into Thai tend to use 'part-repeaters' as their classifiers. Objects such as 'telephone' (*kruang-torasap*), 'hair-dryer' (*kruang-pao-pom*), 'air conditioner' (*kruang-prab-arkad*), 'boiler' (*kruang-tum-kwamron*) are all classified with *kruang.* Although *kruang* literally means 'machine', it also serves as a classifier for mechanical devices as well.

Recent introduction of new objects has given rise to a number of new words in Thai, which are assigned conventional classifiers in keeping with the traditional semantics of the system. For example, 'diskette' (*paen-disc*) is classified with *paen* to denote its flatness; 'French bread' (*kanompang-farangsed*) is classified with *kon* to emphasise its round, irregular shape. This process shows quite clearly that speakers use the underlying semantic regularities in the system to extend classifier use even to novel nouns.

As we have noted, the usage of existing classifiers may also change over time, expanding or contracting. Carpenter's study, carried out in 1987, found that *tua* was also being used as a general classifier and interpreted it as the 'stylistically marked' classifier in colloquial speech. Her supporting evidence came from the colloquial use of *tua* among university students for nouns such as 'cigarette' (*buri*), 'guitar' (*guitar*), tape recorder' (*tape-ad-siang),* 'university course' (*wicha-rian*), etc., which reflected the youth culture at the time (*tua* was used as an equivalent to the English word 'thingie'). However, it should be noted that, thirteen years after Carpenter made this observation in her research, *tua* is now expanding its usage, far beyond 'youth culture' alone. According to my observation, *tua* is not only used by university students to refer to some particular objects, but has also expanded to wider population groups, to classify some concrete and abstract things informally, such as 'stock' (*hoon*), as in stock market, 'merchandise' (*sinka*), medicine' (*ya*), 'problem' (*punha)*, 'idea' (*kwamkid*), etc. However, one can say that *tua* is still a stylistically marked classifier, but it is now marked for general informality, and no longer specifically for youth culture.

It can be said that Carpenter's mixed model could be used to explain the change and productivity of Thai numeral classifiers. According to Carpenter, new members might be added according to these three kinds of generalisation: local analogies with individual members (chained model); resemblance to the prototype (prototype model); and meeting with sufficient criteria (checklist model). She also predicts that "speakers would attempt to make generalisations about category members, and that sometimes such generalisations could result in a new prototype because new members added by chaining make a new prototype more reasonable" (Carpenter 1987:21).

Jaturongkachoke emphasises that change and productivity in the Thai classifier system are unavoidable because language is dynamic and develops over time. According to Jaturongkachoke, the classification process is complex because it involves natural, individual experience, as well as the experiences of groups of people, or of whole societies.

In the next section, the relationship between the classifier categorisation and overextensions in children will be discussed, in order to explore the question of what criteria children use to categorise numeral classifiers and how the use of those criteria is different from the process of categorisation by adults.

2.3 Innateness VS. Emergentism

Emergentism as an alternative to innateness has been a hotly debated issue for the past decade. In this section, both approaches will be critically analysed and discussed as it is closely related to the issue of how children acquire grammar. In connection to this research, the question of to what extent the environment influences children's acquisition of the classifiers will be related. The controversy still exists whether children acquire language by nature (innateness) or by nurture (environment).

2.3.1 Innateness Approaches

The innateness approach linguists believe that "innateness" is a complex outcome of the information contributed by genes. Many psycholinguists accept the nativist views of language acquisition (e.g., Gleitman, 1990; Hyams, 1986; Pinker, 1984, 1994, 1995; Valian, 1990). Pinker (1995:30) states that language acquisition depends on an innate, species-specific module that is distinct from general intelligence. The most eminent nativist account in language acquisition has been proposed by Chomsky (1981, 1986, 1988). Chomsky argues that what is built into a human's mind is a form of Universal Grammar (UG), i.e., linguistic principles that are innately specified and constrain the child's acquisition of his/her native tongue (Karmiloff-Smith 1994: 574). Hyams (1986), as well as Valian (1990), also believes that infants are equipped with a built-in series of parameters with a default setting fixed in with the characteristics of the particular linguistic environment that they will find by themselves when they get older.

Some eminent nativists believe that language grows 'as analogous to the development of a bodily organ.' (Chomsky 1975:11). Pinker (1994) echoes that, this innate knowledge must lie in the "microcircuitry" of the brain. Therefore, language acquisition in children is absolutely innate, and only humans can acquire language because no other species has the same characteristics of the human brain.

Elman *et al.* (in press) proposes a 3-level taxonomy of claims about innateness. From the concept that innateness is a complex outcome contributed by human genes, Elman *et al.* (in press) divides taxonomy of claims about innateness, ranging from the strongest to the weakest link to real brains and the neural networks. They are:

A) *Representational constraints*: These constraints directly refer to direct innate structuring of the mental/neural representations that underlie and constitute "knowledges" (Bates *et al* 1998:590). In addition, this level is most likely to implement detailed knowledge in the brain and operate connections between processing units in the brain.

B) *Architectural constraints*: These constraints refer to innate structures where neural networks or some forms of knowledge can only be realised or acquired with the assistance of some particular right structures. Examples given by Bates *et al* (1998) regarding to these types of structures are the right number of units, number of layers, types of connectivity between layers, etc. (Bates *et al.* 1998:590). These Architectural constraints cannot stand alone and process between units like the representational constraints.

C) *Chronotopic constraints*: These constraints refer to innate constraints which occur on the timing of developmental events. They are captured in neural networks by the increase of data, cell division schedules in growing networks, adaptive learning rates, etc. These constraints have the least connection between the processing of units in the brain.

This kind of the above representational nativism is theoretically plausible and attractive, but has proven hard to defend, especially when technologies have become more advanced. There is very little evidence today in support of the idea that genes code for synaptic connectivity at the cortical level (Bates *et al* 1998:593). The use of computer simulation does not support the constraints raised above, and there are empirical issues to be considered as well. For example, why human infants with left-hemisphere lesions that would lead to irreversible aphasia in an adult go on to attend to the language abilities that are well within the normal range? (Bates *et al* 1998: 595, Eisle &Aram, 1995)

However, with no better alternative theories, four main issues are sometimes confused with the innateness approaches: the domain specificity, the species specificity, the localization, and the learnability. Explanations are as follows;

Regarding the domain specificity, it is claimed that the outcome is so specific to the domain that it must only be innate. Regarding the species specificity, it is argued that humans are the only species that have the subtlety to communicate by languages, so it must be in the human genetics. In regard to the localization, it is also claimed by the nativists that the outcome is affected by a particular part of the brain, so the outcome must be absolutely innate. And finally regarding to the learnability, the nativists propose that we cannot figure out how the outcome could be learned, so the outcome must be innate.

2.3.2 Emergentist Approaches

In contrast to the nativists who believe in the innateness of language, the emergentist linguists propose the Nature-Nurture controversy regarding language acquisition. The emergentist approaches believe that outcomes can arise for reasons that are not predictable from any of the individual inputs of the problem (Bates *et al* 1998:590). In other words, while nativism believes that white and black makes grey, the emergentism, however, argues that the outcome may be green or red or something different from the inputs. Environment is actually an ultimate cause of language development.

According to the emergentism, genes do not act independently. Genes can be turned on and off by environmental signals throughout the lifetime of the organism (Bates *et al* 1998:591). In the emergentists' view, it has become rather noticeable that the emergentist approaches are more convincing nowadays than the innateness approaches because there have been some breakthroughs in developmental neurobiology. It is now possible to simulate changes in multilayered neural networks to explain the emergence of complex solutions from simpler inputs (Rumelhart & McClelland, 1986). Today's neurobiological results also support the case for an emergentist approach regarding the plastic and activity-dependence of the brain.

As it was stated earlier that innateness is sometimes confused with the domain specificity, the species specificity, the localization, and the learnability, it is noted that a more convincing emergentist account of development is now possible. In this part of research, it will be argued that innateness and domain specificity are not the same thing, the innateness and species specificity are not necessarily true. Species specificity alone does not constitue evidence for a specific mental organ (Bates at al 1998:594). In addition, localization does not require innateness, and learnability is not a solid proof for the innateness.

As the Innateness claims that language is so peculiar that it can only be learned by a domain-specific system, the emegentists disagree. Their counter-argument about the innateness of domain specificity is that, if the nativist' claim is true, other similar cognitive systems, e.g. face perception, music, mathematics, and social reasoning should have resemblance to languages, but in fact they do not. Languages have very little in common with other cognitive systems, but they have a lot in common with one another. Bates *et al* (1998) explains that the reason why languages are similar to other languages is because humans share "experiences" that are shared by the normal members of the same species (Bates *et al.* 1998:593). The reason why domain specificity of language is used to infer innateness is because domain-specific behaviours have emerged as a result of the mapping problem. However, the reason can also be explained by an emergentist theory as well.

Regarding the innateness and species specificity, it is protested by the emergentist linguists that, to date, no one has ever identified a neural structure that is unique to only humans e.g. a neuronal type, neurotransmitter, or pattern of cortinal layering (Finley & Darlington, 1995). Therefore, species specificity is not evidence for innateness.

Regarding innateness and localization, the nativist claims that if we could show that the brain handles regular and irregular morphemes differently, it would be evidence enough for two innately specialised, domain-specific processors. The emergentists disagree. According to the emergentist approaches, if we experience two stimuli in exactly the same way, then we do not "know" that they are different. If we do experience them differently, then that difference must be reflected somewhere in the brain (Bates *et al* 1998:592). All knowledge presupposes localization in some form, and hence demonstrations of localization do not constitute evidence for innateness.

The final counter-argument is about innateness and learnability. The nativists claim that we cannot figure out how the outcome could be learned, so the outcome must be innate. This is true only if we make assumptions about the learning device that are unlike any known nervous system. The emergentists claim that no work is being done to find out whether grammars of a different kind are learnable or is another learning device available to acquire such a grammar.

There is no final conclusion from previous research that language acquisition is innate although it is becoming more apparent that the emergentist approaches are more conclusive and more scientifically viable nowadays. The developmental linguists have become more aware of the alternative approaches, emergentism, and the solution regarding the controversy about Nature-Nurture having become scientifically challenged in the past decade. In this research the Nature-Nurture controversy of children acquiring Thai classifiers is still one of the issues we are seeking results for. If it can be proved that the bilingual child acquires the classifiers with ease, despite her limited input of Thai language, and with no difference or delay in comparison to her monolingual counterpart, then it can be assumed that the child possesses innate knowledge or has a blueprint about this grammatical use in her brain.

2.4 Co-existence of irregulars and regularised forms in children's speech

Three interesting questions arise from doing research on the language of three-year-old children. How do they acquire grammar? What kind of errors should we expect in their grammar? How do they produce such errors and how do they overcome those errors eventually? This section will try to answer these questions using emergentist theory of children's language acquisition, referred to as the Competition hypothesis, which was proposed by Kuczaj (1977) and Maratsos (2000). The reason it is necessary to explore the irregulars and regularised forms in children is because the Thai classifier system contains regular forms and unpredictable, irregular forms which children need to acquire. In order to understand their process of classifier acquisition, an analysis of the researches that have been done is essential.

2.4.1 Competition Hypothesis

Competition hypothesis proposes that overregularisations in which both regular and irregular forms are used by children during their first attempt to acquire language are initially acceptable alternatives once the regular form is productive and the irregular form of the particular word is learned. According to Maratsos (2000), the typical choice of the irregular form is made when the child experiences more input, the irregular form could appear. However, the child has a tendency to decrease the production of the regular forms, leaving the irregular form as winner of the implicit competition (2000:184). There is a period where children apply both forms by chance. This period where both irregulars and regularised forms coexist in children's acquisition process is called the 'competition period'.

Thus children might say 'felt' when they are very young, and both 'felt' and 'feeled' when somewhat older. This is not surprising at all. According to the competition hypothesis, errors can be haphazard. Children sometimes use correct and incorrect versions in quick succession. The hit-or-miss nature of these errors is the coexistence of irregulars and regularised forms in a competition period. It suggests that children are not ignorant of the correct forms, but they are fallible in retrieving them. In most cases, children use the correct forms to replace their overgeneralised forms as they get older.

The co-existence of irregulars and regularised forms not only explains why children overgeneralise with the English plural rule or past tense rule, but it is also a good explanation of why the most frequent mistakes Thai children produce in using classifiers is the overuse of general classifiers. Similarly to any morphological system (like the English past tense), Thai classifiers have regular, predictable forms and irregular, unpredictable forms. This is what children have to learn, and the process of using irregulars and eliminating overgeneralised forms is involved in their process of acquisition.

2.5 Some conventional views about noun categorisation and word meaning biases in children

Research suggests that young children assume that certain kinds of concepts go with certain types of words, and other kinds of concepts cannot be the meaning of a word at all (Marcus *et al*, 1992). Linguists also believe that the basic abilities needed to classify objects, to recognise objects as individuals, and to understand relations between objects already exist from very early childhood or even infancy. The interesting developmental question, then, is how children figure out which way to categorise objects that are the culturally specified ones and which of these categories are referred to as specific word meanings (Markman 1991:15).

To learn how children categorise objects we must consider Quine's (1960) problem of induction first because word learning is a form of inductive learning. The child's task is to comprehend what is meant when an adult utters a word; this is like the linguist's problem on hearing a native shout 'Gavagai!' when a rabbit passes by. Logically, there are a huge number of possibilities. 'Gavagai' could of course mean 'a rabbit'. It could mean 'a furry thing', 'a mammal', 'a rabbit's feet', 'ground where a rabbit stands' and many more. How could the linguist or a child, prefer to assume that 'Gavagai' means a rabbit, and reject thousands of alternative meanings? Markman and Hutchinson (1984) and Carey (1988) propose that two hypotheses are relevant to Quine's induction problem: the whole object assumption and the taxonomic assumption. Basically, the inductive problem can be partly explained by the whole object bias of children and adults alike. When shown a novel object and given a word that refers to it, children tend to take the word as an object noun, and this is also true for adults. Therefore, when we hear 'Gavagai', we assume that it means a rabbit. However, the whole object assumption is not the perfect solution to Quine's problem because it explains only how children learn the names of objects. How children learn the meaning of non-object words such as 'under', 'white', 'of', 'running', etc. is still unclear.

Markman and Hutchinson (1984) propose that children, no matter how young they are, develop a 'taxonomic constraint' (which Bloom (2000) calls a 'taxonomic bias') when facing the induction problem. In other words, Markman and Hutchinson believe that children learn new things according to their taxonomic categories, although they are obviously capable of organising things according to their thematic relations. Regarding Quine's problem of induction, children rule out many possible meanings of new terms, in particular many thematic meanings. That is, they do not consider thematic relations as possible meanings for words despite the fact that they consider them a good way to organise the objects themselves. Experimental data from Markman and Hutchinson show that when young children are asked to classify things, they often classify them thematically. But hearing a new word induces children to look for categorical relationships instead of thematic relationships. Even very young children may be aware of the constraints on word meaning so that when they are learning a new word, they shift their attention from thematic to taxonomic organisation (Markman 1991:27).

So what we learn from Quine's induction problem is how children categorise objects. According to Markman and Hutchinson (1984) and Carey (1988), at least two biases are concerned. Children are biased to interpret novel words referring to whole objects (the whole object bias), and to treat them as referring to objects of the same type (the taxonomic bias). Researchers in the past decade have also suggested the mutual-exclusivity bias (Markman, 1991), the noun-category linkage (Waxman, 1994), the shape bias (Landau, Smith & Jones, 1992), the principle of contrast and conventionality (Clark, 1993), and the principles of reference, extendibility, object scope, categorical scope, and novel name-nameless category (Golinkoff, Mervis & Hirsh-Pasek, 1994). However, Bloom (2000) disagrees with the idea that special constraints are innate, equipped only to facilitate the process of word learning. Although he accepts that young children can use their knowledge about phonology, morphology, syntax and the meaning of words to help themselves learn a language, he does not accept Markman's belief that the biases exist. Bloom comments that those biases are not at all special for the learning of words. In fact, the tendencies of children to treat words as object names, to avoid words with overlapping references, and to generalise object names on the basis of shape, would be better explained in terms of other facts about how children think and learn, but not as the solution for how children learn the meaning of words (Bloom 2000:11).

The tendency of children to assume that an object cannot be named with two labels is called 'the mutual exclusivity bias'. A single object cannot be called a bird and a cow at the same time, and a single object cannot be called a chair and a dresser at the same time. Thus, in order for categories to be informative about objects, they tend to be mutually exclusive (Markman 1991:188). The mutual exclusivity bias is closely related to Marcus *et al.* (1992)'s proposal discussed in section 2.3. Marcus *et al.* suggests that when children are faced with a set of alternative structures fulfilling the same function, they should assume that only one of the structures is correct unless there is direct evidence that more than one is necessary.

Among the proposed innate biases children may use to learn word meaning, the shape bias for count nouns (Jones, Smith, & Landau 1991; Landau, Smith, & Jones 1988; Smith, Jones, & Landau 1992; Jones & Smith 1993) appears to be very relevant to the acquisition of the classifier system. The shape bias suggests that young children rely heavily on perceptual properties, especially shape, when generalising words. Children's cognition is often described as 'perceptually bound' or 'concrete' because it is often based on appearance. Tversky (1985) found that young children prefer to group things together on the basis of colour and shape rather than the properties of common category relationships. Evidence from Baldwin (1989), Jones, Smith & Landau (1991), Landau, Smith & Jones (1988, 1998), Smith, Jones & Landau (1992, 1996) shows that when children are taught a novel count noun which refers to an object, they will overextend it to objects with similar shapes, not to objects with similar texture, colour, or size which they already know. Tversky (1985) reports that a four-year-old subject of her experiments grouped a fire engine with an apple because both of them were red, instead of grouping the fire engine and a car together because both were vehicles. Bloom (2000) also mentions that his two-year-old son called an ice-cream cone a 'pee-pee' because its shape was like a penis, and called a slice of pepper 'a hat' and put it on his head because it was a similar shape to a hat. Also, Clark (1973) observed a young child who called a doorknob an 'apple' because of its rounded shape.

However, theories about word meaning biases, including shape bias for count nouns, have not gone unchallenged. In the next section, more recent theories about categorisation and word meaning biases in children will be discussed.

2.6 Some recent development about word meaning biases

During the past decade, conventional theories regarding word meaning biases such as the principle of mutual exclusivity (Markman 1991), the whole object bias (Markman 1990, 1991, 1992, 1994), the taxonomic constraint (Markman & Hutchinson, 1984) and a shape bias for count nouns (Jones, Smith, & Landau 1991; Landau, Smith, & Jones 1988; Smith, Jones, & Landau 1992; Jones & Smith 1993) have been substantially debated. Some linguists, to name just a few, such as Smith (1995, 1999, 2002), Gathercole (2002c), Merriman (1999) have proposed a radically different approach to word meaning in recent years. An alternative approach, emergentist, views the child's knowledge of the possible meanings of words as emerging from the child's growing knowledge of how language works and what language refers to.

Smith (1999) suggests that the form of the bias depends on the properties of the named objects. She argues that when a child learns the names of objects, he or she systematically attends to different properties in different stimulus contexts, forming differently structured categories for different kinds of things (Smith 1999:279). From her experiments, 3-year-old children generalised novel objects' names based on shape, but when the objects had eyes, they generalised the name of the objects based on the texture. Therefore, putting eyes on the objects changed the form of the bias in learning object names. Smith also suggested that word meaning biases in children change with their language development. She concludes that biases emerge over the course of word learning and they reflect the properties of languages being learned.

From her discussion about children's attention to shape across ages, Smith (1995, 1999) traces the development of a shape bias in children from around 24 months of age, and discovered that the attention to shape develops and becomes more specific to count nouns only. In fact, the shape bias develops quickly when children have already acquired approximately 50 count nouns in their productive vocabulary, after the spurt in noun acquisition commonly known as the 'naming explosion' as defined by Gopnik and Meltzoff (1987). The development timing of biased attention to shape suggests that shape bias is a consequence of learning some number of names for shape-based categories. Once learned, this shape bias should support and sustain rapid word learning. Therefore, Smith concludes that "learning words *creates* a shape bias by creating a contextual cue so regularly associated with attention to shape that the presence of that cue automatically shifts attention to shape" (Smith 1999:287).

Gathercole (2002c) suggests that biases may not be biases at all. In fact, it is merely a process children have to go through when they acquire language. According to Gathercole, "a word meaning bias is a symptom of children's reliance on regularities they have discovered about language—about the particular language being learned—in interaction with cognitive factors and linguistic factors." (Gathercole 2002c:11). To clarify, children acquire word meaning depending on two types of factors, linguistic factors and cognitive factors. Linguistic factors are linguistic regularities children experience from the input they hear. The more they get used to language, the more their linguistic regularities increase. Secondly, cognitive factors refer to processing capacity, knowledge of the world, and knowledge of pragmatic principles and social interaction. Some processing capacities are easy for children to process, but some are difficult. 'Shape' is considered easy for children to acquire while 'function' is considered rather difficult to process. Therefore, children tend to overextend novel words according to shape while adults use functional properties to determine extendibility of new names. However, it is reported by Gathercole and Cramer (1995) that children will gradually learn the importance of functional properties in word meaning when they are older. By the age of 9, monolingual children have developed responding patterns similar to adults (Gathercole 2002c:11). So it is noticeable that the child's processing capabilities change with age and maturity. Shape is probably the most salient property children take into account, but some other properties, such as function, may become more influential when they get older.

Children's increasing knowledge of the world is also considered a cognitive factor. The significance of particular aspects of knowledge can change as the child matures (Gathercole 2002c:12). According to Smith (1995), children's shape bias occurs overwhelmingly exactly at the time when the word spurt occurs and children's overextensions are extensive, and then declines afterwards (Gathercole 2002c:12). When shape becomes less dominant, children shift their attention to other aspects of the properties such as materials, texture and function.

Merriman (1999) also argues that the shape bias and the mutual exclusivity bias are not innate constraints for young children in learning words. He proposes that shape bias is a consequence of the dominance of shape in the representation of the first object names that children acquire. Because shape is usually the most distinctive property in familiar objects around children, attention will be drawn to shape when a novel count noun is learned.

Regarding the mutual exclusivity bias, Merriman proposes that this phenomenon also emerges as a consequence when a child learns several words for the same referent. Merriman argues that a second label for an object is easy to learn only if that second label leads the child to shift attention to features that are not strongly associated with the first label (Gathercole 2002b:59).

In conclusion, the emergentist approach argues against the potential innate or built-in biases children may use to accomplish a word learning task. Smith (1995) concludes that word learning biases are the outcome of the real-time activity of dynamic systems. It is suggested that word meaning acquisition is the process by which children learn to coordinate multiple cues to meaning, and the process systematically changes with age and maturity resulting from an increased capacity to process and coordinate those cues (Gathercole *et al.* 1997: 1).

2.7 The relationship between overextensions in children and categorisation in the classifier system

In the previous sections, the ways in which human beings categorise information and how the numeral classifier system is organised have been discussed. It is believed that perceptual properties, especially shape, are important in classifier systems. We have also agreed that the Thai classifier system is culturally based, speakers drawing on their social and cultural background to use the classifiers appropriately.

As the organisation of linguistic categories and the ways of defining numeral classifier categories have been dealt with previously, it is of relevance now to discuss how children start to acquire classifier categories. It is apparent that shape, as well as materials, texture, size, and some other perceptual properties are important criteria in assigning nouns to classes. Is this the case in children's categorisations as well as adults'? In this section, Clark's classical theories about overextension in children will be discussed in detail, in comparison with some current theories about overextensions from other linguists such as Bowerman *et al.* (2002), Gathercole (2002a), and Slobin (2002).

According to Clark (1977), children tend to use properties like shape, motion, texture and size to extend the use of a particular noun, but colour is never used as a basis for overextension. Clark observes that the way children overextend the use of nouns is similar from child to child. She points out that overextension in children and the ways adults define classifier categories are very similar because of their preference for shape, motion, texture, and size as categorisation criteria. She proposes that the similarities reflect basic human cognitive capabilities, and concludes, "both classifiers and overextensions, therefore, may be able to shed some light on the cognitive capacities we use in the formation of natural categories" (Clark 1977:461).

2.7.1 Clark's study of overextensions in children

As a child starts to acquire the meaning of words, he or she is likely to use a great many overextensions. Clark (1977) suggests that overextensions in children are universal. Children may assume that a word picks out only some of the characteristics of an entity. For example, children acquire the word 'doggie' from very early on, and continue to apply it to horses, cows, sheep, etc. It is likely that children pick out the 'four-leggedness' property of 'doggie' and overextend it to other entities with four legs, or they may pick out the 'animalness' of 'doggie' and overextend it to all sorts of animals. Whatever the reason, the implication is that children pick out at least one characteristic that these objects hold in common to make the overextension.

So what does the child use as the basis for his or her overextensions? Clark (1976) suggests that overextensions can be divided, according to the criteria children use, into seven groups: 1) shape, 2) movement, 3) size, 4) texture, 5) sound, 6) taste, and 7) function. It is noted that visual perceptions are very important in all of these except sound and taste. In addition, it is interesting to note that colour is neither a basis for overextensions in children, nor a basis for classifier categories in adults, as discussed earlier. Clark claims that young children tend to make overextensions based on shape most frequently. However, children sometimes overextend objects on the basis of their movement, size, texture, and functional basis, and, less frequently, on the basis of their sound and taste. According to Clark, the vast majority of overextensions in children are based on the children's perception of the world around them. Therefore, what they overextend seems to be heavily based on what they can perceive visually. Some of Clark's examples of children's overextensions for each property are listed in the table below:

Overextensions based on	**Lexical item**	**First referent**	**Domain of application**
Shape	mooi	moon	cakes, round marks on windows, writing on windows and in books, round shapes in books, tooling on leather book covers, round

			postmarks, letter 'O'
Shape	mum	horse	cow, calf, pig, moose, all four-legged animals
Size	babie	baby	cast of 'laughing boy', all persons except adults
Size	fly	fly	specks of dirt, dust, all small insects, child's own toes, crumbs of bread, a toad
Texture	sizo	scissors	all metal objects
Texture	bow wow	dog	toy dog, fur-piece with animal head, other fur-pieces without heads
Movement	titi	animals	pictures of animals, all things that move
Movement	sch	sound of train	all moving machines
Functional	aga (allgone)	said when had drunk all milk	said of anything put out of sight, disappearance of kin
Functional	atta	departures	opening or closing of doors, raising box lid, any disappearance of object from sight

Table 4: Examples of children's overextensions (Clark 1976: 455-457)

2.7.2 Bowerman & Choi's (2002) study of overextensions in children

Clark's studies of overextension in children investigate how perceptual and cognitive biases influence young children to view the world. The semantic categories of language appear to reflect just the sorts of concepts that are nonlinguistically salient to human beings. Several studies have argued whether the question of "how does the child match words to these concepts?" or "how does the child form a concept to fit the word?" is more important (Nelson, 1974). Therefore, in this part of the research, an alternative theory by Bowerman & Choi (2002) that the early semantic development involves a pervasive interaction between non-linguistic conceptual development and the semantic categories of the input language will be discussed in detail, as an opposing approach to Clark's (1973,1976).

Bowerman & Choi's (2002) cross-linguistic studies investigate how young children master and overextend spatial words in their native languages. According to Bowerman & Choi, spatial words are typically cited as prime evidence for the claim that first words label non-linguistic concepts (2002:477). The spatial morphemes they look into involve notions of containment, support, attachment, motion up and down, vertical axis, and opening and closing. The investigation carried out studies comparing early spatial semantic categorisation among children learning English, Dutch, Korean, and Tzotzil Mayan (Choi & Bowerman 1991; Bowerman 1994, 1996a, b; Bowerman, de Leon, & Choi 1995). The investigation followed the use of spatial words by young children from about 1-3 years of age.

Their most crucial finding was that, from their first productive uses of spatial words, the children categorised spatial events language-specifically -there was no evidence that they relied on the same set of basic spatial concepts (Bowerman & Choi 2002: 488). This suggests that children acquiring different languages develop different ways of acquiring spatial words. Bowerman & Choi concluded that "spontaneous speech suggests that language-specific learning gets under way by at least the second half of the second year of life. The sensitivity to develop a semantic categorisation develops even before the production begins. Despite certain under- and overextensions, the overall use of spatial words from the one-word stage on reflects the major semantic distinctions and grouping principles of the target language (2002:490)".

According to Bowerman & Choi, children they investigated used their early spatial words in a rather different range from adults. The children usually overextended words to situations for which adults would never use them. Bowerman & Choi explain this type of phenomena by proposing that children construct spatial semantic categories over time based on how often they hear the input and draw on the perceptual sensitivities and perceptual biases to the task (Bowerman & Choi 2002: 497). Bowerman & Choi agree with Clark (1973, 1976) that some properties are difficult for children to acquire, thus they may be learned more slowly than some other properties which are more salient and more accessible for children cognitively and perceptually. Bowerman & Choi emphasise that a learner's built-in sensitivities to space are in constant interaction with a variety of characteristics of the language input throughout this learning process. They summarise:

> "These include, for instance, the frequency with which given words are used (e.g. relevant spatial properties with relatively low initial salience might still be identified relatively quickly if the child has *frequent* learning opportunities), the *consistency* of the range of referents for which the words are used (e.g. polysemy in a word's meaning might mislead the child and promote overextensions), the *number of words* that populate a given corner of semantic space (e.g. many words may help the child draw boundaries between categories, few may encourage overextensions), and the *degree of overlap* in the referents for which different words are used (low overlap may facilitate learning, high overlap - different words applied to the same referents on different occasions - may slow it down)." (Bowerman & Choi 2002:498).

Evidence of overextensions in children has been drawn from the use of spatial words in many languages in the domain of separating objects. In Bowerman & Choi's studies with children learning English, Korean, Tzotzil Mayan, and Dutch, it is discovered that children have a tendency to see no differences in spatial events as adults in their target languages do. Children overextended spatial words depending on how "separation" was semantically structured in the input language.

Therefore, it is evident that Bowerman & Choi's perspectives regarding overextension in children diverge from those of Clark's (1973, 1976) that overextensions in children are not universal. From the three examples listed above, it is seen that children acquiring different languages may all have a tendency to overextend words for separation, but their overextensions are different and are influenced by the contours of each word's category in adult linguistic input. Overextensions of children acquiring different languages differ based on particular features of the input language. Bowerman concludes that children "must work out the meanings of the forms by observing how they are distributed across contexts in fluent speech" (1996:425).

2.7.3 Slobin's proposal of Typological Bootstrapping

Typological bootstrapping occurs as the result of a child's learning of coherent systems (Slobin 2002:441). When a child develops a successful explanatory structure for part of the exposed language, a coherent theory of the language emerges. That is, the language structures itself as it is learned. For example, while Korean children use verbs to express paths of motion, English children use particles, and some other languages use semantic features in categorising location and movement. Certain patterns of semantic and formal organisation become more and more familiar, and to use an old term, habits are established (Slobin 2002:442). Like many other languages, in regard to the acquisition of Thai classifier system, children develop the regularised system which they will become more familiar with. The system they develop will bootstrap into the fully developed classifier system syntactically and semantically like those of adults when they grow older. Regarding the question of whether the children acquire 'form first' or 'meaning first', Slobin argues that they are interrelated in a child's learning mechanism and must play their roles side by side along the course of language acquisition. In the course of development, the child comes to attend to particular types of forms and to expect them to express particular types of meanings.

In regard to the issues discussed in this chapter, it is expected that the subjects in my study will show some interesting patterns, especially a word meaning bias, as they acquire the classifier system and learn to group linguistic categories. It will be interesting to observe how differently the bilingual subjects will respond to the tasks, in comparison with the monolingual subject. Should there be any differences between the monolingual subject and the bilingual subjects, it will be essential to discover whether or not the discrepancies have occurred due to the effect of bilingualism. Word meaning biases, especially shape bias will be closely looked into, in order to draw on a conclusion whether children categorise things around them according to appearances of the objects, and to study how children categorise things. Coexistence of irregulars and regularised forms in children's speech will be considered to analyse how children overcome errors they made and develop their classifier system into the adult-like version.

In the next chapter the study's research methodologies will be discussed. Details of the materials and the subjects will be presented, as well as the hypotheses and conditions of this research.

Chapter 3 Research Methodologies

Since no study has explored the acquisition of Thai numeral classifiers in bilingual children before, the major aim of the current research will be to focus on the similarities and differences between a native Thai child and British-Thai bilingual children in acquiring Thai classifiers. Two areas will be determined and analysed; a time scale and a sequence. The bilingual subjects' use of classifiers will be compared with the use of classifiers by the control subject, a monolingual Thai child of approximately the same age. The study will also discuss how children are influenced by the semantics of Thai classifiers as they acquire the classifier system, and how semantics help them to classify novel words they have never heard. As mentioned in the previous chapter, this study will focus on the questions of how children categorise things, how word meaning biases influence children in their early acquisition of the classifier system, the coexistence of the regularised and irregular words in children's speech, and how errors the children make along the processes of their classifier acquisition reflect their concepts about word learning and how they bootstrap their knowledge into the adult-like classifier system.

Initially, only one English-Thai bilingual child living in the UK was selected as the sole subject of this longitudinal study, as the purpose of this research is to study the process of classifier acquisition in bilingual children. However, a monolingual Thai child was also included as a control subject in order to compare the progress of the classifier acquisition with the bilingual child. However, after the completion of the studies, the findings of the influence of bilingualism on the subject's classifier acquisition process were still not conclusive as to whether some phenomenon occurred due to the bilingualism, or due to the fact that the subject had little exposure to Thai. Therefore, the researcher decided to include another English-Thai bilingual child living in Thailand to undergo a short series of six-month sessions, as another control subject.

Therefore, there are three subjects who took part in this study: a 3;2 English-Thai bilingual child who lives in Chesterfield, UK, hereafter called the bilingual subject (UK); a 3;1 English-Thai bilingual child who lives in Chiangmai, Thailand, hereafter called the bilingual subject (TH) and a 3;4 monolingual Thai child who also lives in Chiangmai. The background and circumstances of each subject will be described in section 3.4.

As there were age differences between the subjects in the three studies discussed in the previous chapter (Tuaycharoen 1981, Gandour *et al.* 1984, and Carpenter 1987), I decided to run pilot tests with young bilingual Thai children of different ages. These pilot studies revealed that bilingual Thai children under three years old were unable to complete the set task and so it was decided to use children over three years of age. As one initial purpose of this study is to make a comparison between two subjects, a monolingual child and a bilingual child, I decided to do a session with an English-Thai bilingual child in the UK, age 3;2, and compare results with a monolingual Thai child in Thailand, age 3;4. However, at the end of the twelve-month sessions, series of six-month sessions with a bilingual subject in Thailand, age 3;1, was undertaken. This choice of subject was made to investigate whether different amounts of exposure to Thai would affect the way the two bilingual subjects, the bilingual subject (UK) and the bilingual subject (TH), responded to the task. Consequently, one aim of this study is to investigate whether bilingualism really affects the process of classifier acquisition in children, or if it is only the amount of exposure to Thai which makes the bilingual subjects respond to the task differently from the monolingual subject.

Because all three subjects in this research were not at exactly the same ages when the sessions began, as the monolingual subject was a few months older than the other two bilingual subjects, the results from the sessions could not be conclusive unless it could be proven that all three children were at the same linguistic level. Consequently, MLU measures were used on all three subjects in order to determine the month when their grammatical knowledge was on average at the same level. To clarify, children matched on the basis of MLU are much more likely to have speech that is, on internal grounds, at the same level of constructional complexity than are children of the same chronological age (Brown, 1973).

3.1 MLU (Mean Length Utterances)

MLU is an effective simple index used to measure a child's grammatical development. It is well known that the grammatical development of children of the same age can be at different levels. MLU was introduced by Brown (1973) as a measure of children's average length of utterance. Assessing the complexity of children's language by counting the number of morphemes in each utterance (and then averaging them) has been shown to be a much better way of gauging children's structural development than looking at their ages. According to Brown (1973), MLU is a good indicator of children's grammatical development because almost every new kind of knowledge increases length. When children develop their language, not only do their utterances get longer, but the number of different morphemes they use increases.

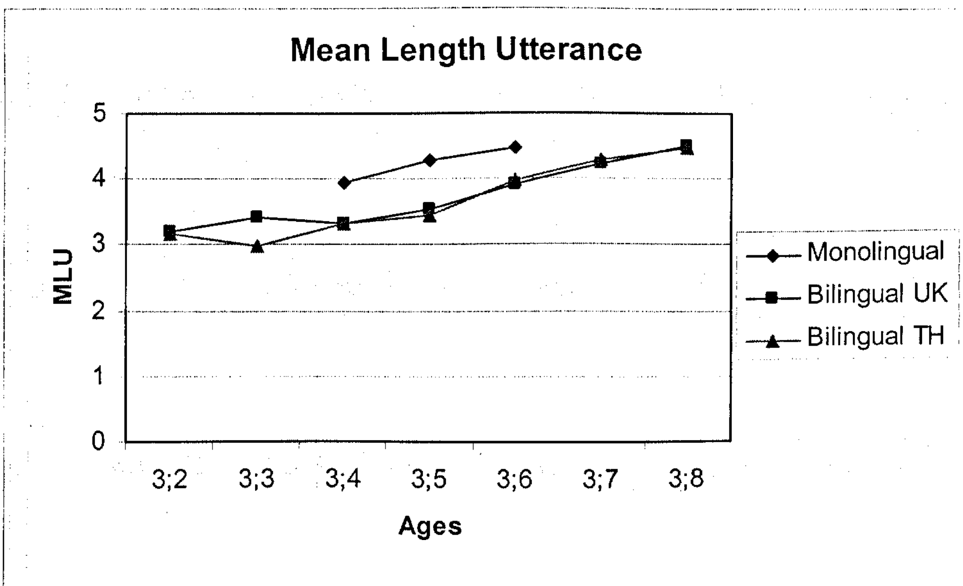
Although MLU is generally considered a reliable method of measuring children's grammatical complexity, some linguists disagree. Dromi and Berman (1982:404) argue that MLU is inappropriate for some highly inflected languages, for example, Hebrew, and probably for highly inflected languages in general, because in those languages, increase in length does not indicate increase in complexity and therefore development. Crystal (1974) also comments that MLU measures according to Brown's rules are rather 'English-oriented'.

It is evident, however, that Thai and English are similar in some respects. Like English, Thai is not an inflected language, and the complexity of a language usually increases with the length of a sentence. Therefore, MLU was calculated to find out if all three subjects were at the same level, in order to make comparisons starting from the first months their MLU matched.

MLU measures were calculated for all three subjects when they were 3;4 as this was the earliest age at which their spontaneous utterances were available for the comparison. The methods were adopted from Brown's rules for calculating mean length of utterance. One hundred spontaneous utterances of each subject were collected as raw data to calculate MLU. The number of morphemes in each utterance were counted and then averaged. The data were collected from the monolingual subject's first month of the sessions, the third month data of the bilingual subject

(UK)'s and the fifth month data of the bilingual subject (TH), therefore they were at the same chronological age (3;4) when the MLU measures were conducted.

The results were not surprising. At the same chronological age, the monolingual subject was found to have more advanced grammatical development than the two bilingual subjects. The MLU of the monolingual subject (at the age of 3;4) was 3.93, compared to 3.21 and 3.16 for the bilingual subject (UK) and the bilingual subject (TH) respectively. Therefore, it was decided to conduct MLU measures for the previous months and the following months on both bilingual subjects, in order to find the point where their MLU matched with that of the monolingual subject, and to find out if their MLU matched from the start. For the monolingual subject, MLU measures for the two following months were also carried out in order to see if there was any unexpected change from the trend. The results can be seen in Graph 1



Graph 1: Mean length utterance of three subjects

From Graph 1, it can be seen that the MLU of both bilingual subjects increased during the subsequent two months. When both of them were at the chronological age of 3;6, their MLU were generally at the same level of the monolingual subject when she was at the age of 3;4. The MLU for the bilingual subject (UK) increased to 3.54 when she was 3;5, and increased to 3.90 when she reached at the age of 3;6. Similarly, the MLU of the bilingual subject (TH) increased to 3.45 and 3.99 at 3;5 and 3;6 respectively. The monolingual subject, at the same time, developed a very similar trend to her counterparts during the two following months. Her MLU increased to 4.28 when she was 3;5 and reached 4.48 when she was 3;6.

It can be noticed, therefore, from the results of the MLU measures that both the bilingual subjects reached the same level of grammatical development of the 3;4-year-old monolingual subject when they were 3;6. The experimental series therefore began when the monolingual subject was 3;4 and when the bilingual subject (UK) was 3;6. Since the data from the bilingual subject (TH) ceased when the subject was 3;6, comparison between the monolingual subject and the bilingual subject (TH) in acquiring Thai classifiers could not be undertaken.

However, it is interesting to note that the MLU levels of the two bilingual subjects were closely comparable. I also collected data from the months when both bilingual subjects were 3;2 and 3;3 and the results were quite similar (as seen in Graph 1). The MLU results of the bilingual subject (UK) at these times were 2.85 and 3.24, compared to those of the bilingual subject (TH): 2.86 and 3.15. According to this finding, it may be assumed that their grammatical development is generally at the same level at the same chronological age.

Consequently, the sessions designed to measure the two bilingual subjects' acquisition of Thai classifiers were conducted from the month when the subjects were 3;2 until they reached 3;6, a total of five months.

The studies were conducted in three parts. In order to observe the general course of each subject's classifier acquisition process, a twelve-month series of sessions was conducted between July 2001 – June 2002 with the monolingual subject, from the chronological age of 3;4 to the age of 4;3, and the bilingual subject in the UK, from the age of 3;2 to the age of 4;1. In order to observe the general course of their acquisition of novel word classifiers, a short series of tests was added for both subjects within the last four months of the series, from March 2002 to June 2002. And finally, a six-month series of sessions with the bilingual subject (TH) at the chronological age of 3;1-3;6 were included from January – June 2002 in order to compare results with the bilingual subject in the UK and to investigate whether the amount of exposure to Thai affects classifier acquisition in bilingual children.

The discussion of each subject's development in the process of classifier acquisition is made individually in chapter 4, in order to see the broader picture of how they developed their conceptual categories.

Then, in order to investigate the subjects' development based on their matched MLU, two sets of comparisons were made as follows:

1. The comparison between the bilingual subject (UK) and the bilingual subject (TH) from the chronological age of 3;2 – 3; 6, a total of five months
2. The comparison of the monolingual subject from the age of 3;4 until the age of 3;11 with the bilingual subject (UK) from the age of 3;6 until the age of 4;1, a total of eight months.

3.2 Materials

This study focuses on how bilingual children acquire classifiers in the use of classifiers in two bilingual English-Thai children, ages between 3;3 and 4;3, and between 3;1 and 3;6. The challenge of the present study was to design an elicitation method that was easy, natural and fun, and which would also elicit as many classifiers as possible.

Although this research is divided into three parts, the testing methods applied in each part are generally similar. Some of the methods used in the previously discussed research of Gandour *et al.* (1984) and Carpenter (1987) have been adapted for use in this research. Firstly, a set of 72 nouns has been adopted from Gandour *et al.*'s test items to use as the test objects for the twelve-month observation with the monolingual subject and the bilingual subject (UK), and for the six-month sessions with the bilingual subject (TH). Coloured pictures of multiple objects (2, 3 or 4) were mounted on a 4" x 6" index cards to show to each subject at random. These 72 words were used because they refer to objects easily recognisable to 3-5 year-old-children and, more importantly, they belong to various category domains. It was hoped that, by using these 72 nouns, some patterns of how children categorise nouns would emerge. According to Gandour *et al.* (1984:457), these 72 nouns also stand for different semantic criteria in accordance with Allan's seven categories of classification (Allen, 1977), i.e. material, shape, consistency, size, location, arrangement, and quanta. All 72 nouns are listed below.

	Noun		**Adult classifier**	**Allan's classification**	**Category/ subcategory**
1.	bird	(*nok*)	*tua*	animate materials	animal
2.	chicken	(*kai*)	*tua*	animate materials	animal
3.	elephant	(*chang*)	*tua*	animate materials	animal
4.	child	(*dek*)	*kon*	animate materials	human
5.	priest (monk)	(*pra*)	*ong*	animate materials	human/ honorific
6.	horse	(*ma*)	*tua*	animate materials	animal
7.	soldier	(*tahan*)	*kon*	animate materials	human
8.	banana	(*kluai*)	*lug*	arrangement	fruit/ single
9.	grape	(*angun*)	*puang*	arrangement	fruit/ multiple
10.	spoon and fork	(*chon-som*)	*khu*	arrangement	utility
11.	shoe	(*rongtao*)	*khu*	arrangement	garment
12.	sock	(*tungtao*)	*khu*	arrangement	garment
13.	match	(*mai-kidfai*)	*klong*	quanta	consumable
14.	tooth	(*fun*)	*si*	quanta	human part
15.	train	(*rodfai*)	*kabuan*	arrangement	vehicle
16.	milk	(*nom*)	*kapong*	quanta	liquid in bottle
17.	7-Up	(*Seven up*)	*kuad*	quanta	liquid in carton
18.	toilet paper	(*kradad-chumra*)	*muan*	quanta	toilet consumable
19.	toothpaste	(*ya-si-fun*)	*lod*	quanta	toilet consumable
20.	keys	(*khunjae*)	*puang*	arrangement	tool

21.	hat	(*muak*)	*bai*	shape	garment
22.	plate	(*jan*)	*bai*	shape	utility
23.	cup	(*tuai*)	*bai*	shape	utility
24.	playing card	(*pai*)	*bai*	shape	paper
25.	cigarette	(*buri*)	*muan*	shape	consumable
26.	button	(*kradum*)	*med*	size	consumable
27.	paracetamol	(*ya-para*)	*med*	size	medicine
28.	pearl	(*kai-muk*)	*med*	size	accessories
29.	cloud	(*meg*)	*korn*	consistency	abstract
30.	flashlight battery	(*tan-faichai*)	*korn*	shape	tool
31.	marble	(*lug-hin*)	*korn*	shape	consumable
32.	boat	(*rua*)	*lam*	shape	vehicle
33.	airplane	(*kruang-bin*)	*lam*	shape	vehicle
34.	paper	(*kradad*)	*paen*	consistency	paper
35.	handkerchief	(*pa-ched-na*)	*phun*	consistency	cloth
36.	rug	(*prom-ched-tao*)	*phun*	consistency	cloth
37.	towel	(*pa-ched-tua*)	*phun*	consistency	cloth
38.	knife	(*miid*)	*lem*	shape	utility
39.	needle	(*khem*)	*lem*	shape	utility
40.	candle	(*tian*)	*lem*	shape	consumable
41.	pen	(*pakka*)	*lem*	shape	consumable
42.	ice cream	(*itim*)	*taeng*	shape	food
43.	tree	(*ton-mai*)	*ton*	shape	plants/ tree
44.	pole	(*sao*)	*ton*	shape	tool
45.	hair	(*pom*)	*sen*	consistency	human part
46.	belt	(*kemkud*)	*sen*	consistency	accessories
47.	necklace	(*sai-soi*)	*sen*	consistency	accessories
48.	rope	(*chuak*)	*sen*	consistency	tool
49.	chain	(*so*)	*sen*	consistency	tool
50.	road	(*thanon*)	*sai*	shape	utility

51.	door	(*pratu*)	*ban*	shape	utility
52.	key	(*kunchae*)	*dok*	shape	tool
53.	rose	(*dok-kularb*)	*dok*	shape	plants/ flower
54.	tulip	(*dok-tulip*)	*dok*	shape	plants/ flower
55.	arrow	(*lug-thanu*)	*dok*	shape	tool
56.	ring	(*waen*)	*wong*	shape	accessories
57.	orange	(*som*)	*luk*	inanimate materials	fruit/ single
58.	bananas	(*kluai*)	*wi*	inanimate materials	fruit/ multiple
59.	house	(*ban*)	*lung*	inanimate materials	accommodation
60.	tent	(*tent*)	*lung*	inanimate materials	accommodation
61.	castle	(*prasard*)	*lung*	inanimate materials	accommodation
62.	chair	(*kawii*)	*tua*	inanimate materials	furniture
63.	table	(*toh*)	*tua*	inanimate materials	furniture
64.	shirt	(*ya*)	*tua*	inanimate materials	garment
65.	watch	(*nalika*)	*ruan*	inanimate materials	accessories
66.	star	(*dao*)	*duang*	inanimate materials	abstract
67.	stamp	(*stamp*)	*duang*	inanimate materials	consumable
68.	bicycle	(*rod-jakkayan*)	*khan*	inanimate materials	vehicle
69.	car	(*rod-yon*)	*khan*	inanimate materials	vehicle
70.	book	(*nungsu*)	*lem*	inanimate materials	tool
71.	radio	(*wittayu*)	*kruang*	inanimate materials	equipment
72.	telephone	(*torasap*)	*kruang*	inanimate materials	equipment

Apart from the above 72 nouns, the monolingual subject and the bilingual subject (UK) were also tested with an additional 32 nouns during the last four months of the testing series (March - June 2002). These 32 nouns are classified into three subcategories: objects the children did not know or had not seen before; objects which the children were familiar with but which appeared in totally different shapes;

and objects from novels or television which do not exist in real life. The three lists of nouns are given below:

Unfamiliar objects:

	Nouns		Adult classifiers
1.	Millennium Dome	*(millennium-dome)*	*thi*
2.	Leatherette stool	*(tung)*	*tua*
3.	Fireplace	*(tao-ping)*	*an*
4.	Mini-dish	*(jan-daotiam)*	*jan*
5.	Loganberries	*(loganberries)*	*puang*
6.	Baby pram	*(rod-ken-dek)*	*khan*
7.	Artichoke	*(artichoke)*	*luk*
8.	UFO	*(jan-bin)*	*lam*
9.	Egyptian pyramid	*(pyramid)*	*hang*
10.	Braille characters	*(tua-nungsu-kon-ta-bod)*	*tua*
11.	Flat scanner	*(scanner)*	*kruang*
12.	Kiwi fruit	*(lug-kiwi)*	*luk*
13.	Skyscrapers	*(tuk-ra-fa)*	*thi*
14.	Lawn mower	*(kruang-tad-ya)*	*kruang*
15.	Harp	*(pin)*	*tua*
16.	Green bean	*(tua-fak-yao)*	*fak*
17.	US bank notes	*(bank-dollar)*	*bai*

Objects the children are familiar with which appear in unfamiliar shapes:

	Nouns		Adult classifiers
18.	Alphabetical-shaped macaroni	*(macaroni-tua-nungsu)*	*an*
19.	Football-shaped cushion	*(morn-football)*	*bai*
20.	Rabbit gingerbread	*(kanompang-kratai)*	*shin*

21.	Chocolate Easter egg	(*kai-chocolat*)	*an*
22.	Animal-shaped candle	(*tian-roop-sad*)	*an*
23.	Swan-shaped hedge	(*ton-mai-roop-hong*)	*thi*
24.	Egg-shaped alarm clock	(*nalika-kai*)	*ruan*
25.	Racing car-shaped carpet	(*prom-roop-rod*)	*an*

Objects representing fictional characters:

	Nouns		**Adult classifiers**
26.	Barbie	(*barbie*)	*tua*
27.	Harry Potter	(*harry potter*)	*tua*
28.	Chewbacca	(*chewbacca*)	*tua*
29.	Ninja turtles	(*ninja turtles*)	*tua*
30.	Teletubbies	(*teletubbies*)	*tua*
31.	The Snowman	(*snowman*)	*tua*
32.	The Simpsons	(*the simpsons*)	*tua*

3.3 Methods

The researcher intended to investigate a particular case of how two bilingual children and a monolingual child acquire the Thai classifier system by testing them with the same methods once a month. Two comparisons were made for this purpose: First, the comparison between the bilingual subject (UK) and the bilingual subject (TH) from the chronological age of 3;2 – 3; 6, a total of five months, and second, the comparison of the monolingual subject from the age of 3;4 until the age of 3;11 with the bilingual subject (UK) from the age of 3;6 until the age of 4;1, a total of eight months. The nature of this research is therefore a combination of a longitudinal case study and an experimental study.

Merriam and Simpson (1995) describe the case study approach as "an intensive description and analysis of a phenomenon or social unit such as an individual, group, institution, or community. In contrast to surveying a few variables across a large number of units, a case study tends to be concerned with investigating many, if not all, variables in a single unit" (1995:108). A case study may be longitudinal if conducted over a period of time, if it is decided that the subjects' changes during this period are worth observing. It has been widely accepted that the case study is a particularly useful methodology for exploring a subject area not well researched or conceptualised.

Wray *et al.* (1998) suggest that the case study approach is advantageous in many ways. The data can be collected in an environment familiar to the subjects, therefore the subjects are likely to respond to the task more naturally and the likelihood of observing representative behaviour increases. Moreover, additional information, both linguistic and non-linguistic, can be obtained from the parents or other adults responsible for the subjects at the same time as the data are collected. The data are valid in its own right, irrespective of how representative of a population the individual is (Wray *et al.*, 1998:190). Particularly, a longitudinal study gives a more genuine picture than can be gained by comparing individuals at each of the different stages (a cross-sectional study).

There are several reasons why it was decided to adopt the longitudinal case study approach for this research. First of all, the classifier acquisition process in young children needs time to develop, and it is essential that the subjects should be monitored regularly over the whole period of the experimental series. Secondly, cases of young English-Thai bilingual children living in the UK who have been taught to understand and speak two languages simultaneously from infancy are rare, and so it was not possible to use quantitative methods of data collection. Thirdly, the nature of this research required that the researcher spend a great deal of time with the subjects. The methods of testing used in this research, involving small real objects, puppets and flash-cards, were time-consuming and the researcher needed to spend the whole day with the subject in each session of the experimental series. The longitudinal study approach support the idea that the researcher spends as much time as possible with the subjects in order to gather data on both elicited behaviour and non-elicited behaviour such as silence, slip of the tongue, and interactional behaviour between the subjects and their parents, with the intention of obtaining a clearer and more comprehensive picture of how the classifiers are used by the subjects.

However, it should be conceded that the methodologies chosen for this research have some disadvantages, with respect to the nature of the longitudinal case study itself, and to the small sample size used in this research.

The longitudinal case study covers a period of one year, and it became apparent during the course of the testing sessions that it was difficult to control entirely the experimental conditions of the study. For example, when the bilingual subject in the UK went for holidays abroad with her parents, the monthly session needed to be conducted by her mother and not by the researcher. Moreover, relying totally on the data from a few very young subjects was risky as sometimes the researcher had to spend a great deal of time just waiting for the subject to be in a good mood to cooperate. Another limitation of this study is the fact that the test design and the observation procedure needed to be changed after the first session had been completed, therefore, it is likely that the results from the first month for the bilingual subject (UK) and the monolingual subject (TH) were not consistent with those from the remaining sessions of the series.

The small sample size is also a disadvantage of this study. According to Borg and Gall's (1989) qualitative research rules of thumb, it is not unusual for case studies to be conducted on a single case, as well as on multiple cases. Nevertheless, the small sample size imposed limitations on this research. Because the nature of the research involves very detailed and a very small number of subjects, the findings can therefore only hold true for that particular group. Since each subject of this study is considered as an individual with a particular set of circumstances, the findings obtained cannot be generalised to other children, as generalisations can safely be made only to a similar group of the population. The findings from this research can therefore only be applied to approximately three year-old English-Thai bilingual children who are taught to understand and speak two languages simultaneously from birth, and approximately three year-old monolingual Thai child.

The strategies of testing were flexible and depended greatly on the situation and mood of the children. Flash cards like Gandour *et al.*'s (1984) were used, as well as puppets as in Carpenter's (1987) study. For each noun, a coloured picture of multiple objects (could be 2, 3 or 4) was mounted on a 4" x 6" index card. The set of cards was presented to the subject in a random order. Using a sentence completion task, the subject was prompted with the incomplete sentence: 'thiinii mii + Noun + Numeral +

classifier' equivalent to 'Here + we have + Noun + Numeral + *classifier*'. The subject was required to complete the sentence with an appropriate classifier. For example, it was intended that if the subject was shown a picture of four books, the conversation would take this form:

Adult: Thii-nii rao mii nung-su si ....

here we have book four ....

'How many books have we got here?'

Child: Nung-su si *lem*

book four *classifier*

'Four books'

The subject completes the sentence with *lem*, the classifier for 'book' (*nungsu*).

However, pilot tests revealed that this kind of task was not interesting enough for young children, and it was impossible to use all 72 picture cards continuously within the same session because the children lost their concentration easily. Therefore, apart from using flash cards, the use of small real objects was also included when the subjects' attention began to wane. This combination of methods helped to keep the subjects enthusiastic about talking. The use of small objects was adopted from the method used in Carpenter's (1987) study. The researcher would play a game with the subject by keeping real objects in a covered basket. Each session began with real objects or puppets, and the subject was asked to guess what the researcher was going to withdraw from the basket. When the object had been withdrawn, the subject was asked, what is this? Or, what do you call this thing? When the subject replied with the name of the object, the researcher would bring out more identical items from the basket and ask the subject to help the researcher count. When the subject finished counting, the researcher would ask the subject to say the complete sentence with a classifier in it. For example, the researcher pulls out a hat from the basket and shows it to the child:

Adult: Thii-nii mii arai?
here have what ?
'What have we got here?'

Child: Muak
hat
'A hat'

(The researcher brings out two more hats from the basket)

Adult: Mii muak tao-rai ?
have hat how many?
'How many hats?'

Child: Nueng, song.. sarm
one two.. three
'One, two, three'

(The researcher asks the child to complete the phrase with a classifier)

Adult: Muak sarm arai?

hat three what?

'Hat three what?'

Child: sarm *bai*

three classifier

'Three *classifier*'

Since this was a longitudinal study using only one subject in the UK, the researcher was able to spend a great deal of time on any one day playing with the child until the responses for all 72 test items had been collected. The child was generously encouraged in any response she made. However, the researcher would continue to push her to make further responses by saying 'Excellent...or, what else could you say?' When the child had difficulty producing a classifier for some items, the responses for those items were considered as silent and hesitant.

The session with the 72 words was repeated once a month for all three subjects, in order to observe and chart developments and changes in the subjects' classifier acquisition. The additional 32 words were used only with the monolingual subject and the bilingual subject (UK). These words were not repeated, so each subject was asked about them only once during their last four months of the series. Therefore, from months 9-12 of their elicitation study (when the monolingual subject's chronological age was 4;0-4;3 and the bilingual subject (UK)'s chronological age was 3;10-4;1), the monolingual subject and the bilingual subject (UK) had to complete the task with 72 nouns from the original list, plus another 8 random novel nouns, totalling 80 nouns. The conversation was tape-recorded, and the results scored on the scoring sheet.

3.4 The Subjects

Although the main body of this research focuses on the development of language acquisition in a bilingual child, it was also necessary to run parallel experiments with a monolingual child as a control subject. In order to make a comparison between a monolingual subject and a bilingual subject, a 3;2-year-old bilingual Thai-English child in the UK and a 3;4-year-old monolingual Thai child in Thailand were initially selected to undergo the same tests. However, after the twelve-month session with both subjects, the results were inconclusive; it was unclear whether certain responses by the bilingual subject were caused by her limited exposure to Thai or by her bilingualism. Therefore, another series of tests was undertaken with another bilingual child, whose exposure to Thai was much greater. The session with the bilingual subject (TH), age 3;1, was conducted along the same lines that the monolingual subject and the bilingual subject (UK) had undergone, for a period of six months.

3.4.1 The monolingual subject

The monolingual child in Thailand, hereafter called the monolingual subject, was an only child in a middle-class family in Chiangmai, the capital of northern Thailand. Her father was a surgeon in a city hospital and her mother was a university lecturer. Both of them were in their early thirties and had to work outside of the home most of the time. The child had started going to a private pre-school in Chiangmai city when she was 3;2 years old. After school, she was generally cared for by her grandparents, who were retired teachers. The family spoke to one another in Central Thai, although she was influenced by the Northern Thai dialect by some of her peers at school.

The session using 72 words began with the monolingual subject in July 2001 and lasted until June 2002. The additional test of 32 novel words was conducted during March-June 2002. The sessions were conducted either by her mother or her father once a month using the same methods as with the bilingual subject (UK). The conversation between the child and the adult was tape-recorded, then sent to the UK for the researcher to analyse, and then scored.

3.4.2 The bilingual subject (UK)

The bilingual subject (UK) was a 3;2-year-old bilingual girl in a British-Thai family. Her father was a British businessman who worked in a telecommunications company in Chesterfield, Derbyshire, and her mother was a full-time Thai housewife. There were three people in the family: the father, the mother, and herself. The child had been raised at home mostly by her mother, because her father worked away from home during the day. Friends and relatives, most of them native English speakers, often came to visit the family. Therefore, the bilingual subject (UK) was keen to speak in English rather than Thai because only her mother communicated with her in Thai. The father could neither speak nor understand Thai, so English was used when he was at home. However, when alone with the subject, her mother always attempted to speak only Thai. It was obvious that she had been learning two languages simultaneously with no difficulty. But growing up in an English-speaking environment influenced her preference for speaking English rather than Thai. Although she seemed to understand everything her mother said to her in Thai and replied to her in Thai most of the time, she sometimes responded in English, or sometimes in both Thai and English mixed together in a single sentence.

In sum, according to Gathercole's (2002a) three variables of the frequency of the language input: the instructional methods in the school (IMS), social-economic status (SES) and language spoken in the home (LSH), the bilingual subject (UK) had not yet started going to school when the elicitation sessions started, therefore her IMS cannot be included. Her SES was upper-middle class in an English suburb, so she was exposed to English most of the time in her everyday life, except when she was alone with her mother; and her LSH was both English and Thai, depending on whom she spoke to.

Playing the same game with the bilingual subject (UK) for a considerable time was not very productive. After spending 10-15 minutes flashing cards, the researcher was forced to change activities in order to keep the child's attention. Watching television, reading picture- books, showing real objects, or playing 'make-believe' were some of the other possible strategies used, depending on the situation. Similarly to the monolingual subject, the sessions with the bilingual subject (UK) were conducted once a month between July 2001 - June 2002, for a total of 12 sessions.

3.4.3 The bilingual subject (TH)

The bilingual subject (TH) was a British-Thai boy whose chronological age was 3;1 when the elicitation series stated. He lived in Chiangmai, Thailand. His father was British and his mother was Thai. Both were lecturers at Chiangmai University. The subject spoke both Thai and English at home since his mother spoke Thai and his father spoke English. However, in the presence of his father at home, he always spoke English because his father knew little Thai. The subject always spoke to his neighbours, some of whom were of a similar age, in Thai. He was attending an international kindergarten school in Chiangmai where lessons were taught in English and Thai. His language competence was considered quite balanced because he was exposed to both Thai and English in his everyday life.

In terms of Gathercole's variables in the frequency of language input, the bilingual subject (TH)'s IMS was English and Thai (although most of his friends at school were Thai and speak Thai to one another, the instructions taught by teachers were mainly in English). His SES was upper-middle class, but in contrast to the bilingual subject (UK), he had more chances to be exposed to Thai rather than English because he lived in an area where there were few English people. In addition, his LSH was also English and Thai, depending on the person whom he talked to.

The sessions with the bilingual subject (TH) started in January 2002 and lasted until June 2002. They were carried out once a month for a total of six months. When we began testing, he was 3;1. In the pilot test, he recognised all 72 objects from the word list, although he named some of the objects in English rather than in Thai. It seemed, therefore, that he did not have any problem with the task provided. The methodology of the test followed exactly what had been done with the two previous subjects. The seventy-two objects were represented by real objects and flash cards so as to elicit his responses as naturally as possible. The conversation during each session was tape-recorded and then transcribed.

3.5 Conditions and hypotheses

As this is a comparative study of two English-Thai bilingual children and one monolingual Thai child over a period of twelve months, it was expected that some interesting patterns of language acquisition would occur. In this section, some predictions are made about how the subjects might respond.

As it was impossible to predict if there would be an influence from English syntax on the bilingual subject (UK)'s classifier acquisition, based on Grosjean's (1982) theory of language dominance in bilinguals, for I had not run a pilot experiment prior to the elicitation sessions to test their command of English, assumptions regarding interference between two languages and language dominance will therefore not be made in this thesis. According to theories illustrated in the previous chapters, the following hypotheses may be considered relevant.

1) It is predicted according to the emergentist approach that there should be no difference in sequence of classifier acquisition between the monolingual subject and the bilinguals. Both bilinguals and the monolingual child should develop similar sequences in acquiring the classifier system.

2) Although it is predicted that the sequence of the classifier acquisition between the monolingual subject and the bilingual subjects should be similar, the issue about time-scale is different. According to Gathercole's (2002a) theory regarding the frequency of input, it is predicted that the bilingual subject (TH) who received more Thai input than his bilingual counterpart in the UK would develop his classifier acquisition faster than the bilingual subject (UK) who has less chance to use Thai in her every day life.

3) According to Smith (1995), it is predicted that children would categorise countable nouns based on their perceptual properties, and that shape bias would emerge and decline when the children grow older. Children should also categorise objects based on taxonomy, texture, materials, etc. but the most dominant bias we should expect would be the shape bias.

4) Based on the competition hypothesis of Maratsos (2000), regulars and irregularised forms of the classifiers should coexist side by side for a period of time, reflecting in the children's use of overgeneralisation and overextension. These phenomena should occur less when the children acquire and have more practice of the irregular forms of the classifiers.

Chapter 4 Results of the study

This chapter is divided into two separate parts. The first deals with the general course of development of each subject in acquiring Thai classifiers, from the first month of their elicitation session until the last, according to their chronological ages. Therefore, the general course of the classifier development of the monolingual subject and the bilingual subject (UK) will be discussed for 12 months since there were twelve elicitation sessions for each of them, but those of the bilingual subject (TH) will be discussed for 6 months since there were only six elicitation sessions for this particular subject. The latter part of the chapter will consequently compare and discuss their linguistic development based on their matched MLU scores. The comparison part, according to their MLU scores, will be separated into two sub-sections; firstly, the comparison between the bilingual subject (UK) and the bilingual subject (TH) for a total of five months, and secondly, the comparison between the bilingual subject (UK) and the monolingual subject for the total of eight months.

4.1 General course of development

This chapter presents the results of the 12-month sessions conducted with the monolingual subject and the bilingual subject (UK). Each subject will be discussed separately with reference to four three-month periods, and the results with respect to the two subjects will then be compared and analysed in order to determine the similarities and differences between them observed during the course of their development.

4.1.1 The monolingual subject: Months 1 – 3

Types of responses	Month		
	1	2	3
Silence/hesitation	0	0	0
Repeaters	57	18	12
General classifier	11	11	15
Referent-based	0	13	15
Arbitrary	0	16	13
Adult classifiers	4	14	17

Table 5: Types of responses of the monolingual subject during months 1-3.

In the first month the monolingual subject used two response types in classifying nouns: general classifiers and repeaters. It can be observed from the data that the classifier most frequently used by the subject was *bai*. The monolingual subject used *bai* as a general classifier with eleven nouns on the list: ('spoon and fork' (*chon-som*), 'sock' (*tungtao*), 'cup' (*tuai*), 'table' (*toh*), 'watch' (*nalika*), 'stamp' (*stamp*), 'boat' (*rua*), 'airplane' (*kruang-bin*), 'telephone' (*torasap*), 'toothpaste' (*ya-si-fun*), and 'arrow' (*luksorn*). Except for the word 'cup' (*tuai*), none of these words is used with the classifier *bai* in adult language.

Apart from the overuse of *bai*, an abundance of repeaters was found in the subject's speech. It appears that the subject would use a repeater on any occasion when she was not sure what the classifier should be. There were 57 nouns with which the subject used head nouns as classifiers, all incorrectly, except *kuad*, which is used to classify '7-up' (*kuadsevenup*).

The monolingual subject had acquired at least four classifiers, *kon*, *phon*, *kuad*, and *bai* at the beginning of the elicitation sessions. However, not all of them were used appropriately with the head nouns. As mentioned before, the subject used *bai* as a general classifier with a number of nouns on the list 11 times. However, she appeared to use *kon* suitably with nouns in the human category, and used *phon* to classify 'orange' (*som*). The classifiers that the subject used most frequently in the first month took the form of repeaters, which were found randomly as classifiers of 57 nouns in the animal category, the fruit category, the vehicle category, and many more. *Bai*, which was used as a general classifier during this month, was also used randomly with nouns in several categories. There was no sign of a semantic relation between classifiers and meanings in this month, and it is noted that the subject never responded to the task with silence and hesitation.

The subject acquired a few more classifiers in the second month. Although 18 repeaters were found, they appeared less frequently compared to those used during the previous month. The subject acquired the classifier *tua* for the first time and used it with four nouns in the animal category. She picked up suitable classifiers for 'a single fruit' and 'fruits in a bunch'. She employed *phon* with single fruits such as 'orange' (*som*) and 'banana' (*kluai*), and used *puang* with 'grapes' (*a-ngun*). She had not yet acquired the adult classifier for a bunch of bananas, *wi*, but at least the results show that she realised that nouns in different sub-categories should be used with different classifiers.

The subject used a greater variety of classifiers with different nouns in the second month. Eleven classifiers were used *(tua, kon, phon, puang, ton, taeng, bai, kuad,* *korn, kruang*, and *an*) and 15 nouns on the list were classified appropriately. The subject applied the classifier *tua* appropriately with nouns in the animal category and also overextended it with 11 nouns in other categories as a general classifier. Apart from using *tua* with 'bird' (*nok*), 'chicken' (*kai*), 'elephant' (*chang*) and 'horse' (*ma*), she also overextended it with 'shoe' (*rongtao*), 'sock' (*tungtao*), 'star' (*dao*), 'button' (*kradum*), 'paracetamol' (*ya-para*), 'pearl' (*kai-muk*), 'towel' (*pa-ched-tua*), 'knife' (*miid*), 'hair' (*pom*), 'chain' (*so*) and 'necklace' (*soikor*), a practice not conventionally used by adults. The use of repeaters was still found with 18 nouns; 'house' (*ban*), 'table' (*toh*), 'tooth' (*fun*), 'train' (*rodfai*), 'plate' (*jan*), 'cup' (*tuai*), 'milk' (*nom*), 'car' (*rod-yon*), 'watch' (*nalika*), 'paper' (*kradad*), 'needle' (*kem*), 'rope' (*chuak*), 'road' (*tanon*), 'radio' (*wittayu*), 'key' (*khunjae*), 'rose' (*dokkulap*), tulip' (*doktulip*) and 'ring' (*waen*).

In this month the subject began to group nouns denoting a similar shape, colour, or texture together and used classifiers which signified those aspects of the object. For example, the classifier *taeng,* which means 'upright and solid', was used repeatedly to classify 6 nouns with solid and upright characteristics like 'spoon and fork' (*chon-som*), 'candle' (*tian*), 'pen' (*pakka*), ice-cream cone' (*itim-kon*), 'toothpaste' (*ya-si-fun*), and 'arrow' (*luksorn*). The classifier *taeng* is conventionally used in adult Thai with 'pencil' and 'ice-cream cone', but it is not the best choice for 'spoon and fork' (*chon-som*), 'candle' (*tian*), and 'pen' (*pakka*) which have their own specific classifiers. It is conceivable that the subject grouped those words together because of their similarities with regard to shape and used the classifier *taeng* with all of them.

Another semantic relationship between head nouns and classifiers can be seen in those cases where the subject could not find a lexical term to use as a classifier so she simply used the quality of texture of a head noun as a reason to employ it as a classifier. For example, a towel is made from cloth ('cloth' is *pa* in Thai), so the subject used *pa* to classify 'handkerchief' (*pa-ched-na*), and 'towel' (*pa-ched-tua*).

Nouns	Adult classifiers	Child's classifier	Meaning
playing cards (*pai*)	bai	kradad	paper
stamp (*stamp*)	duang	kradad	paper
handkerchief (*pa-ched-na*)	phun	pa	cloth
towel (*pa-ched-tua*)	phun	pa	cloth
shirt (*sua*)	tua	pa	cloth
toilet paper (*kradad-chumra*)	muan	pa	cloth

Table 6: The monolingual subject's use of the texture of head nouns as classifiers during months 1-3.

Some of the responses during this month were arbitrary. There was no semantic relation between the nouns and the meaning of the classifiers and it is assumed that the subject used some classifiers randomly. Meaningless words and some adult classifiers which were used inappropriately may be categorised as belonging to this type of response. In the second month there are 16 arbitrary responses. For example, 'chair-two-*ka*' (*kawi-song-ka*) where the meaningless word *ka* was used as the classifier, or 'bunch of bananas-four-*ton*' (*kluai-si-fong*) where *fong*, the classifier used solely for an egg, was inappropriately used as the classifier.

In the third month the subject began using the general classifier *an* with 15 nouns on the list while the use of repeaters as classifiers dropped from 18 to 12. The classifier *an* is a general classifier in Thai which can be used to classify any small countable objects in Thai.The meaning of *an* is equal to 'this one' or 'that one' in English. For example;

Chan mai yak-dai *an* ni
I don't want one this
I don't want this one.

Chan mai chob *an* nan
I don't like one that
I don't like that one.

The subject used an alternative classifier for a single fruit, *luk*, suitably with a single orange, and used the classifier *bai* appropriately with a single banana. She still overextended the classifier *puang* with things in bunches by classifying 'grapes' (*a-ngun*), 'bananas' (*kluai*), and 'keys' (*kunjae*) with it. The classifier *taeng* was also overextended to objects with slim, long, and solid features like 'cigarette' (*buri*), 'knife' (*miid*), 'needle' (*kem*), 'candle' (*tian*), 'pen' (*pakka*), 'ice-cream cone' (*itim-kon*), and 'arrow' (*luksorn*). The subject still used the texture of head nouns; for example *pa* (Thai noun, meaning 'cloth') was used as the classifier for 'handkerchief' (*pa-ched-na*) and 'towel' (*pa-ched-tua*).

The subject increased the number of classifiers used to 14 (*tua, kon, luk, bai, puang, taeng, an, klong, kuad, med, korn, lem, ton, and dok*) and the overuse of a general classifier shifted from the classifier *tua* to the classifier *an*. She used 15 nouns with the classifier *an*: 'shoe' (*rongtao*), 'sock' (*tungtao*), 'hat' (*muak*), 'playing card' (*pai*), 'chair' (*kawi*), 'table' (*toh*), 'shirt' (*sua*), 'tooth' (*fun*), 'watch' (*nalika*), 'stamp' (*stamp*), 'pole' (*sao*), 'belt' (*kemkud*), 'necklace' (*soikor*), 'chain' (*so*), and 'telephone' (*torasap*). The subject also still overextended the classifier *taeng* with long, pointed, solid objects such as 'needle' (*kem*), 'candle' (*tian*), 'knife' (*miid*), 'pen' (*pakka*), 'ice-cream cone' (*itim-kon*), 'cigarette' (*buri*), 'spoon and fork' (*chon-som*), 'toothpaste' (*ya-si-fun*) and 'arrow' (*luksorn*), and still used repeaters with the some nouns such as 'paper' (*kradad*), 'hair' (*pom*), 'rope' (*chuak*), 'road' (*thanon*), 'door' (*pratu*), 'radio' (*wittayu*), 'key' (*khunjae*), and 'ring' (*waen*).

Several arbitrary responses were found in the third month. For example, the subject classified 'toilet paper' (*kradad-chumra*) with *tua*,' which is the classifier conventionally used for nouns in the animal category, and used *bai*, the classifier denoting the round shape of the head noun, to classify 'boat' (*rua*).

4.1.2 The monolingual subject: Months 4 – 6

Types of responses	**Month**		
	4	**5**	**6**
Silence/hesitation	0	0	0
Repeaters	3	0	0
General classifier	24	34	46
Referent-based	17	12	7
Arbitrary	6	4	3
Adult classifiers	22	22	16

Table 7: Types of responses of the monolingual subject during months 4-6.

Since the subject seemed to realise that classifiers normally signify some particular characteristic of their head nouns, interestingly in the fourth month she tried to use the most salient features of certain nouns in deciding on an apparently suitable classifier (see Appendix 1). She used *laem* (meaning 'sharp') to classify 'tooth' (*fun*), and used *baen* (meaning 'flat') to classify 'paper' (*kradad*). The words *laem* and *baen* are adjectives. Her use of them as classifiers reflected the subject's conception that a classifier should denote its head noun in some way. In this same month, the subject also classified 'candle' (*tian*) with *new* (a noun, meaning 'finger'), and classified 'needle' (*kem*) with *yep* (a verb, meaning 'to sew'). Neither *new* nor *yep* are classifiers. They are not even adjectives, but it cannot be denied that there are semantic relationships between the head nouns and the words she used as classifiers.

The subject also used the most salient property of a classifier as the criterion for overextension. *Taeng* was used to overextend with long, pointed objects from the list, such as 'cigarette' (*buri*), 'pen' (*pakka*), 'ice-cream cone' (*itim-kon*) and 'tree' (*ton-mai*).

Another clear pattern seen in the fourth month was the frequent use of the general classifier *an*. The use of this classifier significantly increased, from 15 in the third month to 24 in the fourth month. Although the subject acquired a few more classifiers in this month, she still applied the general classifier with several objects. The use of repeaters as classifiers was found only with 'paracetamol' (*ya-med*), 'pole' (*sao*), and 'rope' (*chuak*).

There was also a significant drop in the arbitrary use of classifiers. The subject responded with six arbitrary classifiers in this month compared with 13 in the previous month. To name just a few, she classified 'tent' (*tent*) with *tua* (instead of its appropriate classifier *lung*), classified 'sock' (*tungtao*) with *puang* (instead of *khu*), and classified 'road' (tanon) with *lu* (meaningless word) instead of *sai*.

In the fifth month, the use of words denoting the attributes of head nouns as classifiers continued. *Ruam* (an adverb, meaning 'together') was used as the classifier for 'bunch of bananas' (*kluai*), *suam* (a verb, meaning 'to wear') was used for 'hat' (*muak*), and *laem* (an adjective, meaning 'sharp') was used for 'candle' (*tian*). The results showed that the subject did not acquire any new classifiers during this month. In fact, she seemed to adopt the strategy of the previous month by overgeneralising the general classifier in places where she was not sure of the appropriate one to use.

While the use of the general classifier was sharply increased to 34 out of 72, it is interesting to see that the use of repeaters, referent-based and arbitrary classifiers was less frequent. In fact, during the fifth month, the subject did not respond with repeaters at all, and responded with referent-based and arbitrary classifiers only 12 and 4 times respectively.

The general classifier was overused most in the sixth month of the elicitation sessions. *An* was used with 46 out of the 72 nouns in several categories, while the use of adult classifiers appeared to cease to develop. Although the subject could use classifiers with most nouns in the human category, the animal category, and the fruit category by the third month, it appears that she did not acquire new classifiers in the following months, apart from the extensive use of the general classifier.

To summarise the development of the monolingual subject in acquiring classifiers during the first half of the elicitation sessions, the findings are quite different from those with respect to the bilingual subject because the monolingual subject had already acquired more classifiers at the beginning of the series. Her first classifier was *kon*, which is used for humans. Repeaters were found frequently in the first month, as well as the overuse of the classifier *bai* for nouns in several groups. However, from the second month, the monolingual subject differentiated nouns in the human category from nouns in the animal category by using different classifiers appropriately for nouns in those two groups. She acquired a few more classifiers including the general classifier *an*, and seemed to realise that classifiers generally imply the characteristics of head nouns. Therefore, from the fourth month, she began to pair certain nouns with some non-classifier words which indicated the characteristics of the noun as classifiers. The general classifier *an* was adopted increasingly, particularly in the fifth and sixth months.

4.1.3 The monolingual subject: Months 7 –9

Types of responses	Month		
	7	8	9
Silence/hesitation	0	0	0
Repeaters	0	0	0
General classifier	46	17	17
Referent-based	5	20	12
Arbitrary	1	8	4
Adult classifiers	20	27	39

Table 8: Types of responses of the monolingual subject during months 7-9.

During the seventh month the monolingual subject's practice showed little change from the previous month. The overuse of *an* was still extended, and dominated 46 out of the 72 nouns on the list. The subject did not acquire new classifiers, but she clearly tried to replace classifiers which she had been uncertain about in the previous month with the general classifier *an*. In this month the number of adult classifiers the subject applied increased a little from 16 to 20, but the use of referent-based and arbitrary classifiers was still decreasing from 15 to 5 and 13 to 1 respectively.

In the eighth month the results were completely different. Although the subject still overgeneralised some nouns with the classifier *an*, the frequency of *an* was much lower. There were 17 instances of the subject's responding with *an*, compared to 46 in the previous month. For the first time since the first experiment the subject appeared to correlate nouns with different shapes and properties with the appropriate classifiers, although not always correctly. Table 8 shows that the referent-based responses sharply increased to 20 in this month. It is seen that the subject clearly chose classifiers to use with some nouns according to the category of the nouns. She classified 'house' (*ban*), 'tent' (*tent*) and 'castle' (*prasad*) all with the classifier *lung*, instead of using *an* to classify them, as in previous months. Although the subject had acquired the classifier *lung* in the fifth month, she chose to use *an* as the main classifier for nouns in this group.

In addition, the subject also classified nouns in the vehicle category with a single classifier, *khan*. Although *khan* is obviously an adult classifier for some vehicles with wheels, like 'car' (*rod-yon*), 'motorcycle' (*rod-jakkayan-yon*) and 'bicycle' (*rod-jakkayan*), it is not possible in adult language to use *khan* with certain vehicles, for example 'boat' (*rua*), 'airplane' (*kruang-bin*) and 'train' (*rodfai*), which should be classified with *lam*. The subject had acquired the classifiers *khan* and *lam* by the fourth month, but she rarely used them appropriately. As for nouns in the accommodation category, she preferred to classify them with the general classifier *an*.

The less frequent usage of the general classifier *an* in this month and the increasing usage of referent-based responses can be seen below:

Head nouns	**Adult classifier**	**child's classifier**	**Meaning**
Playing card / *pai*	bai	paen	flat/horizontal
Paper / *kradad*	paen	paen	flat/horizontal
Handkerchief / *pa-ched-na*	phun	paen	flat/horizontal
Rug / *prom-ched-tao*	phun	paen	flat/horizontal
Towel / *pa-ched-tua*	phun	paen	flat/horizontal
Toiletpaper/ *kradad-chumra*	muan	paen	flat/horizontal
Belt / *kemkud*	sen	sen	long/rope-like
Necklace / *sai-soi*	sen	sen	long/rope-like
Rope / *chuak*	sen	sen	long/rope-like
Chain / *so*	sen	sen	long/rope-like
Road / *thanon*	sen	sen	long/rope-like
Tooth / *fun*	si	taeng	solid/vertical
Cigarette / *buri*	muan	taeng	solid/vertical
Pen / *pakka*	dam	taeng	solid/vertical
Toothpaste / *ya-si-fun*	lod	taeng	solid/vertical
Key / *khunjae*	dok	taeng	solid/vertical
Arrow / *luksorn*	dok	taeng	solid/vertical

Table 9: The monolingual subject's use of classifiers showing shape bias during months 7-9.

Paen, a classifier denoting a flat, horizontal shape, was used to classify most flat objects on the list. *Sen*, a classifier signifying a long, rope-like shape, was also used to classify long, rope-like objects on the list, and *taeng*, a classifier denoting a long, vertical shape, was used with most long, vertical objects on the list. Although some of them were used appropriately, some were clearly not. In adult language some nouns are not classified according to their shapes. For example, although the shapes of playing cards and paper are quite similar, they do not share the same classifier. As remarked earlier, some exceptional classifiers are used unpredictably and have to be acquired through memorisation. However, the subject's use of *paen* as the classifier for flat objects clearly supports the argument that shape bias is strongly presented in young children's categorisation processes.

The results from this month also showed that the subject was able to use four different classifiers appropriately with four nouns in the fruit category for the first time, as follows:

Head nouns	**Adult classifiers**	**Child's classifier**
Orange (*som*)	lug (or phon)	lug
Banana (*kluai*)	lug (or bai)	phon
Bunch of grapes (*a-ngun*)	puang	puang
Bunch of bananas (*kluai*)	wi	wi

Table 10: The monolingual subject's use of classifiers for objects in the fruit category during months 7-9.

From the data above we see that the subject seemed to realise that nouns in the same taxonomic category can be used with totally different classifiers. It is interesting to note that the acquisition of classifiers for fruit was a multi-stage process. The experiment from the previous month had suggested that at first the subject had not realised that different types of fruits are to be used with different classifiers. Then, she started differentiating single fruits (orange, banana) from multiple fruits (bunch of grapes, bunch of bananas) by using *phon*, *lug* or a general classifier *an* with single fruits, and *puang* or her invented classifier *ruam* (adjective, meaning 'together') with multiple fruits, but was still not able to use them appropriately with specific types of fruits. In the last stage of her development, she began to use different classifiers even with nouns in the same sub-categories. She was able to classify 'orange' (*som*) and 'banana' (*kluai*) with two different classifiers, even though both of them are single fruits, and she also classified two multiple fruits, 'bunch of grapes' (*a-ngun*) and 'bunch of bananas' (*kluai*), suitably with different classifiers.

4.1.4 The monolingual subject: Months 10-12

Types of responses	Month		
	10	11	12
Silence/hesitation	0	0	0
Repeaters	0	0	0
General classifier	13	13	12
Referent-based	11	10	13
Arbitrary	6	4	4
Adult classifiers	42	45	43

Table 11: Types of responses of the monolingual subject during months 10-12.

The last three months of the elicitation sessions were also the period when the monolingual subject most improved on her process of classifier acquisition. She acquired a few more classifiers and used the general classifier less. The number of adult classifiers used at the end of the twelfth month increased to 43 and the use of the general classifier dropped to 12. The subject began to acquire some less frequently used classifiers she had never used before, like the classifier used with honorific figures (*ong*). She seemed to acquire the concept that a single classifier can be used with two completely different nouns which are not in the same taxonomic category and do not even share similar shapes.

However, it is noted that the subject still randomly used referent-based classifiers. The numbers of referent-based classifiers used during the last three months were 11, 10 and 13 respectively. The use of arbitrary classifiers, on the contrary, decreased to 6, 4 and 4 during the last three months.

There are a few nouns on the list that the subject never used with adult classifiers in the first nine months of the experiment. During the last three months, however, she started to acquire some of them. The honorific noun 'priest' (*pra*), which possesses a special classifier *ong* in adult language, was first used by the subject in the eleventh month. The subject continued to classify this noun with *ong* in the twelfth month so it seemed that she did not use it randomly.

The classifier *khu*, which means 'pair', is a classifier used with nouns in pairs, like 'shoes' (*rongtao*), 'socks' (*tungtao*), and 'spoon and fork' (*chon-som*), etc. This classifier was not used by the subject until the last month of the elicitation sessions when she used *khu* to classify 'shoes' for the first time. However, she did not classify 'socks' (*tungtao*) or 'spoon and fork' (*chon-som*) with *khu*. Instead, she used the general classifier *an* to classify both objects. Therefore, it is doubtful that she classified 'shoes' (*rongtao*) with *khu* intentionally.

During months 7-9 the monolingual subject applied more than one classifier to nouns in the same category. In the eighth month, she acquired the classifiers *lug, phon, puang* and *wi* and used them appropriately with four nouns in the fruit category. However, it can be seen that in months 10-12 her process of classifier acquisition for nouns in the fruit category was still developing. Details are shown below in Table 12.

Nouns	**Adult classifier**	**Child's classifier**		
		10	**11**	**12**
Orange (*som*)	lug /phon	phon	lug	phon
Bunch of bananas (*kluai*)	lug/bai	lug	phon	phon
Bunch of grapes (*a-ngun*)	puang	puang	puang	puang
Banana (*kluai*)	wi	wi	wi	wi

Table 12: The monolingual subject's use of classifiers for nouns in the fruit category during months 10-12.

Evidence can also be found of her attempt to use different classifiers with nouns in the vehicle category. During this period, the subject used *khan* and *lam* to classify nouns in this group. In adult language, the classifiers *khan* and *lam* are both used for nouns in the vehicle category, but the difference lies in the manner of motion. In adult Thai, *khan* is a classifier for 'car' (*rod-yon*), 'bicycle' (*rod-jakkayan*), 'truck' (*rod-buntuk*), etc., while *lam* is used for vehicles which float or fly, like 'airplane' (*kruang-bin*), 'boat' (*rua*), and 'spaceship' (*yan-awakad*). We do not know whether at this stage the subject understood the difference between *khan* and *lam*, but she had clearly started using *lam* to classify 'airplane' (*kruang-bin*) by the third month, and used it continuously from the ninth month until the twelfth month. She never used *lam* to classify 'boat' (*rua*). Details are given below in Table 13.

Nouns	Adult classifier	Child's classifier		
		10	11	12
Boat (*rua*)	lam	khan	khan	khan
Bicycle (*rod-jakkayan*)	khan	khan	khan	nkha
Car (*rod*)	khan	khan	khan	khan
Airplane (*kruang-bin*)	lam	lam	lam	lam

Table 13: The monolingual subject's use of classifiers for nouns in the vehicle category during months 10-12.

Even though the subject's use of these classifiers at the end of the twelfth month was not exactly the same as an adult's, the data suggest that the subject had acquired different classifiers for nouns in the same category.

During months 10-12, the subject reached another stage of classifier acquisition by using a single classifier, like *tua*, to classify nouns in different categories and of different shapes. In past months, *tua* had been used as the sole classifier with nouns in the animal category. Although the subject had sometimes used *tua* to classify other nouns previously, *tua* tended to be used as a general classifier, or was used randomly and replaced by another classifier in the next month. The subject did not specifically use *tua* to classify nouns other than those in the animal category until the tenth month.

It was seen in the tenth month that the subject acquired the classifier *tua* to use with 'chair' (*kawi*) and 'shirt' (*sua*). The results from the eleventh month showed that she did not use it randomly because she repeatedly classified both nouns again with the same classifier, and in the twelfth month *tua* was also used to classify 'table' (*toh*). So, there were three nouns from the list which do not belong to the animal category, but were still classified appropriately with *tua*. Details are given below in Table 14.

Nouns	Adult classifier	Child's classifier		
		10	11	12
Chair (*kao-ei*)	tua	tua	tua	tua
Table (*toh*)	tua	toh	an	tua
Shirt (*sua*)	tua	tua	tua	tua

Table 14: The monolingual subject's use of classifiers for non-animate quadruped nouns during months 10-12.

'Chair' (*kawi*), 'table' (*toh*), and 'shirt' (*sua*) are three nouns which do not belong to the animal category. 'Chair' (*kawi*) and 'shirt' (*sua*) cannot be seen as nouns in the same taxonomic category, and clearly do not share the same shape. However, these nouns, as well as nouns in the animal category, must be classified with the classifier *tua* in adult Thai. This irregular use of the classifier *tua* represents the idiosyncratic use of the Thai classifier system where a classifier does not necessarily reflect the most salient properties of the head noun. However, it can be argued that 'chair' (*kawi*), 'table' (*table*) and 'shirt' (*sua*) are related to one another through the prototype model of 'animate quadruped' as discussed previously in the literature review, section 2.2.3. It would be interesting to explore whether the subject was aware of the relationship of these three seemingly unrelated items at this stage, or whether she had merely acquired the concept that a single classifier can be used with nouns in different categories and of different shapes.

Her use of the classifier *bai* in months 10 – 12 also conforms to this pattern. In adult language, *bai* is a classifier that can denote either a horizontal, leaf-like shape, like 'bank note' (*bank*), and 'leaf' (*baimai*), or a round shape, like 'balloon' (*lukpong*), and 'hat' (*muak*). It can also be used with some round kitchenware like 'plate' (*jan*), 'cup' (*tuai*) and 'pot' (*mor*). Previously, *bai* had been used by the subject as a general classifier or a random classifier. The subject started to use it repeatedly with certain nouns from the ninth month. Details are shown below in Table 15.

Nouns	Adult classifier	Child's classifier			
		9	10	11	12
Hat (*muak*)	bai	bai	bai	bai	bai
Plate (*jan*)	bai	bai	bai	bai	bai
Cup (*tuay*)	iba	an	bai	an	bai
Playing card (*pai*)	bai	bai	phun	phun	bai

Table 15: The monolingual subject's use of classifiers for 'hat', 'plate', 'cup' and 'playing card' during months 10-12.

It can be seen from the table that the subject finally acquired and used the same classifier, *bai*, for nouns in different categories and of different shapes even though it seemed in the tenth and eleventh months that she tried to classify 'playing card' (*pai*) with *phun* because of its shape.

What we have learned from the first elicitation session up to this point is that the monolingual subject initially acquired a single classifier to use with nouns in the same category, e.g. the classifier *tua* to use with all nouns in the animal category. She later acquired a single classifier to use with nouns which share similar shapes or similar perceptual properties, although belonging to different categories, i.e. the classifier *taeng* with 'ice cream cone' (*itim-kon*) and 'pencil' (*dinso*). At this point, she seemed to understand that nouns in the same category could be used with different classifiers, e.g. the classifier *lug* with 'orange' (*som*) and *wi* with 'bananas' (*kluai*). Finally, from the results of months 10-12, it appears that the subject acquired the knowledge that a single classifier can be used to classify two completely different nouns which do not belong to the same category and do not share similar shapes, e.g. the classifier *tua* with 'horse' (*ma*) and 'shirt' (*sua*).

Although it seems that the monolingual subject improved her classifier acquisition to a great extent during the last three months, there were certain classifiers which still caused difficulties for her; for example, the classifier *lem,* which is used to denote vertical, solid shapes in a similar way to *taeng*. The difference between the two classifiers is reflected in the fact that *lem* can also be used to classify 'book' (*nungsu*) whereas *taeng* cannot. In adult language, the use of *lem* or *taeng* to classify vertical, solid objects is sometimes idiosyncratic. For example, *taeng* is used to classify 'pencil' (*dinso*), but *lem* classifies 'pen' (*pakka*), although both objects are rarely different either in shape or function. Within the set of nouns from the list, *taeng* is only used to classify 'ice-cream cone' (*itim-kon*), while *lem* is the classifier for 'knife' (*miid*), 'needle' (*kem*) and 'candle' (*tian*).

It is clear from the results of the sessions that the subject did not use *lem* to classify nouns denoting vertical solid objects until the twelfth month. Although she seemed to acquire *lem* during the earlier stage of the experimenal series, she limited its usage to the noun 'book' (*nungsu*) only. The subject used *taeng* to classify all nouns on the list with a vertical solid shape like 'knife' (*miid*), 'needle' (*kem*), 'candle' (*tian*), 'pen' (*pakka*), and 'ice-cream cone' (*itim-kon*). This suggests that one of the shape-related classifiers that the subject acquired from the elicitation sessions was *taeng*. Therefore, she tended to overextend the use of nouns with vertical, solid shapes with this classifier, while *lem* was acknowledged as only a classifier for 'book' (*nungsu*) at the beginning. Details are shown in Table 16.

Nouns	**Adult classifier**	**Child's classifier**		
		10	**11**	**12**
Knife (*meed*)	lem	an	taeng	taeng
Needle (*khem*)	lem	taeng	taeng	mle
Candle (*tian*)	lem	korn	taeng	taeng
Book (*nungsu*)	lem	lem	lem	lem
Pen (*pakka*)	lem	taeng	taeng	taeng
Ice cream cone (*itim-kon*)	taeng	an	taeng	taeng

Table 16: The monolingual subject's use of classifiers for 'knife', 'needle', 'candle', 'book', 'pen', and 'ice-cream cone' during months 10-12.

4.2.1 The bilingual subject (UK): Months 1 – 3

Types of responses	**Month**		
	1	**2**	**3**
Silence/hesitation	63	19	10
Repeaters	0	51	25
General classifier	9	2	30
Referent-based	0	0	0
Arbitrary	0	0	0
Adult classifiers	0	0	7

Table 17: Types of responses of the bilingual subject during months 1-3.

In the first month the majority of the bilingual subject's responses were silence and hesitation. The subject responded with silence to 63 out of the 72 nouns, and the rest of the responses consisted of the sole use of the classifier *tua* as the general classifier. The subject applied *tua* with 9 nouns on the list: 'child' (*dek*), 'priest' (*pra*), 'soldier' (*tahan*), 'boat' (*rua*), 'bicycle' (*rod-jakkayan*), 'car' (*rod-yon*), 'airplane' (*kruang-bin*), 'spoon and fork' (*chon-som*) and 'plate' (*jan*). Although none of them was used appropriately, it is noted that most of the nouns the subject only used with *tua* are animate nouns. 'Child' (*dek*), 'priest' (*pra*) and 'soldier' (*tahan*) are animate nouns in the human category, and 'boat' (*rua*), 'bicycle' (*rod-jakkayan*), 'car' (*rod-yon*) and 'airplane' (*kruang-bin*) are animate nouns in the vehicle category. So it is possible that the subject was able to differentiate the animate nouns from the other nouns on the list as early as the first month. However, the fact that the subject also included 'spoon and fork' (*chon-som*) and 'plate' (*jan*), which are obviously not animate nouns does not support this assumption.

Extensive usage of the 'silence and hesitation' and the usage of only the classifier *tua* suggest that the bilingual subject had acquired only one classifier at the beginning of the elicitation sessions. Normally, the classifier *tua* is used with the animal category, while *kon* is used with the human category. According to studies by Tuaycharoen (1984) and Carpenter (1987), the classifier *kon* is the first classifier learned by children because it is the one most frequently used in everyday conversation, as discussed in the Introduction, section 1.2.3. However, according to my research, the bilingual subject simply acquired the classifier *tua* first and applied it with nouns in both the human and the vehicle categories.

It is interesting to note that the monolingual subject never responded to the task with silence as the bilingual subject did. Her silence and hesitation when responding to the task could possibly be a result from a lower degree of input of Thai language she received in comparison to that of the monolingual subject. Silence could be interpreted as the first sign that the subject had attempted to acquire the classifier system but not yet acquired the right word, so she was confused when facing the task and this was reflected in her silence and hesitation. When a picture of 'four birds' was shown, and the subject was asked about the picture, the following dialogue took place:

Adult: Thi-inii mii nok si .... (Blank for a child to add a classifier)

here have bird four ....

'There are four ....'

Child: mii nok si ... (silent)

have bird four (silent)

'Four (silent for the classifier)

Adult: Si arai ?

four what?

'Four what?'

Child: (silent)

Remarkably, the most frequent response of the subject changed from silence and hesitation in the first month to repeaters in the second month, as 51 repeaters were used. This change could be a reflection of the adjustment of the elicitation method, from showing only picture cards to the subject and asking the subject about their classifiers to showing not only picture cards but also puppets, toys, and some real objects in order to keep the subject's attention. This method proved to be more successful because the subject spent more time performing a task, and her concentration also increased. This does not mean, however, that the subject completely stopped responding to the task with silence and hesitation. Although the number of silences used was significantly less than in the first month, the subject still responded with silences with 19 nouns from the list in the second month. All animate nouns in the animal category: 'bird' (*nok*), 'chicken' (*kai*), 'elephant' (*chang*), and 'horse' (*ma*), were responded to with silence, as well as other 15 random nouns such as 'grape' (*a-ngun*), 'sock' (*tungtao*), 'playing card' (*pai*), 'star' (*dao*), 'pearl' (*kai-muk*), 'handkerchief' (*pa-ched-na*), 'towel' (*pa-ched-tua*), 'needle' (*khem*), 'tree' (*ton-mai*), 'pole' (*sao*), 'belt' (*kemkud*), 'toilet paper' (*kradad-chumra*), 'rose' (*dokkularp*), 'tulip' (*doktulip*), and 'ring' (*waen*).

It is noted that the subject still applied *tua* as the classifier for three animate nouns in the human category. 'Child' (*dek*), 'priest' (*pra*) and 'soldier' (*tahan*) were classified with *tua* as in the previous month. Although *tua* was still used inappropriately, this confirmed that the subject could separate those three nouns in the human category from the rest of nouns on the list.

Two types of repeaters were used by the subject. The first type was the repetition of the head nouns and the second was the repetition of the numerals, which will be called here numeral repeaters. Repeaters were used as classifiers 27 times and numeral repeaters were used 24 times. It can be presumed that the subject used repeaters or numeral repeaters as classifiers because she probably thought that it was better than being silent. She realised that there should be a classifier in her sentence, so when it was insisted that she should add the classifier, she simply repeated a head noun or a numeral as a classifier.

Examples of the responses used as repeaters and numeral repeaters are shown below:

Repeaters:

Adult : Thii-nii mii kai song .... (blank for a child to add a classifier)

here have chicken two ....

Child: Mii kai song kai

have chicken two chicken

Adult: Song arai naka?

two what again?

Child: Kai song kai

chicken two chicken

Numeral repeaters:

Adult: Thiinii mii som nuang .... (blank for a child to add a classifier)

here have orange one ....

Child: Mii som nuang nuang

have orange one one

Adult: Som nuang arai ?

orange one what?

Child: Som nuang nuang

orange one one

During the second month, there were two nouns the subject did not know in Thai, so she used the English words 'cigarette' and 'bicycle' as their own classifiers in sentences, mixing the two languages:

(1) Child: Mii bicycle song bicycle
have bicycle two bicycle
'(I) have two bicycles'

(2) Child: Mii cigarette nuang cigarette
have cigarette one cigarette
'(I) have a cigarette'

The data show that the subject acquired three adult classifiers, *tua, kon,* and *dok*, in the third month and used them appropriately with seven nouns on the list. For the first time, she classified 'child' (*dek*), a noun in the human category appropriately with the classifier *kon*, but she still applied the classifier *tua* with 'priest' (*pra*), and 'soldier' (*tahan*). The subject classified all nouns in the animal category, 'bird' (*nok*), 'chicken' (*kai*), 'elephant' (*chang*) and 'horse' (*ma*), appropriately with the classifier *tua*, and classified 'rose' (*dokkularp*) and 'tulip' (*doktulip*) appropriately with *dok*. It is not clear, however, whether the subject intended to classify nouns in the flower category (*dokkularp* and *doktulip*) with their classifier, *dok*, or she simply repeated part of their head nouns.

The subject was still responding to the task with silence in the third month, though significantly less so. There were ten silent responses in the third month, compared to 61 and 19 during the first and second months, and the third month was the last month where silences were observed.

In this month the subject began to adopt the same favourite response type as the monolingual subject employed, the overuse of the general classifier. Although it appeared that the subject had already used *tua* as the general classifier in the previous months, it was not her most frequent response. In the third month, *tua* was used as the general classifier with 30 nouns on the list.

An interesting pattern occurred during the third month. When the subject began to get bored with the experiment, it appeared that she usually mixed two languages in talking to herself and in replying to the task. Although she used English words, interestingly, the word order pattern was that of Thai:

Child: I have key two key

'I have two keys.'

4.2.2 The bilingual subject: Months 4-6

Types of responses	Month		
	4	5	6
Silence/hesitation	0	0	0
Repeaters	20	3	3
General classifier	43	52	53
Referent-based	2	6	5
Arbitrary	0	4	3
Adult classifiers	7	7	8

Table 18: Types of responses of the bilingual subject during months 4-6.

In the fourth month, there was a significant change in the bilingual subject's pattern of classifier usage. First of all, she no longer responded to the task with silence. Twenty repeaters were used as classifiers, and the use of the general classifier rose to 43 even though *tua* was no longer applied as the general classifier. However, it is noted that the adult forms of the classifiers used were not changed and the subject did not acquire any new classifiers in this month. *Kon*, *tua*, and *dok* were applied with nouns on the list in exactly the same way as she had done during the third month.

It is interesting to note that although the classifier *kon* was used appropriately with 'child' (*dek*), it was not extended to other nouns in the human category. The subject still classified 'soldier' (*tahan*) and 'priest' (*pra*) with *tua*, the classifier mainly used for animals. Apart from 'child' (*dek*), *kon* was not applied to any other nouns on the list. The subject continued to use *kon* to solely classify 'child' (*dek*) alone until the sixth month, when she began to overextend it to 'priest' (*pra*).

It was also noted that during the fourth month *tua* was not used as the general classifier. The subject used *tua* only to classify four nouns in the animal category and two nouns in the human category, so it did not seem like a random usage. 'Bird' (*nok*), 'chicken' (*kai*), 'elephant' (*chang*) and 'horse' (*ma*) were appropriately classified with *tua* but the subject also overextended it to nouns such as 'priest' (*pra*) and 'soldier' (*tahan*), which is not conventionally used by adults. Although *tua* was not used as the general classifier, the subject acquired the general classifier *an* in this month and applied it randomly with 43 nouns on the list.

The use of repeaters could still be seen during the fourth month. The subject used repeaters as the classifiers for 20 nouns on the list, including all nouns in the fruit category: 'orange' (*som*), 'banana' (*kluai*), 'grapes' (*a-ngun*), 'bunch of bananas' (*kluai*), all nouns in the vehicle category: 'train' (*rodfai*), 'boat' (*rua*), 'bicycle' (*jakkayan*), 'car' (*rod-yon*), 'airplane' (*kruang-bin*), and some random nouns in different categories such as 'house' (*ban*), 'book' (*nungsu*), 'table' (*toh*), 'rug' (*prom*), etc.

In the fifth month, the use of the general classifier *an* rose substantially to 52 out of 72 nouns on the list while the adult form classifiers remained at seven. The subject still occasionally used repeaters with only three nouns on the list.

Although the subject still used the classifier *an* extensively in the fifth month, she at least acquired a few more classifiers apart from *tua*, *kon* and *dok*. The data suggest that she began to acquire the rule that a bunch of bananas is classified with *wi*, so she overextended by using it to classify every noun in the fruit category: 'orange' (*som*), 'banana' (*kluai*), 'grapes' (*a-ngun*), and 'a bunch of bananas' (*kluai*). In adult language, various classifiers are used with particular fruits. For example, 'orange' (*som*) is classified with *phon*, 'banana' (*kluai*) with *lug*, 'a bunch of grapes' (*a-ngun*) with *puang* and 'a bunch of bananas' (*kluai*) with *wi*. At this stage the subject did not seem to realise the exceptions, so *wi* was applied with all of them. The other adult classifier the subject acquired in this month was *lung*. *Lung* is an adult-form classifier for house-shaped nouns. The subject used *lung* to classify 'house' (*ban*) appropriately, and she did not overextend it with 'castle' (*prasard*) and 'tent' (*tent*).

In the sixth month the subject did not produce any new classifiers. She used only five classifiers: *tua*, *kon*, *dok wi* and *an*. The subject did not use some adult-form classifiers she had used previously, but used the general classifier instead. The subject used *an* to classify 53 nouns from the list, including 'house' (*ban*), although she had used *lung* appropriately in the previous month. She still used *wi* to classify three nouns in the fruit category, except 'orange' (*som*), for which *wi* was replaced by the general classifier *an*. Three repeaters were used with various nouns like 'tent' (*tent*), 'stamp' (*stamp*) and 'door' (*pratu*).

The subject began to overextend the classifier *kon* with another noun in the human category, 'priest' (*pra*). However, the use of *kon* was inappropriate in this case. 'Priest' (*pra*), though undeniably included in the human category, cannot be classified with *kon* in adult Thai. Thai divides nouns in the human category into different cultural and social ranks, and classifies them accordingly. A priest is categorised as an honorific figure and is therefore classified with *ong*. However, the subject's overextension of *kon* with 'priest' (*pra*) signified her attempt to use classifiers according to the properties of the head noun, because she clearly grouped 'child' (*dek*) and 'priest' (*pra*) together as nouns in the same category (human).

4.2.3 The bilingual subject: Months 7-9

Types of responses	Month		
	7	8	9
Silence/hesitation	0	0	0
Repeaters	2	2	0
General classifier	54	52	43
Referent-based	6	5	6
Arbitrary	0	0	2
Adult classifiers	10	13	21

Table 19: Types of responses of the bilingual subject during months 7-9.

In the seventh month of the elicitation sessions the classifier *an* was most used as the general classifier. The subject used *an* to classify 54 nouns, and on no occasion was it used appropriately. Apart from the general classifier overuse, six referent-based responses and two repeaters were found as erroneous responses in this month. The number of adult-form classifiers increased from eight in the previous month to ten in this month.

Results from the seventh month showed no significant change from those of the previous month. The subject's development seemed to be stalled since she overwhelmingly used the general classifier with most nouns on the list. There were signs, however, that the subject was struggling to acquire a new rule in her attempt to classify different kinds of fruits. Her use of classifiers for nouns in the fruit category is shown below.

	Classifier used					
Nouns	**4**	**5**	**6**	**7**	**8**	**9**
Orange (*som*)	an	wi	an	an	an	phon
Banana (*kluai*)	an	wi	wi	an	an	klib
Bunch of grapes (*a-ngun*)	an	wi	wi	wi	wi	wi
Bunch of bananas (*kluai*)	an	wi	wi	wi	wi	wi

Table 20:The bilingual subject's use of classifiers for nouns in the fruit category during months 4-9.

It is assumed that the subject was still in the process of noun categorisation and classifier acquisition as she gradually learned to classify these nouns. At first she overgeneralised all nouns in the fruit category with the general classifier *an*. During the fifth month, however, the data show that she classified 'bunch of bananas' (*kluai*) with *wi*, and overextended it with all nouns in the fruit category. Then, during the sixth month, she realised that *wi* cannot classify some fruits and so resorted to the general classifier *an* to classify 'orange' (*som*). In the seventh month, she may have hypothesised a rule that the classifier *wi* was used to classify multiple fruits, while *an* was used to classify single fruits. The classifier *an* was used with 'orange' (*som*) and 'banana' (*kluai*), which are single fruits, while 'bunch of bananas' and 'bunch of grapes' (*a-ngun*) were classified with *wi*. This rule continued to be used for a while, as we observed that the classifiers used for these nouns were unchanged in the eighth month. In the ninth month, however, there was a change again when the subject used *phon* to classify 'orange' (*som*), and *klib* to classify 'banana' (*kluai*).

Another notable change seen in the seventh month was the way the subject classified nouns in the human category. Results in the previous months had shown that she appropriately classified 'child' (*dek*) with *kon*, whereas other nouns in the same categories such as 'priest' (*pra*) and 'soldier' (*tahan*) were classified with a classifier for animals, *tua*. As has been suggested, the subject had probably not been sure about the difference between the ways of using two classifiers, *kon* and *tua*, in previous months. However, it was in the seventh month that the subject began to include 'soldier' (*tahan*) with a group of nouns to be classified with *kon*.

The subject also acquired a few more classifiers during the seventh month. 'Train' (*rodfai*) and '7-up' (*seven-up*) were classified appropriately with *kabuan* and *kuad* respectively. Previously the general classifier *an* had been used to classify both nouns.

The results from the eighth month reveal that the subject's use of adult-form classifiers showed a slight development. The subject classified 13 nouns appropriately with their adult-form classifiers: 'child' (*dek*), 'soldier' (*tahan*), 'priest' (*pra*), 'bird' (*nok*), 'chicken' (*kai*), 'elephant' (*chang*), 'horse' (*ma*), 'bunch of bananas' (*kluai*), 'bicycle' (rod-jakkayan), 'car' (*rod-yon*), 'handkerchief' (*pa-ched-na*), 'rug' (*prom*) and 'towel' (*pa-ched-tua*). It was in this month that the subject acquired the adult form of classifier for 'priest' (*pra*), which she classified appropriately with *ong*. The use of the general classifier *an* was still overwhelmingly high at 52 out of 72 nouns.

Now, however, the subject began to link head nouns with non-classifier morphemes related with the head nouns by either taxonomic or perceptual properties. This type of response occurred with the monolingual subject after the third month of the elicitation sessions. It was noticeable during the eighth month that the bilingual subject began using as classifiers words related to head nouns, either adjectives or nouns with a thematic relation to the head noun although it was obvious that the overgeneralisation of the classifier *an* was still extensive. Details are shown below:

Head nouns	Adult classifier	Child classifier	Meaning
Cup (*tuai*)	bai	kaew	glass of water (n.)
Tooth (*fun*)	si	ngub	to bite (v.)
Knife (*meed*)	lem	laem	sharp (adj.)
Needle (*kem*)	lem	laem	sharp (adj.)
Hair (*pom*)	sen	yao	long (adj.)
Radio (*wittayu*)	kruang	fung	to listen (v.)
Keys (*khunjae*)	puang	puak	together (adv.)

Table 21: The use of words with thematic relations with the head nouns as classifiers of the bilingual subject (UK) during the months 7-9.

From the above it is clear that the subject was trying to classify some nouns on the list with non-classifier words. Although none of the words she used could be called adult classifiers, her use of them reflects at least two probabilities. Firstly, the subject seemed to realise that there are more classifiers than she had learned so far, including the general classifier *an* which she had overwhelmingly used in the past. Secondly, and more importantly, she seemed to realise that classifiers usually reflect the nature or characteristics of head nouns, so she used certain non-classifier words as classifiers because they are related semantically to the head noun in some way. It is significant that the results of this month for the bilingual subject (chronological age 3;8) resemble those for the monolingual subject produced at a considerably earlier stage (chronological age 3;5). It can therefore be said that the bilingual subject's process of classifier acquisition was similar to that of the monolingual subject, although somewhat slower.

Another surprising type of error made by the bilingual subject in the eighth month, identical to what the monolingual subject had done before, was overextension. The subject appeared to acquire a few more classifiers and overextend them with other nouns in the same categories. Details are shown below:

Head nouns	**Adult classifier**	**Child classifier**
Train (*rodfai*)	kabuan	khan
Boat (*rua*)	lam	khan
Bicycle (*rod jakja yan*)	khan	khan
Car (*rod-yon*)	khan	khan
Airplane (*kruang-bin*)	lam	khan
Paper (*kradad*)	paen	paen
Handkerchief (*pa-ched-na*)	phun	paen
Rug (*prom-ched-tao*)	phun	paen
Towel (*pa-ched-tua*)	phun	paen

Table 22: The bilingual subject (UK)'s overextension of the classifiers *khan* and *paen* during months 7-9.

It is clear that the subject categorised nouns with taxonomic similarities into groups and classified nouns in the same group with a single classifier. Nouns like 'train' (*rodfai*), 'boat' (*rua*), 'bicycle' (*rod-jakkayan*), 'car' (*rod-yon*) and 'airplane' (*kruang-bin*) were grouped together and *khan* was overextended as the classifier for all of them, although *khan* can actually classify only 'bicycle' (*rod-jakkayan*) and 'car' (*rod-yon*) in adult Thai. In the same way, although *paen* is the classifier for 'paper' (*kradad*), the subject overextended it to classify 'handkerchief' (*pa-ched-na*), 'rug' (*prom-ched-tao*), and 'towel' (*pa-ched-tua*) because of their shape. Overextension was seen in the monolingual subject's speech in the fourth month and continued to be found months later.

In the ninth month, the use of the general classifier *an* dropped to 43 while the use of adult-form classifiers increased to 21 from 13 in the previous month. The subject did not use the classifier *ong* she had acquired in the previous month to use with 'priest' (*pra*) and began to use *kon* to classify it in this month. However, a new classifier, *bai*, was acquired in this month, which she used appropriately to classify 'playing card' (*pai*). No repeaters were used.

The subject produced more errors in connecting head nouns with semantically related words as classifiers. This again suggests that the subject realised that classifiers should underscore the meanings of head nouns, and therefore attempted to create some classifiers based on this knowledge. Details are given below.

Head nouns	Adult classifier	Child classifier	Meaning
Banana (*kluai*)	bai	klib	petal-like (adj.)
Cup (*tuai*)	bai	kaew	glass of water (n.)
Tooth (*fun*)	si	ngub	to bite (v.)
Bicycle (*rod-jakkayan*)	khan	ride	to ride (v.d)
Tree (*ton-mai*)	ton	taeng	upright (adj.)
Arrow (*lookson*)	dok	taeng	upright (adj.)
Ring (*waen*)	wong	klom	round (adj.)

Table 23: The bilingual subject (UK)'s use of semantically related words as classifier in month 9.

It appears that most of the words she had used in the previous month which semantically linked head nouns and classifiers were not repeatedly reused in this month, except words as classifiers for 'cup' (*tuai*) and 'tooth' (*fun*). Most of them were replaced with the general classifier *an*, as if the subject was still not sure what their adult classifiers should be. Another uncommon response was the use of the English language 'ride' as the classifier for a bicycle. 'Ride' is obviously not a numeral classifier, but its use showed that the subject was trying to link 'bicycle' with its taxonomic function.

The use of overextensions can also be found in this month. *Khan*, which was previously overextended to classify all nouns in the vehicle category, was still being overextended to classify 'boat' (*rua*), 'car' (*rod-yon*), and 'airplane' (*kruang-bin*).

One important issue to note is that the overgeneralisation of the general classifier *an* was reduced as a consequence of the increasing use of overextensions and words created as classifiers. Repeaters were also rarely seen in the final few months.

In the ninth month, the results seemed to be similar to those of the eighth month. The bilingual subject still used *an* to classify a number of nouns on the list. She tended to group together nouns with similar properties or shapes, and classified them with classifiers whose meaning is related to their shape. However, the subject seemed to realise by the eighth month that nouns in the same taxonomic sub-category could be used with different classifiers.

As seen earlier from the results of the eighth month, the bilingual subject overextended the classifier *paen,* using it with all objects on the list having flat, paper-like, horizontal shapes, used the classifier *taeng* with objects having solid, vertical shapes, and used the classifier *sen* with objects having long, rope-like shapes. During the ninth month, the subject continued to overextend those classifiers, but to a lesser extent. Although there was no obvious change in the use of the classifiers *taeng* and *sen* in this month, the use of *paen* as a sole classifier for nouns in the same category changed. Details are listed below.

Head nouns	Adult classifier	Eighth month	Ninth month	Meaning
Playing card (*pai*)	bai	paen	bai	leaf-like
Paper (*kradad*)	paen	paen	paen	flat (paper-like)
Handkerchief (*pa-ched-na*)	phun	paen	phun	flat (cloth-like)
Rug (*prom-ched-tao*)	phun	paen	phun	flat (cloth-like)
Towel (*pa-ched-tua*)	phun	paen	phun	flat (cloth-like)
Toilet paper (*kradachumra*)	muan	paen	phun	flat (cloth-like)

Table 24: The bilingual subject (UK)'s use of *paen*: changes from month 8 to month 9.

Instead of using *paen* to classify all nouns on the list having flat and horizontal shapes as she had done in the eighth month, the bilingual subject used *paen* only to classify 'paper' (*kradad*). She began to use appropriately *phun*, another classifier that also denotes its head noun's flat and horizontal shape to classify 'handkerchief' (*pa-ched-na*), 'rug' (*prom-ched-tao*) and 'towel' (*pa-ched-tua*). In adult language, although *paen* and *phun* are both classifiers which signify the flat, horizontal properties of their head nouns, *paen* is normally used with paper, rubber, or plastic, while *phun* is particularly used to classify fabrics. In addition, it was seen that *muan* (a classifier signifying a flat, horizontal object which is kept in a roll) was suitably used by the subject to classify 'toilet paper' (*kradad-chumra*). The subject also classified 'playing card' (*pai*) appropriately with *bai* instead of *paen*, although *bai* does not exactly reflect flat, horizontal properties of the head noun.

Similarly to when the subject had distinguished classifiers among nouns in the fruit category in the previous month, this evidence shows that she was aware that she could not always rely on the idea that a single classifier can be used with all nouns in the same taxonomic category, although this is true in some cases. The subject probably started to realise that there are some exceptional cases of the use of classifiers where generalised semantic rules cannot be applied, like the use of the classifier *bai* to classify 'playing card' (*pai*).

4.2.4 The bilingual subject: Months 10-12

Types of responses	Month		
	10	11	12
Silence/hesitation	0	0	0
Repeaters	0	1	0
General classifier	36	25	20
Referent-based	10	13	18
Arbitrary	2	6	2
Adult classifiers	24	27	32

Table 25: Types of responses of the bilingual subject during months 10-12.

During the last three months of the elicitation sessions the bilingual subject developed her classifier system rapidly. In general, it was evident that she acquired more classifiers than in the previous months. Although the general classifier *an* had been used earlier, as discussed in relation to months 7-9, it was used with only 25 and 20 nouns respectively during months 11-12. The subject gradually increased the use of adult-form classifiers from 21 in the ninth month to 24, 27 and 32 during the last three months of the experiment.

In addition, the data suggest that the subject's use of classifiers does somehow reflect the shape, properties, or function of a head noun because the results of the last three sessions revealed that she frequently used classifiers in this way. It can also be seen that the subject acquired additional classifiers, especially in the last two months of the elicitation sessions, because of the variety of the classifiers used. Although the most obvious feature seen in the tenth month was the use of the general classifier in the same way as had been seen previously, the results in months 11-12 were rather different. The number of nouns classified with *an* in the tenth month was 36, but this dropped to 25 and 20 in the eleventh and twelfth months respectively. As the general classifier was less frequently used, the subject adopted classifiers denoting the perceptual characteristics of head nouns more often, such as *paen*, *taeng*, *lug*, etc.

The subject tended to overextend frequently in the last three months of the experiment. In the ninth month, she started to overextend a single classifier for a group of nouns that belonged to the same category; she continued to do this during months 10-12. *Khan*, for instance, was used in the tenth month to classify all nouns in the vehicle category, before being replaced by *lam* in the eleventh and twelfth months.

Nouns in the vehicle category	**Adult classifier**	**Child's classifier**		
		10	**11**	**12**
Boat (*rua*)	lam	khan	lam	lam
Bicycle (*rod-jakkayan*)	khan	khan	wong	lam
Car (*rodyon*)	khan	khan	lam	lam
Airplane (*kruang-bin*)	lam	khan	lam	lam

Table 26: The bilingual subject's use of classifiers for nouns in the vehicle category during months 10- 12.

Not only did the subject overextend a single classifier, using it inappropriately with nouns in the same category, she also overextended her use of a single classifier to nouns in different categories which shared a similar shape. For example, in the tenth month, she repeatedly used *taeng*, a classifier denoting a tall, solid shape, to classify nouns in different categories with an upright shape like 'candle' (*tian*), 'pen' (*pakka*), and 'ice-cream cone' (*itim-kon*). She went further by also overextending *taeng* to classify 'pole' (*sao*) in the eleventh month, and adding 'needle' (*kem*) and 'tree' (*ton-mai*) to the list in the twelfth month. Details are given below:

Head nouns	Adult classifier	Child's classifier		
		10	11	12
Knife (*meed*)	lem	an	taeng	taeng
Needle (*khem*)	lem	an	an	taeng
Candle (*tian*)	lem	engta	an	taeng
Book (*nungsu*)	lem	an	an	an
Pen (*pakka*)	dam	taeng	taeng	taeng
Ice cream cone (*itim-kon*)	taeng	taeng	taeng	taeng
Tree (*tonmai*)	ton	ton	ton	ton
Pole (*sao*)	ton	an	taeng	taeng

Table 27: The bilingual subject's use of classifiers for 'knife', 'needle', 'candle', 'book', 'pen', 'ice-cream cone', 'tree' and 'pole' during months 10-12.

Taeng was not the only classifier that the subject overextended by relying on shape; a few more classifiers should be mentioned here. During the last three months, *phun*, a classifier used with horizontal, cloth-like objects, was overextended to classify nouns on the list with flat shapes, like 'paper' (*kradad*), 'playing card' (*pai*), 'handkerchief' (*pa-ched-na*), 'rug' (*prom-ched-tao*), and 'towel' (*pa-ched-tua*). The subject also used *so*, not a classifier but a noun meaning 'chain', to classify nouns with similar shapes like 'necklace' (*soi*), 'rope' (*chuak*), and 'chain' (*so*).

Although the subject was inclined to use a single classifier with all nouns in the same category, she did not seem to apply the rule to classifiers that she had acquired in previous months. In the seventh month the subject had acquired two classifiers, *wi* and *an*, to use with nouns in the fruit category on the list. Details are listed below.

Nouns	Adult classifier	Child's classifier		
		10	11	12
Orange (*som*)	lug /phon	an	an	klom
Banana (*kluai*)	lug/bai	wi	wi	an
Bunch of grapes (*a-ngun*)	puang	an	phon	wi
Bunch of bananas (*kluai*)	wi	wi	wi	wi

Table 28: The bilingual subject's use of classifiers for nouns in the fruit category during months 10-12.

As we can see from the table, the classifiers used for nouns in the group were still developing. The subject had not yet acquired the classifier *puang* to use with multiple fruits in a bunch, so she used three different classifiers with 'bunch of grapes' (*a-ngun*) in these three months. The subject also used *klom*, an adjective meaning 'round', to classify 'orange' (*som*) in the twelfth month, another example showing how she related a noun to a shape-related word as its classifier.

The results from months 10-12 showed that the bilingual subject related a noun and its classifier in the same way as the monolingual subject had done in her earlier months. Apart from overextension and the use of the general classifier, which both subjects developed in the same order chronologically, there were some surprising errors that both subjects made in a similar way. In the tenth and twelfth months, the bilingual subject classified 'tooth' (*fun*) with *laem*, which is not a classifier but an adjective (meaning 'sharp'). This suggests that the subject was probably searching for a word which shared an important feature of 'tooth' (*fun*) to use as a classifier. Surprisingly, we found that the monolingual subject also used *laem* to classify 'tooth' (*fun*) in the fourth month. Moreover, in the twelfth month, the bilingual subject classified 'hat' (*muak*) with *klom*, which is also an adjective (meaning 'round'), just as the monolingual subject had done in the second month. These examples support the idea that the bilingual subject acquired classifiers in a similar way to the monolingual subject, although her development lagged behind by several months.

4.3 The bilingual subject in Thailand

The bilingual subject (TH)

Reviewing the data from the twelve sessions conducted with the bilingual subject, hereafter called the bilingual subject (UK), and the monolingual subject in Thailand, some differences between the modes of classifier acquisition of the two subjects can be clearly observed. One of the distinguishing features is that the bilingual subject seemed to acquire the classifiers significantly more slowly than the monolingual subject. Another difference is that at the beginning of the elicitation sessions the bilingual subject produced different kinds of errors from those made by the monolingual subject, although most of the errors were similar from the middle of the elicitation sessions until the end.

Because of the longitudinal nature of the research which followed the progress of only two subjects over a twelve-month period, the results cannot validate the hypothesis about the effects of bilingualism on classifier acquisition. Accordingly, at the end of the twelfth month I decided to carry out a short series of sessions with a bilingual child in Thailand in order to compare his acquisition with that of the bilingual subject (UK). As mentioned earlier, the results with regard to the latter subject were not completely satisfactory because it remained undetermined whether her pattern of classifier acquisition had occurred because of her lesser exposure to Thai, or because of the impact of her bilingualism. To investigate this issue, further sessions were conducted over a six-month period, testing a three-year-old bilingual child raised in Thailand, and employing the same methods used to test the bilingual subject (UK). It was hoped that the outcome of the sessions would show whether or not this child would acquire classifiers as slowly as the bilingual subject (UK). The results could also reveal how the child acquired classifiers, and whether he or she produced similar errors in chronological order. If the bilingual subject (TH) acquired classifiers slowly, following the same pattern and producing the same type of errors as the other bilingual, it would provide evidence that bilingualism has an impact on the way such children acquire classifiers, no matter what degree of exposure to Thai they have.

Results of the elicitation sessions with the bilingual subject in Thailand

The sessions with the bilingual subject (TH) started in January 2002 and lasted until June 2002. The sessions were carried out once a month for a total of six months. When we began testing, he was 3;1. In the pilot test, he recognised all seventy-two objects from the word list, although he named some of the objects in English rather than in Thai; it seemed, therefore, that he did not have any problem with the task provided. The methodology of the elicitation processes followed exactly what had been done with the two previous subjects. The seventy-two objects were represented by real objects and flash cards so as to elicit his responses as naturally as possible. The conversation during each experiment was tape-recorded and then transcribed.

4.3.1 The bilingual subject in Thailand: Months 1 – 3

Types of responses	Month		
	1	2	3
Silence/hesitation	47	15	0
Repeaters	25	56	32
General classifier	0	0	33
Referent-based	0	0	1
Arbitrary	0	0	0
Adult classifiers	0	1	6

Table 29: Types of responses of the bilingual subject in Thailand during months 1-3.

During the first month, most of the responses were in the form of silence or hesitation and repeaters. The subject responded with silences to 47 nouns and with repeaters to 25 nouns from the list. No other types of responses were given during the first month. The subject seemed to be uncertain and kept silent when asked to address classifiers. However, if the subject was asked the same questions a second time, he tended to change his reply from silence and hesitation to repeaters.

(3) (The experimenter showed a picture of three birds to the subject)

Adult: An-ni mee nok sarm.. a-rai-ka?
here have bird three what ?
'How many birds have we got here?'

Child: Sarm...(silent)

three....(silent)

Adult: Nok sarm a-rai-ka?
bird three what?
'Three....'

Child: Nok sarm nok
bird three bird
'Three birds birds'
(The subject used the repeater 'bird' as the classifier)

The second month showed no obvious changes from the first. The subject still responded with silences and repeaters to most of the nouns. However, there was a tendency to use silences less, and repeaters more frequently. Repeaters were used with 56 nouns while silences were used with only 15. The subject also began using his first classifier during this month. He used *kon* appropriately for the first time to classify 'child' (*dek*), but still used repeaters with other nouns in the human category like 'monk' (*pra*) and 'soldier' (*tahan*).

During the third month there were some obvious changes in the subject's responses. Repeaters and silences, which had been found in abundance during the first two months, decreased to 13 and none respectively. They were replaced by the classifier *tua*, which was used with almost every noun on the list, except 'child' (*dek*) and 'monk' (*pra*). The subject still classified 'child' (*dek*) with *kon* as he had in the second month, and used *tua* as a general classifier to classify every other noun.

According to the data, the subject acquired classifiers rather slowly, and it is clear that he started the experiment in a similar way to the bilingual subject (UK). However, although it seems that he did not acquire any classifiers in the first month, he still responded to most of the nouns with silences and repeaters. As discussed earlier, it is difficult to assess a child's use of silences. There are two possibilities with reference to the classifier task. Firstly, the child does not know that a classifier must follow a numeral: in this case, it can be said that the child has already acquired English syntax and therefore silences suggest interference from English syntax. Alternatively, the child has acquired the rule that something must follow a numeral, but does not yet acquire the lexical terms to go with the rule. In this case, the response indicates that the child has already acquired Thai syntax. In both cases, the response is likely to be silences.

In this subject's case, the child made some progress, recognizing after the first month that there should be a classifier after a numeral. Repeaters were used with 25 nouns in the first month, and 56 nouns in the second months, implying that he realised the need for a classifier in the noun phrase. Moreover, the use of 47 silences in the first month rapidly decreased to 15 in the second month, and by the third month they were no longer being used, replaced instead by the classifier *tua*.

The subject started using classifiers in the second month by classifying 'child' (*dek*) with *kon*. However, it was not certain that the subject recognised *kon* as a classifier denoting nouns in the human category, because he used *kon* to classify 'child' (*dek*), but not 'monk' (*pra*) or 'soldier' (*tahan*).

The evidence is more convincing, however, that the subject started to link the classifier *kon* with humans during the third month. According to the data, the subject used *kon* to classify 'child' (*dek*) and 'monk' (*pra*), probably because he realised that both are nouns in the same category (humans). Two classifiers were used by the subject in this month: *kon* and *tua*. Apart from 'child' (*dek*) and 'monk' (*pra*), every noun on the list was classified with *tua*. Interestingly, the subject tended to divide nouns into two categories: human and non-human. He used *kon* to classify nouns he seemed to recognise as denoting human beings. Otherwise, *tua* was applied. However, since there are three nouns on the list which are human, 'child' (*dek*), 'monk' (*pra*), and 'soldier' (*tahan*), it is still open to question why the subject classified 'soldier' (*tahan*), which is obviously human, with *tua*.

The abundant use of the classifier *tua* in the third month is also significant. As discussed earlier, although the subject may have recognised *kon* as a classifier for humans, it is questionable whether he also realised that *tua* is to be used with nouns in the animal category. As he repeatedly used *tua* with 70 nouns on the list, it seems more likely that he used it as a general classifier, not a specific classifier for nouns in particular groups. In fact, as mentioned before, it is possible that at this very early stage the subject tended to divide nouns into two categories, i.e. human and non-human, using *kon* and *tua* respectively as classifiers.

The sudden disuse of silences in the third month can be taken as evidence supporting the theory discussed earlier that the subject used these two strategies because he did not know which classifier to use. Once he acquired a classifier, he seemed to replace silences with the classifiers he acquired.

4.3.2 The bilingual subject in Thailand: Months 4 – 6

Types of responses	Month		
	4	5	6
Silence/hesitation	0	0	0
Repeaters	13	2	2
General classifier	45	47	50
Referent-based	4	12	10
Arbitrary	1	1	0
Adult classifiers	9	10	10

Table 30: Types of responses of the bilingual subject in Thailand during months 4-6.

The types of response changed during the fourth to sixth months in comparison with the first three months of the experiment. The use of repeaters dropped significantly, whereas the use of general classifiers increased dramatically. Thirteen repeaters were used during the fourth month; this number was reduced to two in the fifth and sixth months. The subject used general classifiers to classify 45 words in the fourth month, and this gradually increased to 47 and 50 during the fifth and sixth months respectively. The use of referent-based classifiers and adult classifiers also noticeably increased. The subject used nine adult-form classifiers during the fourth month, and added up to ten in the fifth and sixth months.

In the fourth month the subject acquired two new classifiers, *lug* and *lung*. He applied *lug* appropriately with single fruits such as 'orange' (*som*) and 'banana' (*kluai*), and used *lung*, the classifier used for 'things with a roof' to classify 'house' (*ban*). The subject started producing words of other lexical categories, e.g. adjectives and nouns, although it is not conventionally used in adult language, as a classifier. Details are listed below.

Head nouns	Adult classifier	Bilingual TH	Meaning
grape (*a-ngun*)	puang	ruam	group together (adj.)
bananas (*kluai*)	wi	ruam	group together (adj.)
keys (*khun jae*)	puang	ruam	group together (adj.)

Table 31: The bilingual subject (TH)'s use of *ruam* during months 4-6.

Ruam, an adjective meaning 'grouped together', was applied as the classifier for three nouns on the list sharing similar properties. The data suggest that the subject was already aware that a classifier usually reflects in some way the semantic properties of a head noun, although he was still in an early stage of classifier acquisition.

One striking difference between the data from the third and the fourth months concerns the number of repeaters used. The subject used 32 repeaters during the third month, but used only 13 during the fourth. Repeaters were randomly used with nouns in different categories, for example 'hat' (*muak*), 'plate' (*jan*), 'bowl' (*tuai*), 'milk' (*nom*), 'star' (*dao*), 'stamp' (*stamp*), 'cloud' (*meg*), 'boat' (*rua*), 'bicycle' (*rod-jakkayan*), 'car' (*rod-yon*), 'tree' (*ton-mai*), 'necklace' (*sai-soi*), 'road' (*thanon*) and 'telephone' (*torasap*).

While the subject's use of repeaters fell, his use of the general classifier in the fourth month increased. He used *an* to classify 45 nouns on the list, as compared to 33 nouns during the third month. *An* was applied randomly to objects of different shapes and in different categories.

During the fifth month, the number of adult-form classifiers used increased to ten while repeaters were used with only two nouns. The number of referent-based classifiers (which are not necessarily the adult-form classifiers but somehow reflect the semantic properties of the head nouns) also increased. Apart from *kon*, *tua*, and *lug* which had been used previously, the subject also used *lam* appropriately to classify nouns in the vehicle category, 'boat' (*rua*) and 'car' (*rod-yon*). However, he also overextended *lam* to other nouns on the list which belong to the same category, as shown below.

Head nouns	**Adult classifier**	**Meaning**	**Bilingual subject (TH)**	**Meaning**
Boat (*rua*)	lam	vehicle (flying, floating)	lam	vehicle (flying, floating)
Bicycle (*rod-jakkayan*)	khan	vehicle (driving, riding)	lam	vehicle (flying, floating)
Car (*rod-yon*)	khan	vehicle (driving, riding)	lam	vehicle (flying, floating)
Airplane (*kruang-bin*)	lam	vehicle (flying, floating)	lam	vehicle (flying, floating)

Table 32: The bilingual subject (TH)'s overextension of *lam* during months 4-6.

The overextension suggests that the subject set the rule that every noun in the vehicle category should be classified with *lam*, just as he classified every noun in the human category and the animal category with *kon* and *tua* respectively.

In this month the subject did not use *ruam* to classify 'grapes' (*angun*), and 'bananas' (*kluai*) as he had done during the previous month. However, he still used *ruam* to classify 'keys' (*khunjae*) and 'spoon and fork' (*chon-som*), probably thinking that *ruam* somehow reflected the head noun's property of being grouped together. The subject also used *klom*, an adjective meaning 'round', to classify 'hat' (*muak*) and 'plate' (*jan*).

In the sixth month, although the number of adult form classifiers used was still unchanged from the previous month, the subject acquired three new adult classifiers: *puang*, *kuad* and *taeng*. He appropriately used *kuad* to classify '7-up' (*seven-up*) and used *taeng* to classify 'ice-cream cone' (*itim-kon*). However, the data suggest that he overextended *taeng* to classify most nouns on the list with long, tall, upright properties, as shown below.

Head nouns	**Adult classifier**	**Bilingual subject (TH)**	**Meaning**
Knife (*miid*)	lem	taeng	long, tall, upright
Needle (*khem*)	lem	taeng	long, tall, upright
Candle (*tian*)	lem	taeng	long, tall, upright
Tree (*ton-mai*)	ton	taeng	long, tall, upright
Pole (*sao*)	ton	taeng	long, tall, upright
Toothpaste (*ya-si-fun*)	lod	taeng	long, tall, upright
Arrow (*luktanu*)	dok	taeng	long, tall, upright

Table 33: The bilingual subject (TH)'s overextension of *taeng* during months 4-6.

Similarly, *puang* was overextended to most nouns in the fruit category during the sixth month. The subject used *puang* to classify 'banana' (*kluai*), 'grapes' (*a-ngun*) and 'bananas' (*kluai*), but he consistently used *lug* to classify 'orange' (*som*) as he had done since the fourth month. The subject still used *ruam* to classify 'keys' (*khunjae*) during this month. The use of *an* as a general classifier rose to its peak in the sixth month. The subject classified 50 nouns on the list with *an*, and repeaters were used only twice.

Although the elicitation sessions with the bilingual subject in Thailand were conducted over a shorter period of time, we can nonetheless recognise differences and similarities in classifier acquisition in these early stages among the three subjects, especially between the two bilingual children.

In conclusion, results from elicitation sessions with each subject have been discussed individually in order to see the whole picture of their classifier acquisition processes. In the next part of this research, discussion will be made based on the comparison among the three subjects with matched MLU levels. It is hoped that the knowledge we gather from the comparison will help us show the effect of bilingualism on classifier acquisition in children.

4.4 Discussion

In this section, a comparison will be based on each subject's MLU scores measured at the beginning of the elicitation sessions. As stated in the previous chapter, comparing the grammatical development of children of the same chronological age cannot be considered valid because the speech of children at the same age may show different levels of grammatical complexity. Therefore, MLU is introduced as an index of a child's development in acquiring language because almost every new kind of knowledge increases the length of an utterance. Two children with matching MLU are more likely to be at the same level of constructional complexity than are two children of the same chronological age.

According to results of MLU tests presented in section 3.1 of the previous chapter, the monolingual subject's MLU at the age of 3;4 was 3.93, while those of the bilingual subject (UK) and the bilingual subject (TH) were 3.16 and 3.21 respectively at the same age. Therefore, comparison of the elicitation sessions could not begin from the month when all three subjects were 3;4 since the monolingual subject's MLU score was higher than those of the two bilingual subjects, indicating that her grammatical development was more advanced. The MLU tests were then continued in the following months for both bilingual subjects in order to find the point where both of them reached an MLU level comparable to that of the monolingual subject. It was in the fifth month of the elicitation sessions, when the bilingual subject (UK) was at the age of 3;6, that her MLU score increased to 3.90; and in the sixth month of the bilingual subject (TH)'s elicitation sessions, when he also was at the age of 3;6 his MLU score reached 3.99.

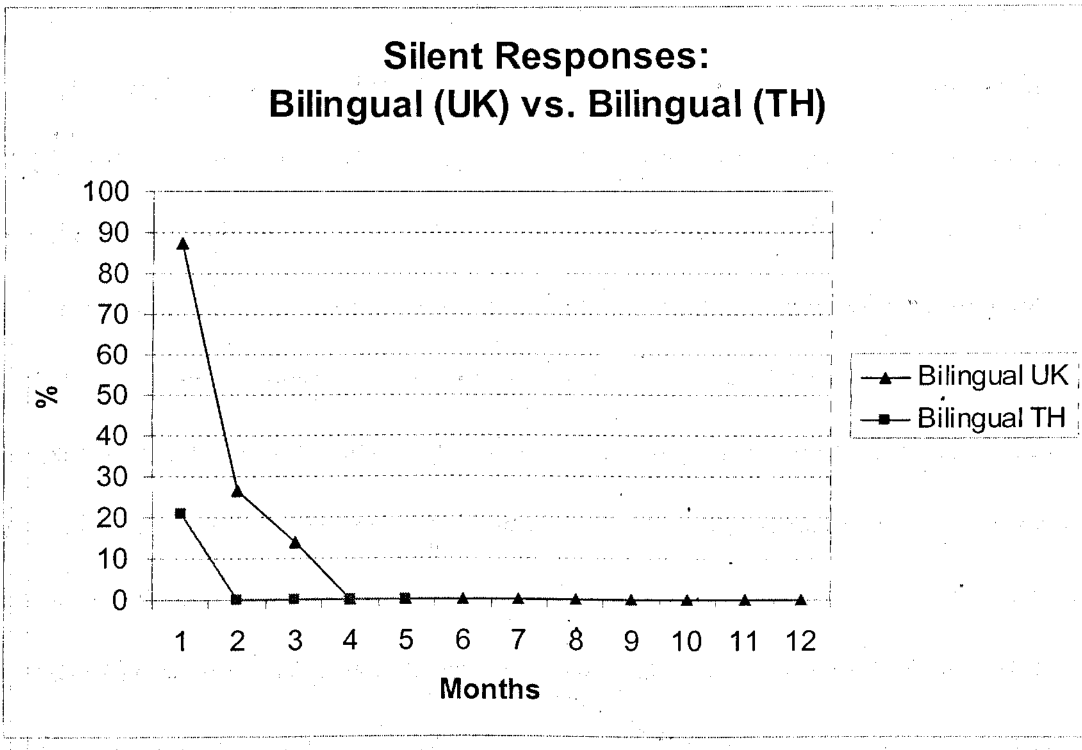
Thus it was found that the three subjects were at the same grammatical level at different chronological ages: the monolingual subject at the age of 3;4, and the two bilingual subjects at the age of 3;6. Since the elicitation sessions on the bilingual subject (TH) was conducted from when the child was 3;1 until he reached 3;6, comparison cannot be made between him and the monolingual subject. However, the comparison between the two bilingual subjects will be discussed at length because both of them were found to have had the same level of MLU from the beginning of the elicitation sessions, when they were 3;2, until they reached 3;6. It will also be interesting to explore if they acquire classifiers differently because of the different amounts of language input (Thai) they received.

This section will therefore be divided into two parts on the basis of MLU matching. The first part discusses the results of the elicitation sessions that was designed to measure the Thai classifier acquisition of the two bilingual subjects from when both of them were 3;2, with generally equal MLU, until they reached 3;6; a total of five months. The second part of the discussion will be based on the comparison of the monolingual subject from the age of 3;4 until the age of 3;11 with the bilingual subject (UK) from the age of 3;6 until the age of 4;1, a total of eight months.

4.4.1 Comparison: the bilingual subject (UK) vs. the bilingual subject (TH).

Generally, six types of responses were used by each subject during the elicitation sessions: silent responses, repeaters, general classifiers, referent-based morphemes, arbitrary morphemes and finally, adult classifiers. In this section, comparison will be made between the two subjects according to the types of errors they produced during the course of the elicitation sessions.

4.4.1.1 Silent responses: The bilingual subject (UK) vs. The bilingual subject (TH)

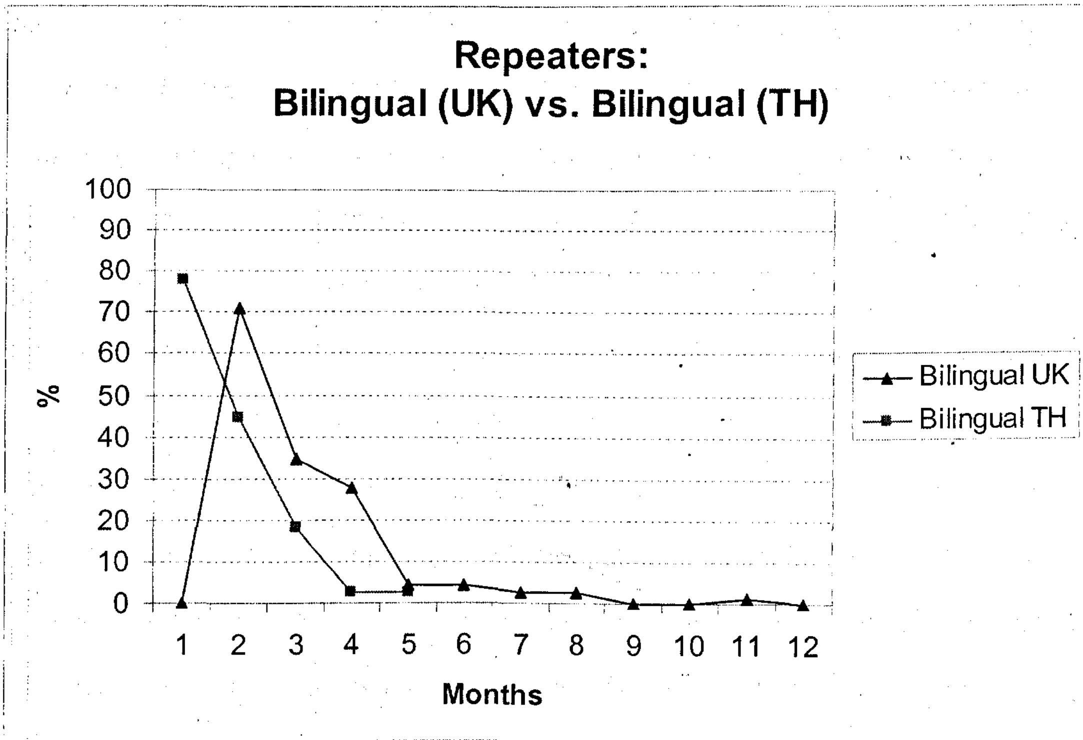


Graph 2: Silent responses of the bilingual subject (UK) and the bilingual subject (TH).

From the plotted graph, it is evident that at the age of 3;2 with approximately equal MLU, both bilingual subjects produced silent responses but at different rates. The bilingual subject (UK) used silence to respond to the task more frequently than the bilingual subject (TH) when they were 3;2: 87.5% of the bilingual subject (UK)'s responses were silent, compared to 20.8% of the responses made by the bilingual subject (TH). The large gap between the two subjects could be explained in terms of the frequency of input. The bilingual subject (TH) most likely received more input in Thai, in comparison to her counterpart in the UK. Thai was used as her main language at school and at home, while it was not used as much for the bilingual subject (UK). This supports the assumption that the lesser degree of exposure to Thai would be likely to delay the process of classifier acquisition in the bilingual subject (UK), and as the graph shows, the bilingual subject (TH) produced far fewer silent responses. However, it can also be argued that the large gap in silent responses during the first month when both of the subjects were 3;2 happened simply because of the difference in methodologies used. When the first experiment on the bilingual subject (UK) was run when she was 3;2, only flash cards were used as materials to elicit responses from the subject. This proved tiresome and boring to the child, who quickly lost concentration during the task. So it is possible that the bilingual subject (UK)'s high percentage of silent responses was produced because of her lack of interest in the task. Consequently the researcher changed the methods of elicitation in the following months. As well as flashcards, real small objects, puppets, and picture books were used in order to maintain the concentration of the child. For the bilingual subject (TH), on the other hand, real small objects, puppets, picture books and flash cards were used as the materials of elicitation from the onset of his elicitation sessions, and this may be why he did not produce as many silent responses as his counterpart.

However, as the graph shows, both bilingual subjects' use of silent responses declined rapidly. The bilingual subject (UK) stopped producing silent responses when she was 3;5, and the bilingual subject (TH) stopped using silence when he was 3;3. After the silent responses ceased, this type of error never re-occurred in either subject's responses to the end of the elicitation sessions.

4.4.1.2 Repeaters: The bilingual subject (UK) vs. The bilingual subject (TH)

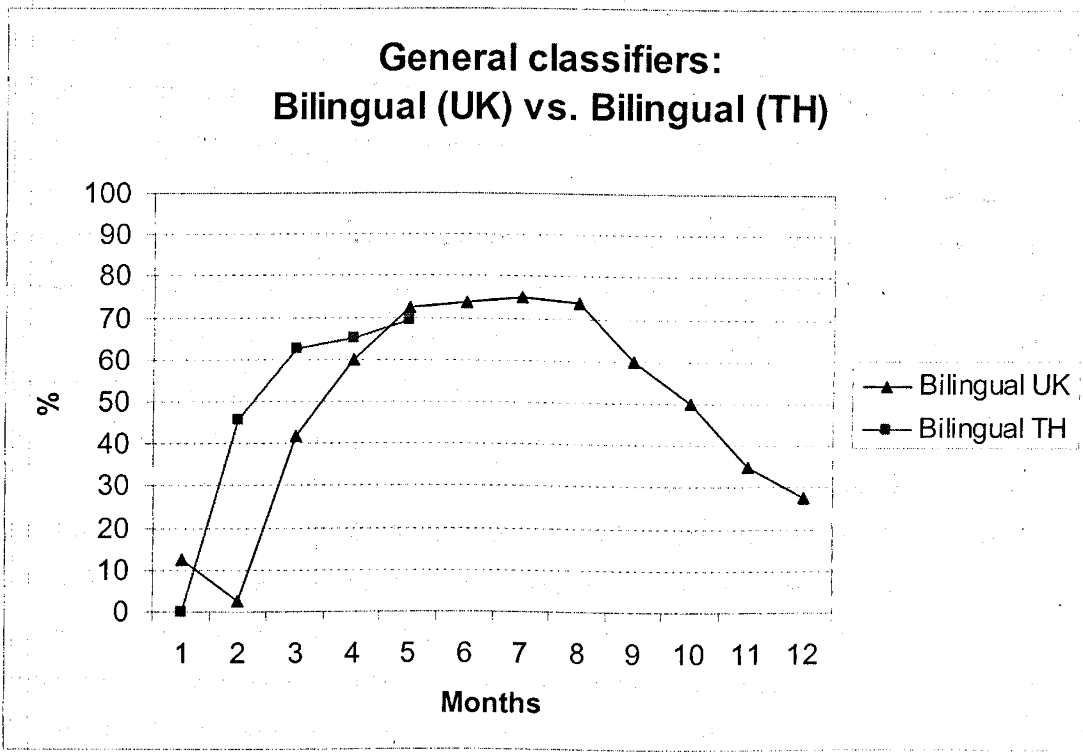


Graph 3: Repeaters used by the bilingual subject (UK) and the bilingual subject (TH).

The use of repeaters (including numeral repeaters) in both bilingual subjects is generally similar, although in the first month when both of them were 3;2, a considerable difference can be seen: the bilingual subject (UK) responded to the task without using any repeaters (0%) while the bilingual subject (TH) used a high proportion of repeaters (77%). The difference can be attributed to the fact that the majority of responses of the bilingual subject (UK) when she was 3;2 were silences. Her use of repeaters dramatically increased to 70.8% when she was 3;3 and then steadily declined to almost 0% over the following three months. The bilingual subject (TH)'s use of repeaters also declined steadily, though consistently one month ahead of the UK subject, and he stopped using repeaters completely when he was 3;5.

There is a similarity in the use of silences and repeaters by both bilingual subjects. Although these types of errors appeared frequently in the first two months, they did not continue or seem to influence either subject in the following months. It is suggested that these errors occurred temporarily during the period when the subjects were trying to acquire their first classifier, and disappeared once the subjects started using classifiers.

4.4.1.3 General classifiers: The bilingual subject (UK) vs. the bilingual subject (TH)

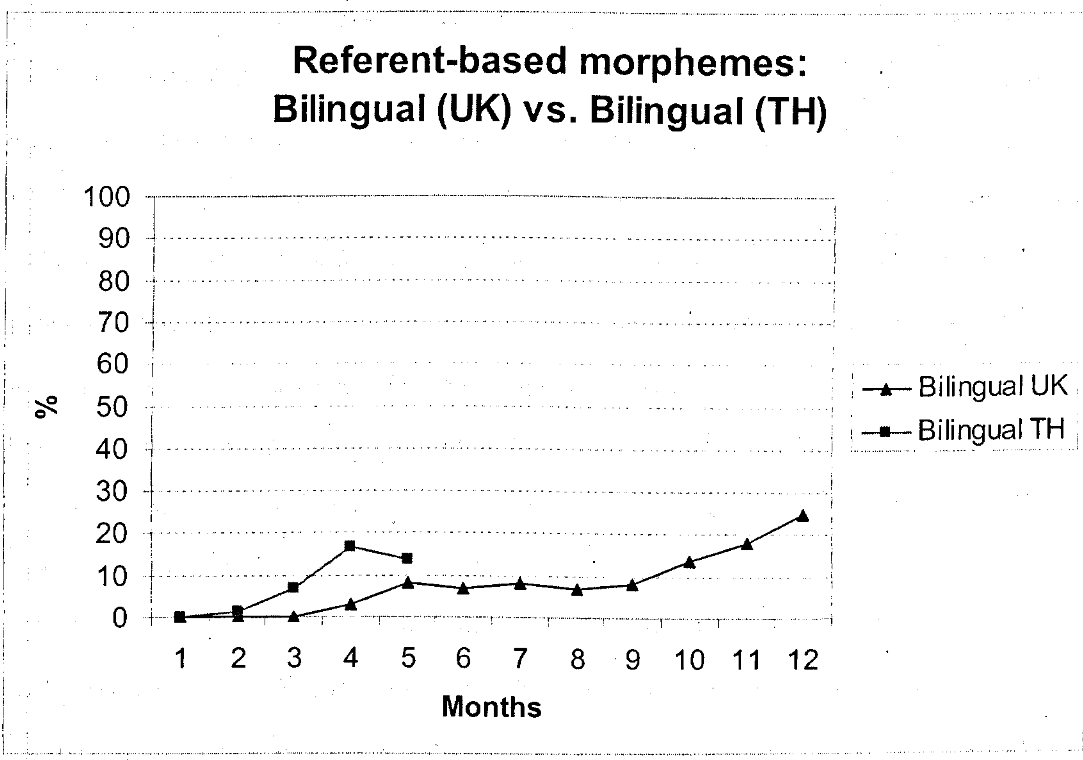


Graph 4: General classifiers used by the bilingual subject (UK) and the bilingual subject (TH).

The use of general classifiers by both bilingual subjects follows a similar pattern. There was little use of the general classifiers at first, but their use steadily increased during the following months. The bilingual subject (UK) used *tua* as a general classifier when she was 3;2 to classify seven nouns from the list: 'child' (*dek*), 'priest' (*pra*), 'soldier' (*tahan*), 'spoon and fork' (*chon-som*), 'plate' (*jan*), 'boat' (*rua*), and 'car' (*rod-yon*). The classifier *tua* is considered the general classifier in this month because the subject used it as a sole classifier, all her other responses being silent responses. Does her use of *tua* indicate that she could congregate nouns with similar properties and use a single classifier to classify them, or was this merely a coincidence? Although the classifier *tua* is not a proper classifier for nouns in the human category, using this classifier to discriminate certain nouns from others could suggest an early realization of noun categorisation. However, we cannot be sure whether the child used the classifier *tua* randomly or purposefully. Obviously 'child' (*dek*), 'priest' (*pra*) and 'soldier' (*tahan*) are nouns which share the same property (all are human), while 'boat' (*rua*) and 'car' (*car*) also share a similarity (both are means of transport). But 'spoon and fork' (*chon-som*) and 'plate' (*jan*) have no connection to human beings or transport so it appears they were associated randomly with *tua*. The use of *tua* as a general classifier was also found extensively in the following month when the subject was 3;4.

The bilingual subject (TH) also used *tua* as his first general classifier. When he was 3;3, the subject applied *tua* as a sole classifier to 33 nouns in different categories from the list, including nouns in the animal category. However, as in the case of his counterpart, the use of *tua* at this point could not be confirmed as indicating his discrimination between animate and inanimate because he also applied *tua* to a number of inanimate nouns in various categories. Both bilingual subjects changed their general classifier from *tua* to *an* in the following months. When the subjects reached the age of 3;5, *tua* was no longer their preferred general classifier; *an* was overwhelmingly used instead. The plotted graph shows that the trends of general classifier use of both bilingual subjects were quite similar: use of general classifiers rapidly increased until the subjects were 3;6. Unfortunately I did not obtain further elicitation data from the bilingual subject (TH) so we could not make a further comparison, but it is likely that the trend of his general classifier usage would have been similar to the bilingual subject (UK). As the graph shows, the general classifier responses of the bilingual subject (UK) remained steady at a very similar level for three months, and gradually and steadily decreasing after month eight when she was 3;10. During these last months the general classifiers were replaced by other types of responses such as referent-based morphemes and adult classifiers.

4.4.1.4 Referent-based classifiers: The bilingual subject (UK) vs. The bilingual subject (TH)



Graph 5: Referent-based morphemes used as classifiers by the bilingual subject (UK) and the bilingual subject (TH).

The trends of both bilingual subjects' referent-based morpheme responses are again generally similar. Neither subject had used referent-based morphemes as classifiers in the first month, when they were 3;2. The bilingual subject (TH) appeared to be the first to capture the semantic relationship between a head noun and a classifier as early as the age of 3;3, when he used *kon* to classify 'priest' (*pra*). Normally the classifier *kon* is used to classify nouns in the human category in general, except a few which are honorific and carry high social status such as 'priest', which is classified with *ong*. The bilingual subject (TH) overextended the classifier for nouns in the human category, using it with 'priest' (*pra*), probably because he understandably categorised 'priest' (*pra*) with other nouns in the human category such as 'child' (*dek*) and 'soldier' (*tahan*), and so the classifier *kon* was applied to all of them. The subject continuously classified 'priest' (*pra*) with the classifier *kon* until the last month of his elicitation sessions, when he reached the age of 3;6.

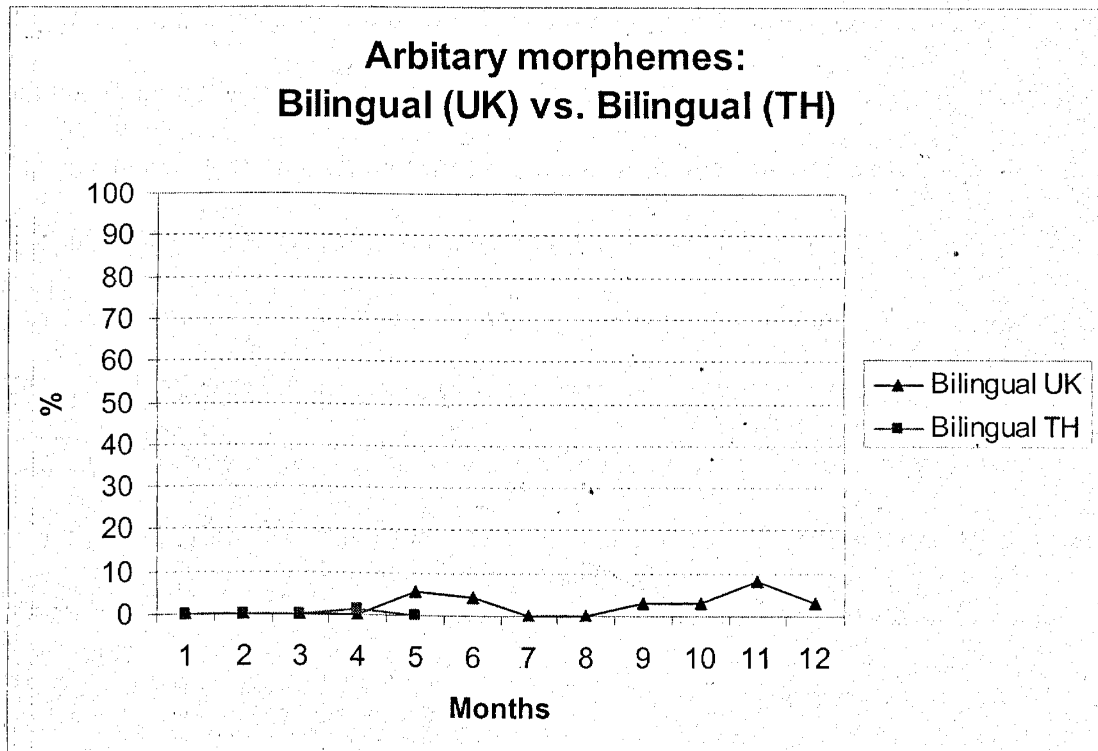
His use of *kon* to classify 'priest' (*pra*) is not surprising. *Ong* is a difficult classifier because cultural knowledge and experience is needed in order to use it correctly. It is therefore to be expected that children will acquire this classifier relatively late in their classifier system development. The data from all three subjects show that none of them was able to use the classifier *ong* appropriately with 'priest' (*pra*) until the final month of the elicitation sessions.

The bilingual subject (UK), on the other hand, made her first attempt to link head nouns with referent-based classifiers when she was 3;5. The subject used *tua*, the classifier for nouns in the animal category, to classify all animate nouns including 'priest' (*pra*) and 'soldier' (*tahan*). She continued to do so in the following month, and began to classify 'priest' (*pra*) with the classifier *kon* when she was 3;7. Thus the subject differentiated animate nouns from inanimate nouns, and used *tua* to classify all animate nouns except 'child' (*dek*), which she appropriately classified with *kon*, the classifier for human beings.

Therefore it seems that both bilingual subjects were conscious of noun categorisation at an early stage. This finding is consistent with Clark's (1977) assumption that humans are born into the world with a predisposition to organise information in certain ways. Interestingly, the first nouns both of them tried to classify were nouns in the human category. Although they did not classify them with their appropriate classifiers, they were at least able to recognise that a classifier should be used with a noun, rather than responding with silence or hesitations and repeaters as they had done previously. The categorisation of human vs. non-human at the early stage of the classifier acquisition process in children is consistent with previous findings by Tuaycharoen (1984), Gandour *et al* (1984) and Carpenter (1987) that humanness and animalness are the very first categories of nouns which children are aware of, and are able to make the classification.

It is noteworthy that both bilingual subjects used as classifiers morphemes whose meaning was related to that of the head nouns to a greater extent as they got older. The use of referent-based classifiers indicates that the subjects were aware from an early stage that the classifiers should somehow embody certain characteristics of the head nouns. The linguistic categories conceptualised by the subjects will be explored and discussed in detail in Chapter 6. As the graph shows, the percentage of referent-based morphemes used by both bilingual subjects increased steadily but slowly until the end of the elicitation sessions.

4.4.1.5 Arbitrary morphemes used as classifiers: The bilingual subject (UK) vs. the bilingual subject (TH)



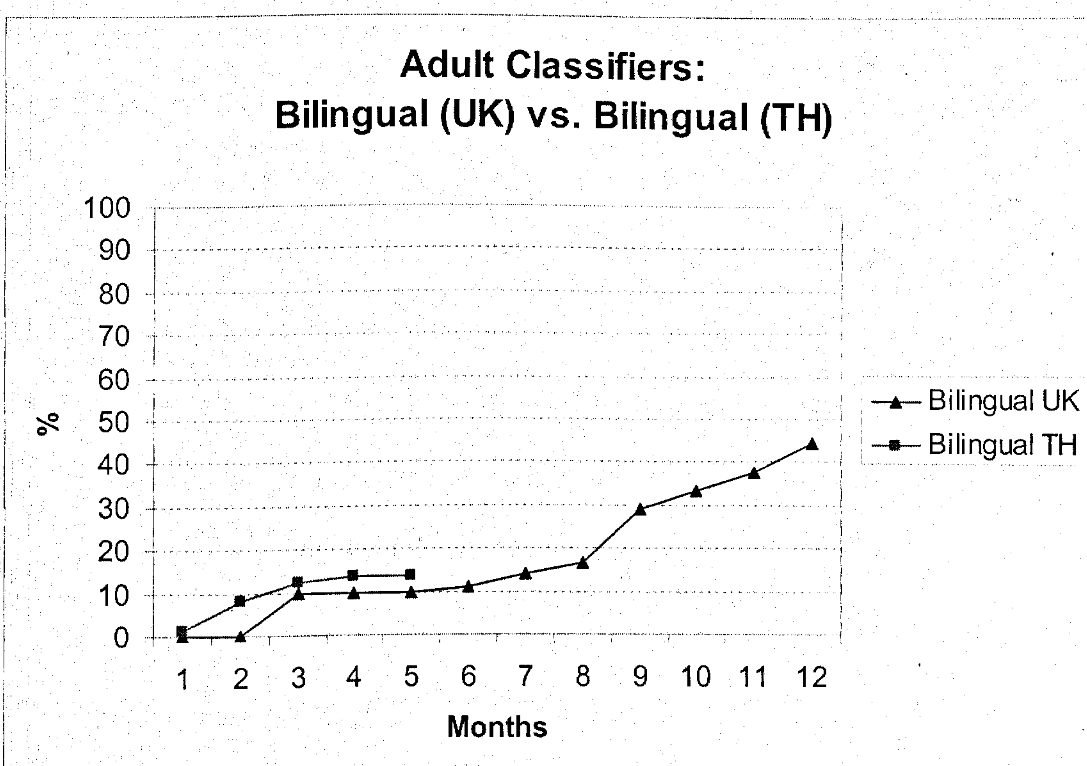
Graph 6: Arbitrary morphemes used as classifiers by the bilingual subject (UK) and the bilingual subject (TH)

There was little use of arbitrary morphemes as classifiers by either bilingual subject during the elicitation sessions. The 'arbitrary' classifiers are meaningless morphemes which have no connection with the head nouns. It is difficult to explain why the subjects picked up these morphemes to use with some nouns on some occasions. They may have been slips of the tongue, or meaningless morphemes created by the subjects on the basis of some individual categorisation that connected them with the head nouns; but they made no sense to adult ears.

For example, the bilingual subject (UK) used *nga* (a morpheme, meaning ivory tusk) to classify '*muak*' (hat) when she was 3;6 and used *ka* (a meaningless morpheme) to classify '*tent*' (tent) when she was 3;10. The bilingual subject (TH) used *lee* (a meaningless morpheme) to classify '*mek*' (cloud) at the age of 3;5. It occurred to the researcher that the morpheme *lee* he uttered might have been a contraction of '*sum-lee*' (a noun, meaning 'white cotton') because there is an obvious similarity between 'cloud' and 'white cotton' in terms of their soft appearance and whiteness. However, this assumption could not be confirmed because the subject never repeated the morpheme *lee* as the classifier for the noun '*mek*' (cloud) again.

The use of arbitrary morphemes as classifiers conforms to no recognizable pattern; so there is no way of predicting how and when they are going to appear. However, it is noticeable from the graph that the bilingual subject (UK) responded to the task with arbitrary classifiers slightly more often than did the bilingual subject (TH).

4.4.1.6 Adult classifiers:The bilingual subject UK vs.The bilingual subject TH



Graph 7: Adult classifiers used by the bilingual subject (UK) and the bilingual subject (TH)

The trends of adult classifier usage in both bilingual subjects are very similar. Neither bilingual subject used adult classifiers when they were 3;2 but acquired them slowly and gradually in the following months. The bilingual subject (TH) appeared to acquire a few more adult classifiers than his counterpart in the second month. At the age of 3;5, the bilingual subject (TH) appropriately used adult classifiers in 13.9% of his utterances compared to 9.7% used by the bilingual subject (UK). There was no increase in the following month for either subject and the percentage remained the same when both of them were 3;6, which was the last month for which we have elicitation data on the bilingual subject (TH).

However, the graph shows that the use of adult classifiers by the bilingual subject (UK) increased steadily after the age of 3;6. The percentage of adult classifiers used by the subject leaped to 29.2% when she was 3;10 and continued to rise rapidly during the following months. By the age of 4;1 when I collected the elicitation data from the subject for the last session, her adult classifier use had increased to 44.4%.

There is no doubt that the first adult classifiers the bilingual subjects acquired were classifiers for nouns in the animate category. *Kon* and *tua* were acquired during the first few months of the elicitation sessions. The bilingual subject (UK) acquired *tua* and used it with all animate nouns when she was 3;4, while the bilingual subject (TH) acquired *kon* and used it to classify 'child' (*dek*) when he was 3;3.

The next type of adult classifier the subjects appeared to acquire during the course of the elicitation sessions was those having strong connections with head nouns. The connections between the two were either taxonomic or shape-related. The bilingual subject (UK), for instance, learned that nouns in the taxonomic category of 'fruits' should be classified with *wi* when she was 3;6. *Wi* is appropriately used with only one noun from the list, 'bananas' (*kluai*), but the subject's use of *wi* indicates that she had already learned that head nouns are related to their classifiers. The bilingual subject (TH), at the age of 3;5, appeared to bring nouns in the vehicle category together and used *lam* to classify all of them. This, too, is not completely appropriate to adult ears, but it signifies that the subject was in the process of classifier acquisition.

The classifiers denoting the shape of head nouns were also easily acquired by the bilingual subjects. It is apparent that *taeng*, the classifier denoting a tall, solid shape, *wong*, the classifier denoting round objects and *paen*, the classifier denoting a flat shape were acquired by both subjects as early as the age of 3;5. This shows that perceptual properties are important factors in assisting children to learn the classifier system.

Findings from this study are consistent with the previous research by Gandour *et al* (1984) and Carpenter (1987) which found that the most difficult classifiers are those whose proper use requires learned cultural knowledge and some experience of the world. Classifiers such as *ong* and *pra-ong* which indicate social rank proved to be too difficult for three year-old bilingual children. It can be noticed that the amount of input does not affect the acquisition of classifiers at this point, since both bilingual children who received different degrees of input are equally unaware of some difficult classifiers, such as *ong* and *pra-ong*.

4.4.2 Comparison: the monolingual subject vs. the bilingual subject (UK).

It is evident that our two bilingual subjects displayed similar trends in acquiring classifiers despite their differing amounts of exposure to the Thai language. In this section, the acquisition of Thai classifiers by the monolingual subject and one bilingual subject will be compared in order to determine if a bilingual child and a monolingual child acquire noun classes in a different sequence or a different time-scale. According to the MLU tests, the bilingual subjects on average reached the level of the monolingual subject at the age of 3;4 when both of them were 3;6. The monolingual subject at the chronological age of 3;4 was 3.93 while the MLU of the bilingual subject (UK) and the bilingual subject (TH)'s MLU at the chronological age of 3;6 were 3.91 and 3.99 respectively. Therefore it was more appropriate to start the comparison of the subjects' Thai classifier acquisition from the point where their MLU scores were parallel, as they were then likely to have a generally similar level of grammatical knowledge, rather than to make a comparison based on their chronological ages. However, the gathering of elicitation data for the bilingual subject (TH) ceased when the child reached 3;6, as the elicitation sessions were conducted for a six-month period to observe if the bilingual subjects developed similar trends in acquiring classifiers despite the difference in language exposure. Therefore, a comparison beyond this point will be made only between the monolingual subject and the bilingual subject (UK) covering a period of eight months. On the basis of the MLU results, the first month for the bilingual subject (UK) in the following graphs was counted when she was 3;6, and so the eighth month indicates her reaching the chronological age of 4;1; the first month on the graph for the monolingual subject was counted when she was 3;4, and so she was 3;11 in the eighth month.

4.4.2.1 Silent responses: The monolingual subject vs. the bilingual subject (UK)

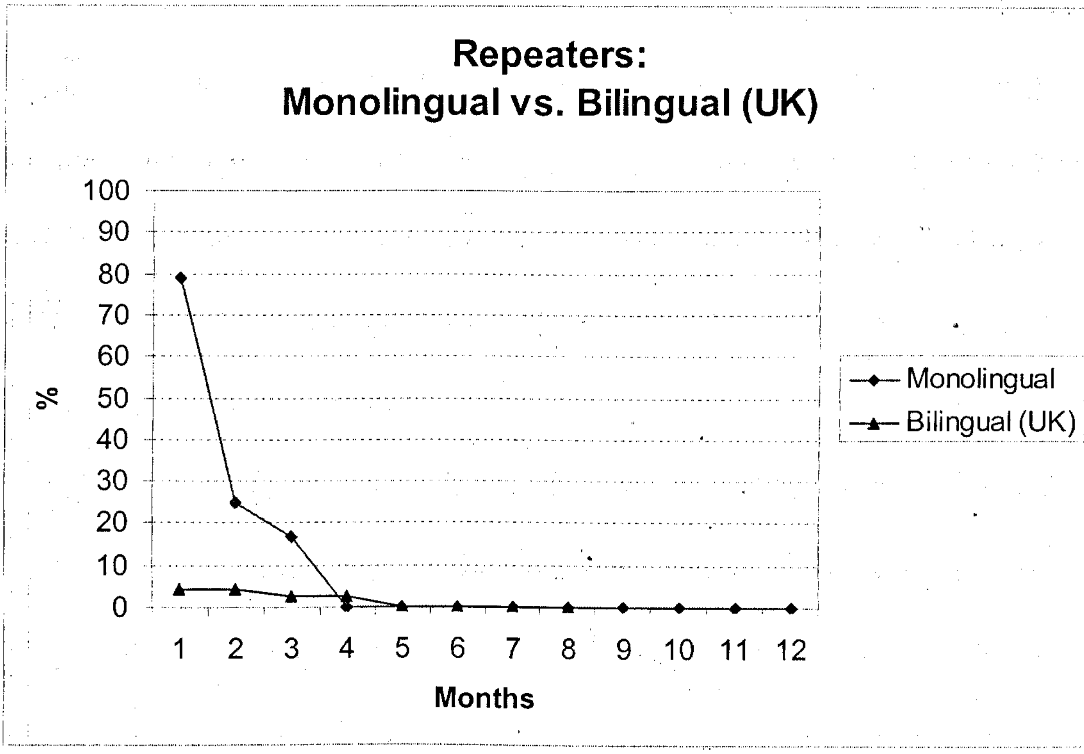
During the period of comparison between these two subjects, it is clear that neither produced any silent responses. Earlier in her elicitation sessions, it was noticeable that the bilingual subject (UK) used silent responses profusely when she was 3;2 but these gradually declined during the two following months, until none was observed after she reached 3;5. According to the comparison between two bilinguals in the previous section, silence was also observed as an early response of the bilingual subject (TH) during his first few months of the elicitation sessions. It may therefore be concluded that silence is the first response of bilingual children acquiring the Thai classifier system, but it would be interesting to determine if monolingual children also go through the same phase as bilinguals. Since our elicitation sessions began when the monolingual subject was 3;4, with an MLU score matching those of the bilingual subjects at the age of 3;6, it is possible that the monolingual subject might have gone through the silent response phase when she was younger. Unfortunately, since the first experiment on the monolingual subject did not until she was 3;2 no data are available from the current present study to support this assumption.

However, a conclusion about silent responses in young monolingual children can be drawn from previous studies of classifier acquisition in young children. Tuaycharoen (1984), in her longitudinal study, states that silence is the first response of all children attempting to use classifiers. According to Tuaycharoen's study, silent responses were observed in one of her subjects when the child was just two years old. Although her conclusion is debatable because she did not continue collecting data of her subject using recorded tape after this point, and there was a large gap of six months before she started using written records again when the child was 2;6, it is worth pointing out that young monolingual children may produce silent responses when they begin to develop their classifier system, even though the phenomenon may occur only briefly.

The results of Carpenter's (1987) study, however, do not support Tuaycharoen's assumption. According to Carpenter, none of her subjects whose ages ranged from 2 to 11 produced silence in place of classifiers. The first response of her subjects in acquiring the classifier system was an across-the-board usage of a single classifier in all post-numeral positions, regardless of head nouns, and this type of response was first observed when the youngest children, who were all monolingual, were 2;8 years old.

Therefore, it is still uncertain whether silent responses were used exclusively by the bilingual children as their earliest stage of classifier acquisition. The classifier acquisition of monolingual children aged below three years will be left for further research, in order to determine whether silent responses are made by monolingual children when attempting to use classifiers.

4.4.2.2 Repeaters: The monolingual subject vs. the bilingual subject (UK)

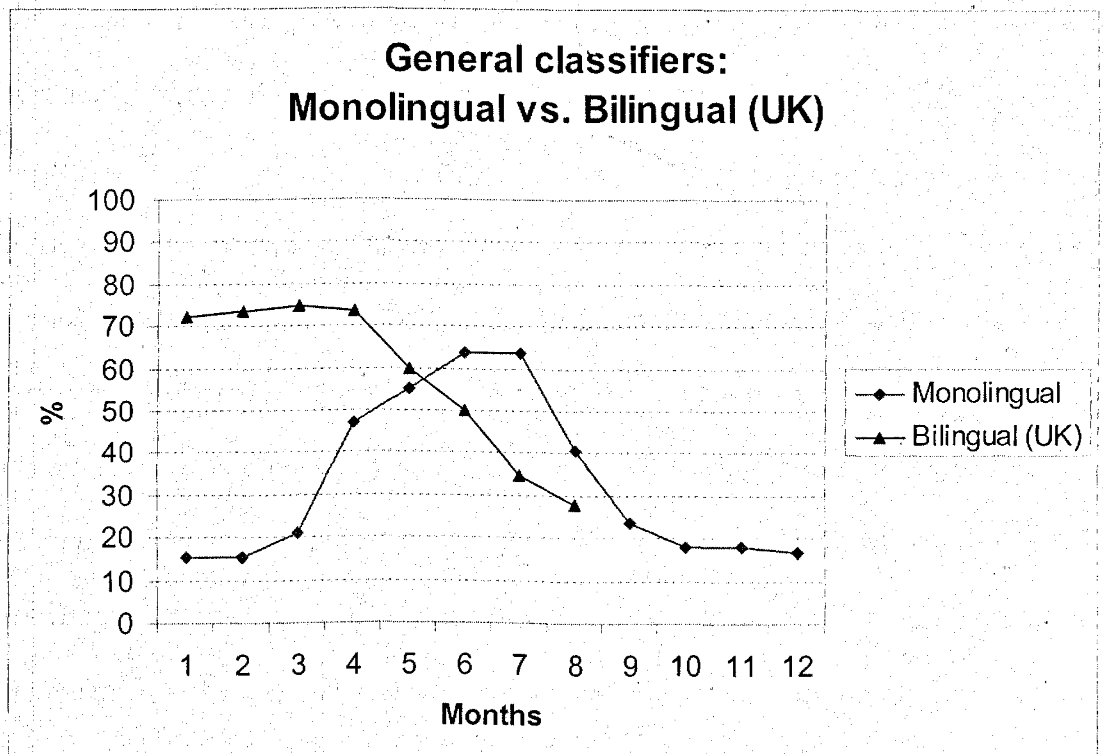


Graph 8: Repeaters used by the monolingual subject and the bilingual subject (UK).

The first three months shown on the graph indicate a considerable difference between the two subjects. In the first month, with about the same MLU, the responses of the monolingual subject (3;4) contained 79.2% repeaters whereas those of the bilingual subject UK (3;6) contained only 4.2%. The monolingual subject still used repeaters in the two following months but the percentage declined a great deal, falling from 79.2% in the first month to 25% and 16.7% in the following two months. The use of repeaters disappeared completely when she reached the age of 3;7.

The bilingual subject (UK), on the other hand, made little use of repeaters during the first four months and stopped using them completely when she was 3;10. Although there seems to be a great discrepancy between the two subjects here, the explanation is that each subject opted for different techniques in acquiring classifiers, and that each subject may develop different a time-scale in the processes of their classifier acquisition. Moreover, the bilingual subject (UK) had gone through the phase of applying repeaters extensively a few months earlier, when she was at the chronological age of 3;3-3;6, and similarly to her counterpart, her use of repeaters declined gradually, to be replaced by other types of response.

4.4.2.3 General classifiers: The monolingual vs.The bilingual subject (UK)



Graph 9: General classifiers used by the monolingual subject and the bilingual subject (UK).

Here again differences can be seen regarding the use of general classifier responses. The responses of the monolingual subject (3;4) contained 15.3% of general classifiers for the first two months. The use of general classifiers rose dramatically to 47.2% in the fourth month when she was 3;6 and continued to increase until it reached its peak at 63.9% when she was 3;9-3;10, and then gradually declined, being replaced by other types of response. By the end of her elicitation sessions (4;3), the percentage of general classifiers used by the subject had decreased to 16.7%.

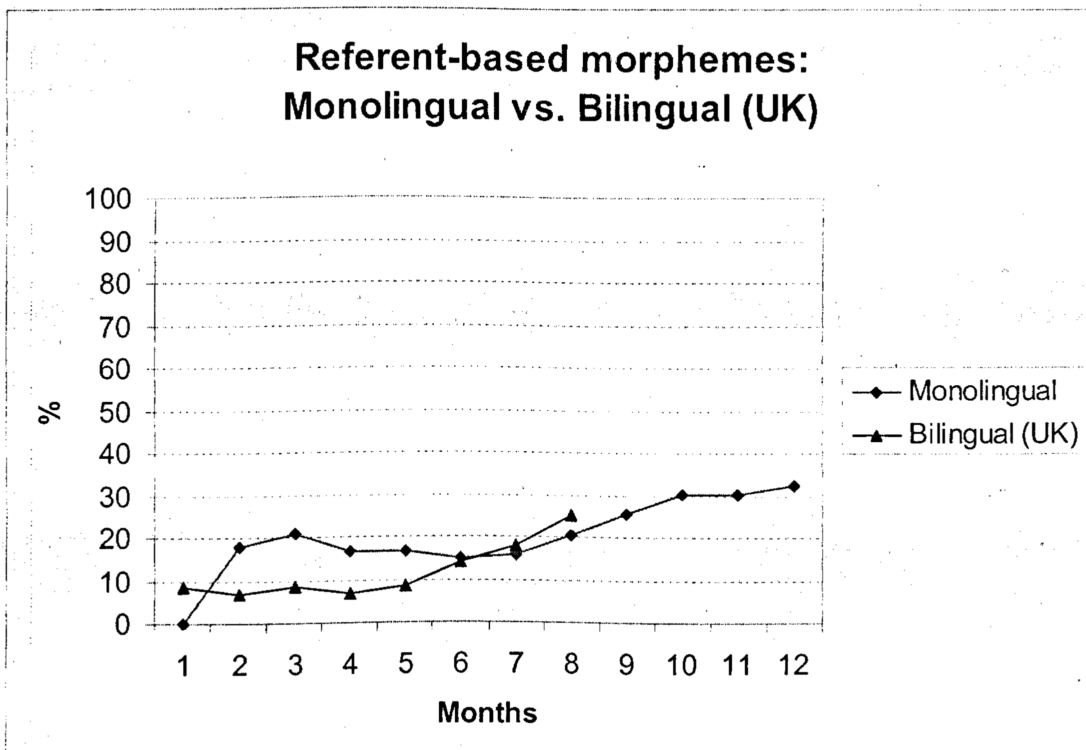
It is evident from the first month that the bilingual subject (3;6) used a high proportion of general classifiers in her responses: 72.2% of her responses used general classifiers in the first month, and this percentage continued at more or less the same level for the following three months. The use of general classifiers started to decline to 59.7% in the subject's fifth month when she was 3;10, and steadily decreased until the percentage reached 27.8% when the subject reached the chronological age of 4;1.

Each subject's choice of lexical item as a general classifier was different. The monolingual subject (3;4) chose *bai*, the classifier denoting round hollow objects, as the general classifier in her first month of the elicitation sessions. However, the classifier *bai* was completely abandoned in the following month, and was replaced by *tua*, the classifier denoting animals, when she was 3;5. Then, when she was 3;6, she began to use *an* as the general classifier for objects. *An* was then applied frequently as the general classifier until the elicitation sessions ended when the subject reached the chronological age of 4;3.

The bilingual subject (UK) also used *an* as the general classifier from the start of the series, and it was solely used as the general classifier until she was 4;1.

It is interesting to note that, no matter how great the difference between the two subjects in the graph may appear, the patterns of general classifier usage for both subjects were basically similar. Firstly, both subjects acquired a single classifier and used it across the board. Secondly, the use of general classifiers increased rapidly until the point where it became steady; it then gradually decreased. Thirdly, the general classifier most used by both subjects was *an*, the general classifier used meaning 'this one' and 'that one', and this was predictable because *an* is widely used by children and adults alike as the general classifier for small objects.

4.4.2.4 Referent-based morphemes: The monolingual subject vs. the bilingual subject (UK)



Graph 10: Referent-based morphemes used by the monolingual subject and the bilingual subject (UK).

The use of referent-based morphemes as classifiers by both subjects developed in a comparable way: the rate of increase in both cases was small but steady. In the first month, the monolingual subject (3;4) did not use referent-based morphemes at all, but began to apply them as classifiers as early as age 3;3, when the percentage of referent-based classifiers rose to 18.6%. This percentage then remained more or less stable until the eighth month of the sessions, when the subject was at the chronological age of 3;11, and when her use of referent-based classifiers began to slowly increase again. By the end of the series, the use of referent-based classifiers by the monolingual subject (4;3) was 32.3%.

The bilingual subject (UK) showed a similar trend in her use of referent-based classifiers. When she was 3;6, the percentage of her referent-based responses stood at 8.3%, and this percentage remained almost unchanged until she reached the age of 3;11, when it increased to 13.9% and gradually rose to 25.0% when she was 4;1.

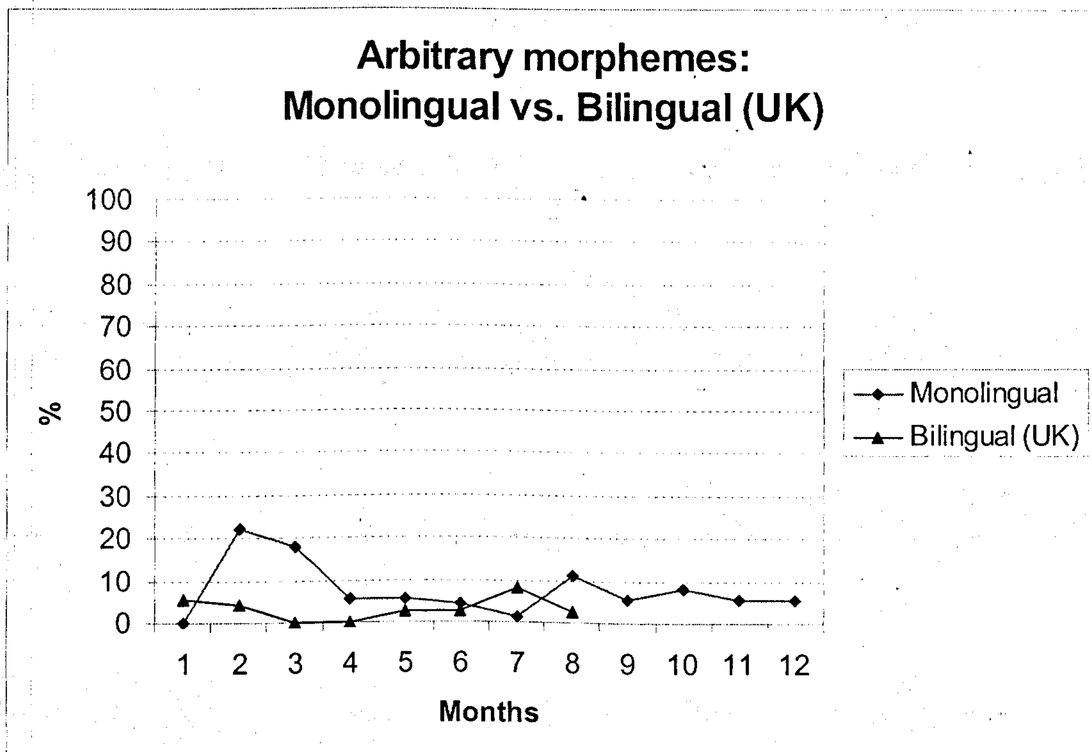
The referent-based morphemes used by the monolingual subject appeared to be instances of both categorical overextension and analogical overextension. Just as the bilingual subject (TH) had done at the age of 3;3, the monolingual subject used *kon*, the classifier denoting human beings, to classify 'priest' (*pra*). Lack of cultural and world experience is a factor here. The subject had not yet grasped the more complicated rules governing the use of specific classifiers with nouns denoting human beings of high rank or social status, so she simply used *kon* to classify priest (*pra*), as she had probably acquired the knowledge that *kon* is the classifier solely used for nouns in the human category, and 'priest' (*pra*) is obviously human. The subject continued to use *kon* to classify 'priest' (*pra*) until she reached the age of 4;0, when she started to acquire its appropriate classifier *ong* and used it instead.

The monolingual subject's use of referent-based morphemes denoting shape indicates a tendency to produce analogical overextensions. On several occasions the subject used morphemes denoting the shape of the head nouns as the classifiers of those nouns. To name just a few: *taeng*, the classifier denoting a tall solid shape, was used inappropriately to classify 'spoon and fork' (*chonsom*) when she was 3;5-3;6; *ruam*, an adjective meaning 'brought together', was used to classify 'bunch of bananas' (*kluai*) when she was 3;8; and *suam*, a verb meaning 'to wear', was applied as the classifier for 'hat' (*muak*) when she was 3;8. These examples indicate that the subject realised that a classifier usually denotes some perceptual and functional characteristic of the head nouns, therefore this type of response occurred.

The bilingual subject (UK) continued the trend seen in previous months (as discussed in the comparison with the bilingual subject (TH)) regarding the linking of head nouns with referent-based morphemes, as the graph shows. Most of the morphemes used as classifiers were related to some perceptual property of the head noun. For example, at the age of 3;8, the subject used *klom*, an adjective meaning 'round', to classify 'hat' (*muak*) and 'plate' (*jan*). *Taeng*, the classifier denoting a solid tall shape, was used to classify most objects with related shapes such as 'knife' (*meed*), 'needle' (*khem*), 'candle' (*tian*), 'pen' (*pakka*), and 'pole' (*sao*) when the subject was 4;1, and so on. It is particularly important at this point to note that our subjects, regardless of whether they are monolinguals or bilinguals, show some distinct patterns regarding their conceptualisation of word meaning. The acquisition of linguistic categories in children will be analysed at length in Chapter 6.

Both subjects' usage of referent-based morphemes as classifiers was similar in some respects. Both monolingual and bilingual children responded to the perceptual properties of head nouns and used them as criteria for category discrimination. For both subjects, this type of response occurred immediately after the use of general classifier responses had declined, and increased slowly in accordance with the use of adult classifiers.

4.4.2.5 Arbitrary morphemes: The monolingual subject vs. the bilingual subject (UK)

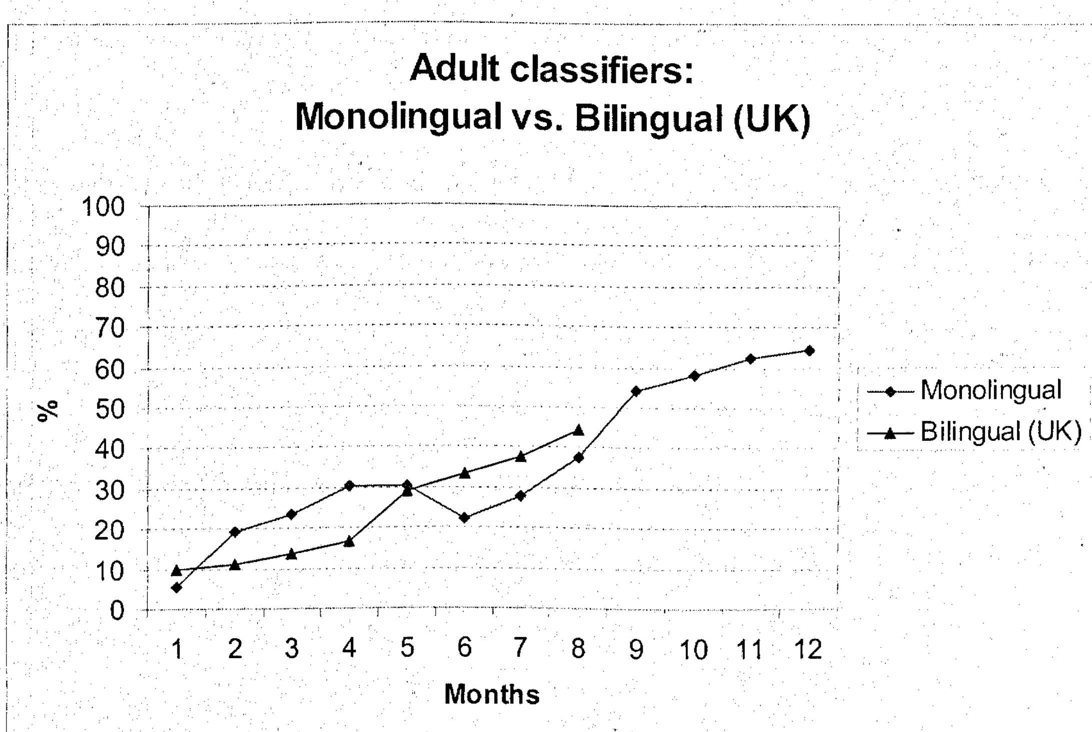


Graph 11: Arbitrary morphemes used by the monolingual subject and the bilingual subject (UK).

There was no definite pattern in the subjects' use of arbitrary morphemes. However, besides slips of the tongue, it is interesting to note that both subjects occasionally produced morphemes which had meaning, but no connection to the head nouns. For example, the monolingual subject (3;5) used *fong*, the specific classifier denoting an oval shape, and exclusively used to classify poultry eggs in adult language, to classify 'bunch of bananas' (*kluai*). There is no connection between 'egg' and 'bunch of bananas' with respect to either taxonomic or shape properties. The monolingual subject (3;5) also used the morpheme *raka*, a noun meaning 'price', as the classifier for 'castle' (*prasard*). Again, the motive for this remains unclear. The bilingual subject (UK) also used the morpheme *kaew*, a noun meaning 'glass', as the classifier for 'shoe' (*rongtao*) when she was 3;10. It is impossible to guess why she made this connection.

Although the subjects' use of arbitrary responses was rare, in comparison to other types of response made during the course of their elicitation sessions, it did not disappear and continued sporadically to be seen until the final month of the tests.

4.4.2.6 Adult classifiers: The monolingual subject vs. the bilingual subject (UK)



Graph 12: Adult classifiers used by the monolingual subject and the bilingual subject (UK).

The subjects' use of adult classifiers steadily increased with age, and its development in both cases is very similar. The monolingual subject (3;4) started with a low usage of adult classifiers (5.6%) in the first month, and this gradually and steadily increased until her adult classifier responses reached 30.6% when she was 3;8. The percentage of adult classifier responses fell slightly in the following month, but rose again when she was 3;10. In the final month of the elicitation sessions, the monolingual subject's (4;1) percentage of adult classifier responses increased to 64.5%.

The trend was analogous for the bilingual subject (UK). At the age of 3;6, the proportion of her adult classifier response was 9.7%, and it climbed steadily month by month. At the end of the series, when she was 4;1, her use of adult classifiers stood at 44.4%. Although there was no available data for her development in the following months, it is predictable from the graph that her adult classifier usage would increase at an approximately similar rate to that of the monolingual subject.

Similarly to the two bilingual subjects (whose ability to categorise has been discussed earlier), the first noun category the monolingual subject was able to distinguish was the animate category, i.e. humans and animals. The first adult classifier she acquired was *kon*, the classifier for human beings, which she applied appropriately to 'child' (*dek*) and 'soldier' (*tahan*). A month later when she reached the age of 3;5, she acquired the classifier *tua*, the classifier for animals. Classifiers which clearly belong to the same taxonomic category with the head nouns were acquired with ease.

From the elicitation results it appears that there were some nouns whose classifiers both subjects had difficulty in acquiring. Although some nouns have salient perceptual properties, their classifiers do not always reflect this. Instead, cultural knowledge and world experience play an important part in the assigning of classifiers to those nouns. For example, 'priest' (*pra*), which should be classified with *ong*, was never classified appropriately by either subject until the very late stage of the elicitation sessions; both of them used *kon*, the classifier for human beings in general. 'Cigarette' (*buri*) is another example of a noun where cultural knowledge is essential in assigning the classifier. Despite its tall and upright shape, 'cigarette' cannot be classified with *taeng* or *lem*, words used by both subjects to classify this noun; it must be classified with *muan*, the classifier denoting a manner of rolling, because the procedure of the ancient Thai in making a cigarette involved rolling a dry banana leaf to wrap around tobacco. Young children are extremely unlikely to know this.

Regarding the time-scale of adult classifier acquisition, it is evident that, based on their equivalent MLU, both subjects acquired adult classifiers in a similar time-scale. The bilingual subject (UK) appears to have achieved slightly more than the monolingual subject when comparison is made month by month, but the difference is minimal. This suggests that bilingual children have no difficulty in acquiring Thai classifiers, and they develop their language system in a way closely comparable to that of monolinguals. It is therefore likely that bilingualism has no influence on children's acquisition of a classifier system.

4.5 Conclusion

On examining the general course of development gathered from the data collected over the twelve-month period from the bilingual subject (UK), it was initially hypothesised that she was influenced by her other language, English, and so acquired classifiers more slowly than the monolingual subject and developed errors such as silent responses. However, this assumption can be questioned on the following grounds. Firstly, it is possible that her slow process of acquisition reflected her limited input of Thai, which she could only speak with her mother. Secondly, it is possible that the use of silent responses is a stage of classifier acquisition that any child, whether bilingual or not, may pass through. This latter assumption is supported by the fact that the bilingual subject in Thailand also produced silent responses in her first few months, although to a lesser extent than the bilingual subject (UK).The assumption that silent responses are the process every child has to experience is supported by previous studies by Tuaycharoen (1984), and Carpenter (1987). A few children of very young ages from their research also encountered the process of silent responses before they could develop different type of responses in their classifier acquisition.

Regarding the use of silence at the earliest stage of classifier acquisition, it is arguable whether this kind of response is made exclusively by the bilingual subjects. Although the monolingual subject did not go through this stage as seen evidently from the elicitation sessions, it is possible that she had made this type of response when she was younger, prior to this study.

When comparisons of the classifier acquisition among three subjects were made based on their MLU scores, it became more apparent that linguistic development among three subjects is parallel. Based on the MLU scores, it is evident that both bilingual subjects developed classifier use at the same rate as the monolingual subject, although there was a lag at the early stage of the bilingual subject (UK) due to the overuse of silent responses. However, when taking the results of the additional six-month elicitation sessions of the bilingual subject (TH) into consideration, we may argue that silent responses in the bilingual subject (UK) resulted from the lower frequency of Thai language input, since the large gap of the use of silent responses between the two bilingual subjects during the first few months is noticeable (as seen in graph 12). It is therefore suggested that the frequency of input does somehow initially delay the progress of classifier acquisition of the bilingual subject (UK), but the effect was temporary and she appeared to catch up with her counterparts in the whole development at the end of the elicitation sessions.

Chapter 5 Acquisition of novel word classifiers

5.1 Introduction to the study

As we have seen in the literature review (Chapter 2), researchers such as Markman (1991), Rescorla (1980), Bloom (2000), and Pinker (1999) agree that children tend to overextend when they categorise objects. According to Rescorla (1980), there are three kinds of overextension:

- Categorical overextension

Categorical overextension occurs when children overextend an object to another object in the same taxonomic category. For example, a child uses 'apple' to label another type of fruit.

- Analogical overextension

Analogical overextension occurs when children overextend one object to another object in a different taxonomic category which share physical or functional similarities (texture, colour or shape). For example, a child may use 'cat' to label a soft scarf, or 'hat' to label a hairbrush.

- Statement overextension

Statement overextension occurs when children refer to one object in relation to another object. For example, saying 'Dolly' when seeing an empty doll's bed, or 'apple' when looking at the refrigerator.

There is also research by Markman (1991) providing evidence that when children make categorical overextensions, they tend to categorise objects on a taxonomic basis, but when they make analogical overextensions, they mainly categorise things based on a shape bias.

To test Markman's claim, a further elicitation session with two subjects, the monolingual subject (at the age of 4;2) and the bilingual subject in the UK (at the age of 4;0), was conducted. Thirty-two new objects were included in the elicitation sessions during the last four months of the twelve-month sessions (month 9 – month 12). Each month, eight new objects were presented, along with the seventy-two objects usually tested to see how the subjects would classify new objects, which had not been included before the ninth month. The set of eight newly added words, selected randomly, were presented to the subjects only once, to be replaced by another set of eight new words in the following month so that the subjects would not feel bored and overloaded with too many objects at the same time. Therefore, from the ninth to the twelfth month of the sessions, instead of having 72 objects in the elicitation sessions, 80 objects were presented to both subjects.

The results of the test were compared with a mini-survey conducted with a small group of Thai adults. The thirty-two new objects were presented to three Thai adults in a similar fashion to what was done with the children. To obtain a clearer understanding, the adults were asked separately to classify all 32 objects in order to compare their responses with those of the children. The mini-survey is designed to reflect the differences between children and adults in categorising and classifying objects, and therefore addresses the question whether experience of the world is significant in determining the use of classifiers.

The purpose of adding new objects to the elicitation sessions is to find out what influences children most in a situation when they categorise new objects, a taxonomic bias, a shape bias, or some specific linguistic input which is influenced by culture. The thirty-two newly added objects were used to investigate four questions:

(a) How do children classify unfamiliar new objects?

(b) How do children classify objects they know which appear in an unexpected or unfamiliar shape?

(c) How do children classify fictional objects? and

(d) Whether bilingualism affects the way children learn to classify novel words, and if yes, how do bilingual children classify novel objects differently from monolingual children?

The elicitation sessions in which children classify unfamiliar objects and familiar objects with an unconventional shape is designed to determine whether shape or taxonomic category is more important to children in deciding which classifier to use. In addition, regarding the seventy-two-word list, it is evident that the children were well aware from the very first stage that animate objects are classified with either *tua* or with *kon*. The classifier *tua* seemed to be applied to objects in the animal category, while *kon* was used only with objects in the human category. However, it is also interesting to see how children categorise borderline objects, like fictional characters from television or myth. It was expected that *tua* and *kon* would be used, but reasons the children might choose to use them were yet to be discovered.

It was also thought important to compare the responses of the monolingual subject and the bilingual subject in the UK, in order to see if there were similarities or differences in their classifying of novel objects. Although it was quite obvious from the findings discussed in the previous chapter that the bilingual subject's development in classifying objects was slightly different from that of the monolingual subject because of their different levels of MLU scores at the same chronological ages, it is still interesting to see how these children conceptualise novel words and how they classify them accordingly.

The results of the elicitation sessions taken as a whole should reflect the way children categorise things and support Markman's (1991) claim that children categorise objects based on both a taxonomic bias and a shape bias.

5.2 List of new objects

Unfamiliar objects:

1. Millennium Dome (*millennium-dome*)
2. Leatherette stool (*tung*)
3. Fireplace (*tao-ping*)
4. Mini-dish (*jandaotuam*)
5. Loganberries (*loganberries*)
6. Baby's pram (*rod-ken-dek*)
7. Artichoke (*artichoke*)
8. UFO (*jan-bin*)
9. Egyptian pyramid (*pyramid*)

10. Braille characters (*tua-nungsu-kon-ta-bod*)

11. Flat scanner (*scanner*)

12. Kiwi fruit (*lug-kiwi*)

13. Skyscrapers (*tuk-ra-fa*)

14. Lawn mower (*kruang-tad-ya*)

15. Harp (*pin*)

16. Green bean (*tua-fak-yao*)

17. US bank notes (*bank-dollar*)

<u>Objects the children are familiar with which appear in completely different shapes:</u>

18. Alphabetical-shaped macaroni (*macaroni-tua-nungsu*)

19. Football-shaped cushion (*morn-football*)

20. Rabbit-shaped gingerbread (*kanompang-kratai)*

21. Chocolate Easter egg (*kai-chocolat*)

22. Animal-shaped candle (*tian-roop-sad*)

23. Swan-shaped hedge (*ton-mai-roophong*)

24. Egg-shaped alarm clock (*nalika-kai*)

25. Racing car-shaped carpet (*prom-roop-rod*)

<u>Fictional objects:</u>

26. Barbie

27. Harry Potter

28. Chewbacca

29. Ninja turtles

30. Teletubbies

31. The Snowman

32. The Simpsons

Considering the results presented later in this chapter, it is interesting to see how both subjects classified new words, reflecting how they conceptualised things. It is evident that children do tend to categorise objects based on the shape bias, especially when they encounter objects they have never seen before, but is 'shape bias' the only constraint the children rely on when acquiring new objects? Surprisingly, the children in the current research categorised familiar objects based on their shape, although it was clear they knew what taxonomic class those objects belonged to. This contradicts Markman's contention that children also categorise objects on the basis of a categorical bias. When categorising fictional objects from novels or television, they reacted differently, showing idiosyncratic discrimination. Nevertheless, it appears that both the monolingual subject and the bilingual subject categorised objects in a similar way. This shows that these biases hold independent of language (Merriman, 1999). This also shows that bilingualism does not affect the way children learn to categorise and classify new objects.

5.3 Results

5.3.1 How do children categorise unfamiliar objects?

According to the results, both the monolingual and the bilingual subject relied heavily on their visual perceptions when they overextended words; that is, they employed the shape bias. Novel objects were used because we wanted them to overextend, in order to discover precisely how they would overextend. The children's overextension to almost every new word with an obvious shape provides clear examples of overextension based on the shape bias. The subjects' usage of classifiers can be seen in Table 34:

Object	Monolingual subject		Bilingual subject		Adults from the mini-survey	
	classifier	**denotation**	**classifier**	**denotation**	**classifier**	**denotation**
baby pram	khan	vehicle	an	general classifier	khan	vehicle with handles
US bank notes	paen	flat object	paen	flat object	bai	bank notes
Millennium Dome	klom *	round (adj)	an	general classifier	hang/lung	place/building
harp	an	general classifier	an	general classifier	an	general classifier
lawn mower	khan	vehicle	kruang	mechanical object	khan	vehicle with handles
fireplace	tu *	cabinet(n)	an	general classifier	an	general classifier
leather stool	tua	4 legged-animal like	an	general classifier	tua	4 legged animal-like
mini dish	bai	dish plate	duang	sun/moon/star	an	general classifier
UFO	lam	vehicle	lam	vehicle	lam	flying or floating vehicle
pyramid	lug	mountain	an	general classifier	hang	place
Braille alphabets	tua	Animal-shaped-like thing	tua	alphabet	tua	animal-shaped like thing
Skyscrapers	taeng	solid object	taeng	solid object	hang/tuk	place/building
green bean	sen	long object	yao *	long (adj.)	sen	long slim object
flat scanner	paen	flat object	ban *	flat (adj.)	kruang	mechanical object

* Not a classifier

Table 34: Comparison of classifiers used to classify unfamiliar objects

Starting from the most obvious example above, 'skyscrapers' (*tuk-ra-fa*) was classified as *taeng* by both subjects. The classifier *taeng* is indeed a classifier which reflects the solid, upright nature of the head noun, such as a pencil or a candle, but it is not possible to use it with skyscrapers in adult language. 'UFO' (*jan-bin*) and 'mini-dish' (*jan-daotiam*), whose shapes are circular, were classified differently by the subjects, but the classifiers they used showed that they categorised objects by their shapes, because the monolingual used *bai* with 'mini-dish' (*jan-daotiam*). In fact, according to the results of the previous elicitation sessions, she opted to use *bai* with 'plate' (*jan*), 'bowl' (*tuai*), or 'cup' (*tuai*). *Klom,* which is not a classifier, but an adjective meaning 'round', was also used with 'UFO' (*jan-bin*). The bilingual subject, on the other hand, chose to use *duang*, the classifier to use with 'the sun' (*pra-artid*), 'the moon' (*pra-jan*), and 'star' (*dao*), with 'mini-dish' (*jan-daotiam*), and *bai* with the UFO (*jan-bin*). Moreover, while the monolingual subject adopted a general classifier *an* for 'Millennium Dome' (*millennium-dome*), the bilingual subject chose to classify the Dome with *klom*, which, as stated above, is not a classifier but an adjective meaning 'round'.

'Flat scanner' (*scanner*) and 'US bank notes' (*bank-dollar*), however, are similar in that they have a flat, horizontal shape. They were given classifiers by both subjects in accordance with this shape. 'US bank note' (*bank-dollar*), for which the adult classifier is *bai*, was used with the classifier *paen* by both subjects. Although *paen* is an appropriate classifier for 'paper' (*kradad*), 'diskette' (*diskette*), 'CD' (*CD*), etc., all of which have a flat shape, it is not the adult classifier for bank notes, which is unexpectedly used with the classifier *bai*, normally used with round kitchenware objects like 'bowl' (*tuai*), 'cup' (*tuai*) or 'plate' (*jan*). Thai adults do not find this surprising because *bai* can be used in more than one taxonomic domain. It can be used with round kitchenware objects, and also can be used with some specific flat single objects like 'leaf' (*bai-mai*), 'bank note' (*tanabat*), and 'card' (*pai*), and, surprisingly, with 'pillow' (*morn*). But the children applied *bai* only to round kitchenware objects. No doubt the children produced this inappropriate classifier because the classifier *bai* does not reflect the salient characteristics of the head noun, but reveals the unpredictable usage of Thai classifiers. Thus, knowledge of the classifier system is significant here. The children had not yet acquired the concept that some Thai classifiers have double or triple meanings. 'Flat scanner' (*scanner*), on the other hand, is categorised by Thai adults as a noun in the electronic equipment category, therefore its classifier is *kruang*, which normally reflects the mechanical or electrical attributes of the head noun. However, the monolingual subject classified the flat scanner with the word *paen*, which is a classifier for flat, paper-like objects as I mentioned above, while the bilingual subject opted to use *baen*, which is not a classifier, but an adjective meaning 'flat'.

There is some direct evidence from the elicitation sessions that the subjects also categorised objects based on a taxonomic bias, as shown in Table 35:

Object	Monolingual subject		Bilingual subject		Adults from the mini-survey	
	classifier	denotation	classifier	denotation	classifier	denotation
loganberries	lug	single fruit	puang	fruits in bunch	lug	single fruit
artichoke	lug	single fruit	dok	flower	dok	flower
kiwi fruit	lug	single fruit	lug	single fruit	lug	single fruit

Table 35: Overextension of some classifiers with nouns in the same taxonomic domain

The monolingual subject used *lug* to classify all three objects, while the bilingual subject used three different classifiers with three different objects. Why was this? While 'artichoke' (*artichoke*), 'loganberries' (*loganberries*) and 'kiwi fruits' (*lug-kiwi*) were not completely unfamiliar to the bilingual subject for they are commonly found in the UK, they were quite new to the monolingual subject, who lives on the other side of the world. Having some previous knowledge of these objects, the bilingual subject was aware that they all belong to different taxonomic categories, so she classified them accordingly. 'Artichoke', which looks very much like a flower, was classified with *dok*, the classifier for flowers. On the other hand, 'loganberries', obviously a type of fruit, was classified with *puang*, which is a classifier for fruits in a bunch, like grapes. And 'kiwi fruit' was classified with *lug* because it was clearly a single fruit. Taxonomic bias is clear in this case. The monolingual subject, in comparison, had no prior experience of these objects, and so categorised them rather differently according to their categorical basis, that is, fruits and vegetables. She then adopted the general classifier for single fruits, *lug*, with all three objects, regardless of how different they appeared to be. The differences between the two subjects' application of classifiers to these objects show that taxonomic classification increases with increased knowledge of the world. The bilingual subject knew the function of loganberries, the kiwi fruit, and the artichoke because she was more familiar with them, but the monolingual subject did not.

5.3.2 How do children classify familiar objects which appear in an unusual shape?

To determine which is more salient to a child when categorising words, taxonomic function or shape, some familiar objects in unconventional shapes were presented to the subjects at random, a few words each month. The subjects were asked first what these objects really were in order to make sure they realised what taxonomic categories the objects belonged to, regardless of their shape. Then, the subjects were asked to use classifiers with these objects. The results were intriguing, as shown in Table 36:

Object	Monolingual subject		Bilingual subject		Adults from the mini-survey	
	classifier	denotation	classifier	denotation	classifier	denotation
Alphabet-shaped macaroni	an	general classifier	an	general classifier	chin/an	small item/general classifier
Football-shaped cushion	lug	round object	lug	round object	bai/an	cushion/ general classifier
Rabbit-shaped gingerbread	tua	animal	tua	animal	chin/an	small item/general classifier
chocolate Easter egg	fong	egg	lug	round object	chin/an	small item/general classifier
animal-shaped candle	tua	animal	tua	animal	lem/an	general classifer
swan-shaped hedge	tua	animal	tua	animal	pum/ton	hedge-like object
egg-shaped alarm clock	fong	egg	lug	round object	ruen/an	clock/general classifier
racing car-shaped carpet	khan	vehicle	lam	vehicle	puen/an	flat, clothlike object/ general classifier

Table 36: Comparison of classifiers used to classify familiar objects which appear in an unfamiliar shape

The results concerning this set of objects show clearly that the children, both the monolingual and the bilingual, categorised objects similarly according to their shape. Every object from this list was classified by its shape except for 'alphabet-shaped macaroni' (*macaroni-tua-nungsu*), which was classified with the general classifier *an* by both subjects. It is not surprising that both subjects chose to use a general classifier with this object since many Thai adults, including myself, are not sure which particular classifier should be best used with it. Therefore the use of a general classifier seems to be a good solution. Thai adults frequently classify objects having an unconventional or confusing appearance with the general classifier *an* although they can just as well be classified according to their taxonomic identifications. For example, 'football-shaped cushion' (*morn-football*), which can be classified according to its own taxonomic class with the classifier *bai*, can also be classified with *an*, a general classifier. 'Egg-shaped alarm clock' (*nalika-kai*), which belongs to the clock taxonomic category, can be classified with either *ruen*, according to its taxonomic classification, or with *an*, as a general classifier. Hundreds of Thai objects which appear in an unconventional shape can be classified with a general classifier in adult language.

The bilingual subject used the classifier *lug* with all three objects on the list having a rounded shape; 'football-shaped cushion' (*morn-football*), 'chocolate Easter egg' (*chocolat-kai*), and 'egg-shaped alarm clock' (*nalika-kai*). Whereas the bilingual subject adopted *lug* with all three round objects on the list, the monolingual subject used *lug* only to classify 'football- shaped cushion' (*morn-football*), and used *fong*, the specific classifier for an egg, to classify both 'chocolate Easter egg' (*chocolat-kai*) and the 'egg-shaped alarm clock' (*nalika-kai*), although she was well aware that a chocolate Easter egg is not a real egg, and an egg shaped alarm clock is a clock, not an egg.

Another piece of evidence suggesting that children categorise objects on the basis of the shape bias is noticed when both subjects were asked to classify 'rabbit-shaped gingerbread' (*kanompang-kratai*), 'dog-shaped candle' (*tian-roop-ma*) and 'swan-shaped bush' (*poommai-roop-hong*). Obviously they realised that these objects were not real animals, but interestingly both of them used the classifier for animals, *tua*, to classify them. In addition, 'car-shaped carpet' (*prom-roop-rod*) was classified with *khan* by the monolingual, and with *lam* by the bilingual. Both of them used classifiers for vehicles to classify the object, regardless of the fact that the object was obviously a carpet. *Lam* is the classifier to use with a boat, a ship and a plane, while *khan* is the classifier for road-using vehicles.

5.3.3 How do children classify fictional figures from novels or television?

This section of the experiment was designed to test what sort of classifiers the children tended to apply when asked to classify objects which are known from television, novels or myth. Some of the objects tested were contemporary and well recognised by them, such as Barbie, Teletubbies, Harry Potter, The Simpsons and the Snowman, and some were not very well known to them, like Chewbacca, from the film 'Star Wars' Trilogy decades ago, and the Ninja Turtles, characters in a television series. Chewbacca and the Ninja turtles date from well before both subjects were born. The use of classifiers for objects in this group is listed in Table 37:

Object	Monolingual subject		Bilingual subject		Adults	
	classifier	denotation	classifier	denotation	classifier	denotation
Barbie	kon	human	kon	human	kon/tua	human/animal
Harry Potter	tua	animal	tua	animal	kon/tua	human/animal
Chewbacca	tua	animal	tua	animal	kon/tua	human/animal
Ninja turtles	tua	animal	tua	animal	kon/tua	human/animal
Teletubbies	kon	human	tua	animal	kon/tua	human/animal
The Snowman	kon	human	tua	animal	kon/tua	human/animal
The Simpsons	kon	human	tua	animal	kon/tua	human/animal

Table 37: Comparison of classifiers used to classify fictional figures from novels or television

The results from both subjects proved to be not very different across the two subjects. Only two classifiers were used, *kon* and *tua*, which indicates that both subjects regarded fictional objects as either humans or animals. It is implied that the children expanded the scope of the use of classifiers for humans and animals to use with fictional animate objects. Both subjects seemed to discriminate between the use of *kon*, the classifier for human beings, and *tua*, the classifier for animals. There were a few objects which they classified differently, but this can be considered as a matter of individual perception.

5.3.4 How do adults classify fictional figures from novels or television?

There were interesting arguments between the Thai adults during the mini-survey regarding the correct way to classify fictional figures. They could reach no consensus as to the best way to classify non-human beings with human behaviour like Chewbacca and the Ninja Turtles, and fictional human characters like The Simpsons and the Snowman. Some adults claimed that any creature that is not a real human being should not be classified with *kon*, the classifier which is human-specific. Therefore, all objects on the list should be classified with *tua*. But some adults argued that Chewbacca and the Ninja Turtles should be classified with *kon*, because they cannot be classified with *tua* as they are definitely not animals. So the way adults classify fictional characters is not at all different from the way children classify them. It depends on the boundary fixed by each individual to distinguish 'humans' from 'animals'.

5.4 Conclusion

What have we learned from the experiment discussed in this chapter? The results of the tests contradict Markman's claim that when children make categorical overextensions, they tend to categorise objects on a taxonomic basis. However, when they make analogical overextensions, they mostly categorise things based on a shape bias. What is remarkably clear is that when children are asked to categorise objects that they have never seen before, they tend to make classifications based on both shape and taxonomy. On the other hand, when they are asked to categorise familiar objects in an unconventional appearance, they seem to use the shape bias in categorising things, although they know the actual taxonomic class of the objects. What is intriguing is that both the bilingual and the monolingual subjects tended to categorise objects in similar ways, which shows that they learn to perceive the world in a similar way, no matter how many languages they speak. The knowledge of the world seems to be significant since it shows that taxonomic classification increases with the knowledge of the world, and so adults tend to use classifiers according to taxonomic class rather than according to shape like children do.

The results from this chapter support Smith's (1999) claim mentioned in the literature review chapter that the form of the bias depends on the properties of the named objects. Smith argues that when a child learns the names of objects, he or she systematically attends to different properties in different stimulus contexts, forming differently structured categories for different kinds of things (Smith 1999:279). The case of the bilingual subject and the monolingual subject acquiring novel count nouns from this chapter agree with Smith's assertion. It is seen particularly obviously when both children used different classifiers to classify nouns in the same taxonomic category; 'artichoke' (*artichoke*), 'loganberries' (*loganberries*) and 'kiwi fruits' (*lug-kiwi*). The monolingual subject had no previous perceptual experience about these three objects, so *lug*, the typical classifier for fruits and small-round things, were used to classify all three objects. This is different from the case of the bilingual subject who used three different classifiers with the three different objects. While 'artichoke' (*artichoke*) was classified with *dok*, the classifier used for flower-part of plants, 'loganberries' (*loganberries*) was classified with *puang*, the classifier used for fruits in bundles, and 'kiwi fruits' (*lug-kiwi*) was classified with *lug*, a typical classifier for single fruits and small-round objects. It should be remarked that both subjects had different experience about these three objects. While they were not completely unfamiliar to the bilingual subject for they are commonly found in the UK, they were quite new to the monolingual subject who had no opportunities to know or to see these objects before. Therefore, according to Smith (1999), each subject attended to different properties in different stimulus contexts when they categorised these novel objects. The monolingual subject, who had no previous experience about these novel objects, used shape alone in classifying them; while the bilingual subject, used taxonomy in classifying the same objects. The form of biases for each child is different from each other according to their different perception about the objects seen. Their categorisation of the novel objects rather depend on their attention to different properties of the objects being seen. As suggested by Smith (1999), biases emerge over the course of word learning and they reflect the properties of languages being learned. This conclusion also agrees with Gathercole's (2002c) proposal that shape is probably the most salient property children take into account, but some other properties, for example, taxomony, in the case of this chapter, is also important when the children take into account their knowledge of the world when they categorise objects around them.

Chapter 6 Implications and Discussion

In this chapter, issues regarding what has been discovered from this study will be extensively discussed according to theories and frameworks debated in the literature review chapters. Discussions and analysis made in this chapter will be separated into several parts. First the question of how bilingualism affects classifier acquisition in children will be analysed, followed by the discussion about the overextentions and the word meaning biases in children. Next, the sequence of the classifier acquisition of children in this study will be comparatively discussed in detail, and then, the question of why children sometimes use adjectives or other types of syntactic categories such as nouns and verbs or create novel words as classifiers will be re-visited, followed by the analysis of why bilingual children sometimes use English forms as classifiers. The final part of this chapter will be the conclusion of the research where all issues will be summarised and re-examined again in accordance with the hypotheses made at the beginning of this research.

6.1 How does bilingualism affect classifier acquisition in children?

There is no evidence from this study suggesting that both bilingual subjects acquired classifiers in a different fashion from the monolingual subject. Instead, it seems that the acquisition process of all three subjects occurred roughly following a similar sequence according to their matched MLU scores. Although there was no evidence from this study showing that the monolingual subject responded to the task with a silent response at the beginning of the elicitation sessions, she may have produced silent responses prior to the elicitation series, when her MLU scores were comparable to those of the bilinguals at the beginning of the elicitation sessions. Does this imply, therefore, that bilingualism does not affect the process of classifier acquisition?

Although the two bilingual subjects briefly used silences in responding to the task during the first month while the monolingual subject did not, it cannot be concluded that the monolingual subject did not use the silence strategy when she was younger than 3;4. It is apparent that the monolingual subject at the chronological age of 3;4 had MLU scores at approximately the same level as the bilingual subjects at the chronological age of 3;6,. Therefore, in the first month, the comparison made between the monolingual and the bilingual subject (UK) was when their ages were 3;4 and 3;6 respectively. Since the elicitation sessions for the monolingual subject began when she was 3;4, we did not acquire any knowledge about her linguistic capacity prior to the sessions. It is possible that the monolingual subject also used silence and hesitation when she was younger. According to Tuaycharoen's (1984) findings, monolingual Thai children may show their first recognition of the classifier system by using silent responses as early as 2 years old. Carpenter (1987) also reports that 31 out of 241 two-year-old children and 10 out of 795 three-year-old children produced silent responses when facing her classifier task.

The three subjects' chronological processes of classifier acquisition observed during the study, apart from the use of silence, were remarkably similar. After the difference of the number of silent responses used during the first month, it became apparent that both bilingual subjects had undergone a remarkably similar process. Although there were some differences regarding the choice of classifiers each one made, both subjects developed their classifier acquisition in a comparable way. The bilingual subject (UK) stopped responding to the task with silence after the third month, completely replacing it with a number of numeral repeaters and repeaters. During the fourth month, a number of repeaters were applied; she started to use *tua* to classify most of the remaining nouns across the board. From the fifth month, *an* was used as a sole classifier for almost every noun in the list except for nouns in the human or animal categories, which were classified appropriately with *kon* and *tua* respectively. It is clear that from the sixth month onwards the bilingual subject (UK) started conceptualising the meanings of each classifier and therefore started using different classifiers for different categories of nouns.

The bilingual subject (TH) seemed to follow a similar process of classifier acquisition. The subject continued to respond to the task with silence during the second month, but it was apparent that repeaters were used with most of the nouns on the list. During the third month, the subject consistently used a single classifier, *tua,* to classify almost every noun in the list except those in the human category, which were classified with *kon*. It was seen from the fourth month on that he started to use multiple classifiers with different categories of nouns.

Although there is no direct comparison between the monolingual subject and the bilingual subject (TH) because of the difference in their MLUs, it can be assummed that the classifier acquisition of the bilingual subject (TH) should be parallel to that of his bilingual counterpart in the UK. The reason for this prediction comes from the fact that their MLU scores matched from the start. Therefore, their linguistic development should be approximately equal. Consequently, the patterns of classifier acquisition which emerged among all three subjects are rather similar, as shown in the following diagram:

Bilingual subject (UK) - *Silence → repeaters → single classifier → multiple classifiers*

Bilingual subject (TH) - *Silence → repeaters → single classifier → multiple classifiers*

Monolingual subject - *(could be) Silence → repeaters → single classifier → multiple classifiers*

Figure 1: Comparison of process of classifier acquisition among three subjects

The diagram shows that the three subjects' classifier acquisition process developed along similar lines. Consequently, it can be suggested that bilingualism does not affect the sequence of the classifier acquisition in children.

The speed of their classifier acquisition, however, is a different story. In a comparison based on matched MLUs of the two bilingual subjects, it is apparent from the first month when they were at the chronological age of 3;2, that both of them responded to the task with a greater number of silent responses. However, the bilingual subject (UK)'s silent responses were far greater than the bilingual subject (TH)'s (87.5% compared to 20.8%). Why was that? There could be several explanations why the large gap occurred. One of the possibilities might be explained by making reference to the phenomenon of interference. It might be expected that the bilingual subject (UK) experienced greater interference from English syntax when attempting to use Thai classifiers; therefore her silent response occurred whenever she tried to adapt an English grammatical rule to Thai phrases.

However, this theory is just one remote explanation and it is not supported by evidence from this research. When the bilingual subject (UK) used silence instead of classifiers more frequently than her counterpart in Thailand, it did not necessarily indicate interference from English, since there may have been other reasons for her silence. A more reasonable explanation was the difference of the frequency of Thai VS English input between the two bilinguals themselves. The fact that the bilingual subject (TH) had greater Thai language input than the bilingual subject (UK) might be a reason why there was a difference in the first month between them. Although both bilingual subjects were at approximately equal MLUs from the start, it cannot be denied that the bilingual subject (TH) had more opportunities to speak and to listen to Thai than the bilingual subject (UK) and this is probably why she used other types of responses apart from silence.

In considering Gathercole's (2002b) variables in determining the complexity of the frequency of input, the language spoken at home (LSH), the instruction methods at school (IMS) and the social status of the child (SES) must be taken into consideration. It is evident that the two bilingual subjects are dissimilar, although both could speak Thai and English considerably fluently. Details can be seen from the following table:

Frequency of input factors	Bilingual (UK)	Bilingual (TH)
LSH	Exposed to English and Thai equally	Exposed to English and Thai equally
IMS	Not yet attended to school when the sessions began, but started going to school at the mid of the elicitation sessions, IMS was English only.	Attended to an international school. IMS both English and Thai.
SES	Upper-intermediate level in English suburb. Exposed to English only.	Upper-intermediate level in urban Thailand. Exposed to Thai and English, but mainly Thai.

Table 38: Comparison of the factors of the frequency of input between the bilingual subject (UK) and the bilingual subject (TH).

From the table, it is evident that although their LSH were similar, their IMS and SES made their exposure to the input language different. The bilingual subject (UK) was exposed less to Thai language with respect to IMS and SES, while the bilingual subject (TH) was exposed less to English than her counterpart. This finding could explain the difference in their responses at the beginning of the elicitation sessions, despite their equal MLU scores. The bilingual subject (UK) produced a greater number of silent responses than her counterpart, due to her less frequency of Thai input. Therefore, although the sequence of her acquisition of the classifier system was similar to the bilingual subject's (TH), the silent responses at the beginning indicate a delay.

However, it can be seen from graph 7 (*p. 187*) that the bilingual subject (UK) caught up with her counterpart in the classifier acquisition overall in the following months, despite her noticeable use of silent responses at the beginning. This suggests that although the frequency of input caused a delay in the acquisition process at the beginning, it did not make any qualitative difference in the acquisition by the end. Moreover, it is evident that the use of silent responses in both bilingual subjects did not put them at a disadvantage in their classifier system development by the end of the study in comparison to the monolingual. The number of adult classifiers used by the monolingual subject and the bilingual subject (UK) in the final month of the sessions is approximately equal. The results from this study support Gathercole's (2002b) findings that, "while a given group may have an early advantage relative to their peers in one of the languages, with time and experience they may eventually catch up with the other groups" (Gathercole, 2002b).

In conclusion, bilingualism does not affect the sequence of the classifier acquisition process in children, but it causes some delay between bilingual children having a different frequency of language input. The bilingual subject (UK) who had less frequency of Thai language input developed the classifier system more slowly than the other bilingual, and the delay was reflected in her overuse of silent responses at the start of the elicitation sessions. However, the differences between them lessened and disappeared as the process of classifier acquisition developed. At the end of the elicitation sessions, it was apparent that the numbers of adult classifiers acquired by all three subjects were nearly the same.

6.2 Overextensions and word meaning biases in children

Overextensions in children have already been discussed to some extent in the literature review. Previously, it has been noted that overextensions are especially likely if do not know the rig childrenht word (Bloom 2003:37). From the point of view of the conventional theorists, what Landau, Smith and Jones (1992) propose as the 'shape bias' is closely related to the notion of overextension in children. Landau, Smith and Jones explain the importance of shape by noting that young children rely on perceptual properties, especially shape, when they overgeneralise because Children are often described by linguists as 'perceptual bound' (Landau, Smith and Jones, 1992) because their cognition is often based on appearance of the objects. However, the emergentist approach argues that the shape bias is merely a consequence of the word meaning acquisition children have to undergo in order to reach the level of adult-like-word meaning acquisition. Children seem to attend to shape when acquiring new words because shape is usually the most observable characteristic of an object. However, shape becomes less dominant when children get older and children tend to shift their attention to other properties, such as function, material, and texture (Smith, 1995). Gathercole concludes that 'word meaning bias', therefore, reflected in overextensions in children, is the process by which children learn to coordinate multiple cues to meaning, and the process systematically changes with age and maturity resulting from an increased capacity to process and coordinate those cues' (Gathercole *et al.*, 2002:234).

In this section, the data from the study which supported some concepts of Landau, Smith and Jones (1992), Markman (1989), Rescorla (1980), and Clark (1977) will be discussed. The importance of perceptual properties, especially shape, in the categorisation process in children will be examined in order to determine how they are significant to the child's word learning process.

Examples from the study where children made overextensions based on shape are abundant. The clearest type of the shape-based overextension found in the monolingual subject's classifier usage is analogical overextension. The subject used certain classifiers which belong only with certain nouns to classify other nouns which are in different categories, but which denote objects sharing similar shapes. To mention just a few, she used *taeng* to classify 'pen' (*pakka*) and 'tree' (*ton-mai*) in the fourth month. *Taeng* is in fact the classifier for 'pencil' (*dinso*), while *dam* is the classifier for 'pen' (*pakka*). The subject overextended *taeng* to 'pen' (*pakka*) because she placed 'pen' (*pakka*) and 'pencil' (*dinso*) in the same category. The subject further overextended *taeng* to classify 'tree' (*ton-mai*), whose actual classifier is *ton* (although 'tree' (*ton-mai*) is regarded by adult speakers as being in a completely different category from 'pencil' (*dinso*)) because a tree has similar features to a pencil: its upright and solid shape. Moreover, in the sixth month of the sessions, the subject overextended *taeng* to classify 'toothpaste tube' (*ya-si-fun*) for the same reason.

Although overextensions in the bilingual subject (UK) were not clearly seen during the first six months of the elicitation series, it can be argued that overextensions in the bilingual subject were not as clearly observable as those in the monolingual subject at the beginning due to her lower MLU. Indeed, from the sixth month onwards, her overextensions became abundant. These phenomena also occurred in the latter half of the elicitation sessions of the bilingual subject (TH). It should be noted that the bilingual subject overextended words in a similar way to the monolingual subject, by using perceptual properties, especially shape, as the main criteria for overextensions, so it is likely that bilingualism has no influence on children's use of overextensions. Extensive analysis about the effect of bilingualism on classifier acquisition, together with the comparison of the sequence of the classifier acquisition between the monolingual and the bilinguals, will be discussed at length in part 6.3 of this chapter.

Although the data from the study undoubtedly indicate the importance of shape as a perceptual category for children when acquiring the classifier system, it is noteworthy that categorisation by shape is never overwhelming, and is in every case complemented by categorisation by other characteristics of the objects, such as taxonomy, function, material, texture, and thematic relation. By analysing all responses made by the three subjects using referent-based morphemes as responses to the elicitation tasks, the data reveal that the monolingual subject made 108 referent-based overextensions in 12 sessions, the bilingual subject (UK) made 88 referent-based overextensions in 12 sessions, and the bilingual subject (TH) made 33 referent-based overextensions in 6 sessions. The percentage of time that children used shape as the criterion for overextension, as opposed to other characteristics, can be seen in the following table:

Subjects	Shape	Taxonomy	Function	Materials	Texture	Others
Monolingual subject	71 (65.74%)	12 (11.11%)	10 (9.26%)	8 (7.41%)	2 (1.85%)	5 (4.63%)
Bilingual subject (UK)	51 (57.95%)	21 (23.86%)	6 (6.82%)	5 (5.68%)	1 (1.14%)	4 (4.54%)
Bilingual subject (TH)	21 (63.64%)	8 (24.24%)	2 (6.06)	0 (0%)	0 (0%)	2 (6.06)

Table 39: Percentage of time each child overextended based on characteristics of the objects

It should be noted at this point that some objects in which two or more characteristics are important were categorised based on their most noticeable properties. For example, pen and pencil, for which 'shape' is important, as well as their 'function', are categorised by 'shape' rather than 'function' because their solid upright properties are more visible to children's perception than their use as writing instruments. On the other hand, vehicles such as bicycles, cars and trains are categorised based on their 'function', because they are movable machines clearly seen around the transportation system.

From the results of this research, it is very noticeable that shape is the most dominant factor for children in their categorisation process and classifying process. However, apart from the priority given to shape as a basis for their overextensions, there were a few examples where the subjects used taxonomy, function, material, texture, and thematic relation for overextensions. For example, the monolingual subject apparently came to acquire the rule that the classifier *khan* should be used as the sole classifier for mechanical, moving objects. Therefore, she started to overextend the use of *khan* to objects such as 'car' (*rod-yon*), 'bicycle' (*rod-jakkayan*), 'boat' (*rua*), and 'airplane' (*kruang-bin)* in the eighth month of the elicitation sessions. Later on, possibly realising that not all mechanical, moving objects can be classified with *khan*, she gradually ceased overextending with *khan* while she acquired another classifier, *lam*, to use with some objects in the category.

An example of texture-based overextensions can be seen in the twelfth month of the bilingual subject (UK)'s elicitation sessions. It is seen that all the fabric-textured objects from the list, namely 'shirt' (*sua*), 'handkerchief' (*pa-ched-na*), 'rug' (*prom*), and 'towel' (*pa-ched-tua*) were classified with *phun*, the classifier for cloth-like objects. Although *phun* is an appropriate classifier for 'handkerchief' (*pa-ched-na*), 'rug' (*prom*) and 'towel' (*pa-ched-tua*), it is not the adult classifier used with 'shirt' (which is *tua*).

From an emergentist point of view, the shifting of attention from one characteristic of the properties to another is not unusual. In fact, the 'shape bias' phenomenon is not considered a bias at all. When a child uses shape as a criterion to categorise objects, it is because shape is the most salient property the child notices (Merriman, 1999). According to Smith (1995), some characteristics of objects are easier for children to process than other characteristics. For example, 'shape' is considered easy for children to perceive, while 'function' is considered difficult. He suggests that children pay attention to shape first, and later shift their attention to other properties of the objects such as taxonomy, function, materials, etc.

The children's timing of attention to shape is interesting. For all three subjects, 'shape' was not the first notion to which the children paid attention. An important point that needs to be recognised is the fact that all three children seemed to draw a distinction between animates and non-animates, and humans and non-humans in their language at a very early point in their classifier acquisition processes. As early as the first month of the sessions, the monolingual subject was already distinguishing humans from other objects, and animals from other objects. The bilingual subject appeared to separate animate objects from inanimate objects, and used *tua* to classify most animate objects in the early months of the elicitation sessions as well. The children's early discrimination between animate and inanimate objects in this research is supported by previous findings by several linguists. Clark (1977) claims that animacy is one of the first and most frequent notions used in children's noun overextensions. She proposed that children are aware of animacy very early as a principle for generalising knowledge. According to Gandour *et al.* (1984), animate classifiers in Thai are acquired earlier than classifiers in other categories, and Carpenter (1987) found that the first classifier most children acquire is *tua*, the classifier for nouns in the categories of animals and animal-like things. The early emergence of animate classifiers reflects the fact that animacy is an essential feature of categorisation in classifier languages (Gandour *et al.*, 1984:460). According to Adams and Conklin (1973), all classifier languages mark a distinction between animate and inanimate entities. This distinction is also seen in young children's early word meanings (Clark 1977, Markman 1989, and Bloom 2000).

Therefore, it can be summarised that a 'shape bias', if it exists, appears to occur late rather than early. According to the results, animacy appeared to be emerging in children's cognitive process long before the notion of shape even started. Although children seem to overextend objects on the basis of shape more than any other characteristic, findings from this study cannot support a conclusion that categorisation in children depends entirely on shape.

6.3 The sequence of the development of the use of classifiers in children

Some interesting questions emerge from this study. What is the sequence of the development of the use of classifiers in children? Where does the sequence of acquisition come from and why do the classifiers emerge in this order? Finally, how does this knowledge shed light on related theories about language acquisition discussed in the literature review chapter?

As seen from Figure 1 (*p.226*) showing a comparison of classifier acquisition among the three subjects, it is evident that children developed a similar sequence in the use of classifiers, regardless of whether they were bilinguals or not. Errors made by children before acquiring adult classifiers appear to be in the same chronological patterns: the use of silent responses, followed by the use of repeaters (or numeral repeaters), overgeneralisation with the overuse of general classifiers, the use of referent-based overextensions, and finally, the use of adult classifiers.

It is worth pointing out that results from this study are consistent with findings from previous studies by Tuaycharoen (1984), Gandour *et al.* (1984) and Carpenter (1987) regarding sequences of classifier acquisition in young children. All three previous studies reported similar trends for classifier acquisition in monolingual Thai children, despite minor differences due to some experimental variation which has already been discussed in Chapter 1. We shall consider more closely in this section where these patterns come from, and why.

First of all, it is notable that silent responses could be the first sign that children show recognition of the classifier system. Silence can be analysed in two different ways. First of all, silent responses could be the first sign of classifier recognition in children as their hesitation may suggest their realisation of the existence of the grammatical category of classifiers, and that a classifier must follow a quantifier to modify a head noun, but they do not know what category of lexical item to fill in this position. The other possibility is that the children have not acquired the concept of the classifier system yet, thus silence merely reflects their confusion in response to an elicitation task. This is not surprising because findings from previous studies of various classifier languages suggest that classifier systems are a type of grammatical category which children develop rather late. However, it is interesting to note that, although silent responses were used overwhelmingly at the beginning of the elicitation sessions, this stage did not last long and the children appeared to pass through very rapidly.

The next phase after the temporary stage of silent responses was the use of repeaters as classifiers. The children's indication of the presence of a classifier appeared in a use of a noun form. The children used a noun followed by a number and added the same noun to indicate the unit classifier. This raises an interesting question. Why do repeaters emerge after silent responses? The use of repeaters is evidence that the children started acquiring the rule governing classifier use but had not acquired the classifiers themselves. Therefore, the head noun before the quantifier seemed to be the easiest choice to apply. However, it is intriguing to note that the very first repeaters children used similarly across the board in their first few months of the elicitation sessions was *kon*, an animate classifier denoting human beings, which is understandably the most salient classifier for the children. It is noted that the first two adult classifiers all three subjects in my study could use appropriately were *kon* and *tua*, and this phenomenon implies that children are aware of animacy very early as a principle for generalising knowledge as discussed in section 6.2.

Because *kon* is one of a few classifiers which 'repeater' is acceptable to use as a classifier in adult language, the children had not acquired the rule that 'repeater' is not normally used as a default classifier for any other objects except for human beings. It is conceivable that the children acquired a syntactic rule that every noun followed by a quantifier must be followed by its head noun. Therefore, repeaters were used overwhelmingly during the first few months for all three subjects of my study.

After the decline of the use of repeaters, children in the studies appeared to overgeneralise a great deal. There were a few general classifiers the children opted to use as their favourites, but the most frequently used one was *an*, a classifier whose meaning is equivalent to 'this one', 'that one' or 'thingie' in English. As mentioned earlier in Chapter 2, in adult Thai language, hundreds of classifiers are used in everyday life. Although there are general classifiers that can be used with many nouns, such as *an*, which can be used in many contexts, it is not always grammatically appropriate in all cases. The elicitation results show that the classifier *an* was used extensively by all three subjects as a general classifier, along with certain other general classifiers such as *bai* (in the case of the monolingual subject), and *tua*. It therefore can be said that *an* is the default form of Thai classifiers which all the subjects acquired.

The reason why all subjects chose to use *an* as a classifier was probably that, firstly, they might have heard this word frequently in conversations among adults, even though *an* is not always used as a classifier. For example:

(1) Chob an nai?
like one which?
'Which one do you like?'

(2) Me kee an?
have how many one?
'How many have you got?'

Secondly, although *an* is usually grammatically inappropriate when applied as a general classifier, it is widely used in everyday conversation as a substitute for any conventional classifier for small, irregularly shaped inanimate objects. However, *an* was not the only general classifier used by the subjects which provided evidence of overgeneralisation. The data show that the subjects also used *tua*, *bai*, *phun*, *paeng*, *taeng*, *lug* as the overgeneralisation depending on their concept of the classifier meaning at the time. These overgeneralisations were temporary, and normally were quickly replaced by their newly acquired classifiers in the following months.

Overgeneralisation in children brings into focus the emergentism approach of Kuczaj (1977), Rumelhart & McCelland (1995), and Maratsos's (1999) 'competition hypothesis'.

According to the competition hypothesis theory, the irregular and regularised forms are both initially acceptable alternatives once the regular form is productive and the irregular form of the particular word is learned.

The coexistence of the irregulars and regularised forms of the three subjects' classifier acquisition is not at all surprising. There is a good deal of evidence in this research supporting the competition hypothesis, i.e. that children tend to produce regularised forms of the classifiers (*an*) even when they had already acquired an irregular form of the classifiers. It is true that all three subjects acquired a set of rules, used them appropriately for some time, and then suddenly stopped using them for a few months before beginning to use the same set of rules all over again. The phenomena appear to be universally valid as no differences were found among the bilingual subjects and the monolingual subject.

The bilingual subject (UK), for instance, acquired the classifier *lung*, which is an adult classifier for a house. She used it appropriately to classify 'house' (*ban*) in the fifth month, and then stopped using it for the next two months, using *an* instead. However, *lung* emerged again in the eighth month, when she again used it to classify 'house' (*ban*). She then stopped using this classifier for the next two months until she suddenly picked it up again and used it to classify 'house' (*ban*) in the eleventh and twelfth months.

The monolingual subject was no different in this respect. She acquired the classifier *phun*, which is a classifier for a towel, a rug, and a handkerchief, as early as the fourth month. She first applied this classifier to 'towel' (*pa-ched-tua*) in the fourth month, and stopped using it for two months, before starting to use it again to classify 'rug' (*prom-ched-tao*) in the seventh month. It was not until the ninth month that the subject repeatedly used the classifier *phun* with 'handkerchief' (*pa-ched-na*), 'rug' (*prom-ched-tao*), and 'towel' (*pa-ched-tua*) and continued to do so until the end of the twelfth month.

It is noted that during the periods when the children "forgot" to use the appropriate classifiers, they tended to use the regularised form, the general classifier *an* as a substitute for most of them. The explanation for this phenomenon seems to be that the children had already acquired the appropriate classifiers but had difficulties in retrieving them. In the competition period, the children appear to be in the stage of "reorganisation". When any irregular, adult-form classifier was not readily retrievable, the regularised, general classifier *an* was applied instead. Once the children had heard more and practised more, retrievability would be improved, the regularised general classifier would be suppressed and the irregular, adult form classifier would be used again. Therefore, the data from this research agree with the competition hypothesis that irregulars and regularised classifiers can appear side by side in the competition period as discussed above. It can be concluded that the results from this research supports the opposing competition hypothesis to explain the children's process of classifier acquisition.

The next sequences of the classifier acquisition in children after the overuse of general classifiers are the use of referent-based overextensions followed by the emerging adult classifier usage. Analyses about how children overextend and why children overextend have already been analysed in the previous section (6.2) so I will not scrutinise them again here. To summarise, overextension in children is the product of the child's learning how classifiers work in Thai before they acquire a fully developed adult-like classifier system. Although children seem to pay particular attention to shape in acquiring new classifiers, this is because shape is usually the most salient characteristic of the objects children could perceive. However, shape is not the sole property children use to classify objects. According to the elicitation results, taxonomy, texture, function, material, and thematic relations are also important for children to develop their classifier acquisition system.

After the children produced a great number of overgeneralisations and overextensions in their classifier acquisition system, the notion that a classifier must somehow relate to the head noun and reflect its properties, e.g. shape, function, materials, etc. began to develop. Certain patterns about the classifier system emerged from this point. According to Slobin (2002), when a child develops a successful explanatory structure for part of the exposed language, the language structures itself as it is learned. This is where children develop their 'typological bootstrapping' and consequently they develop very quickly towards the adult-like classifier system. According to Gathercole (2002a), 'children can take advantage of regularities in semantic-syntactic linkages to bootstrap into the meaning of new words of similar category, even by 2 years of age' (Gathercole: 2002a:64). Therefore, it is not surprising that all subjects in the current study developed their classifier system towards the adult system very quickly during their last few months of the elicitation sessions.

In conclusion, the monolingual and bilingual children in this study have systematically and chronologically produced a comparable sequence of development of the use of classifiers. The sequence is not accidental, but orderly, as summarised in the following diagram:

Silent responses → Repeaters → Over-generalisation → Over-extensions → Adult classifiers

Diagram 2: Sequence of development of the use of classifiers in children

6.4 Why do children sometimes use other types of syntactic categories or create novel words as classifiers?

One of the interesting aspects arising from the results of this study is the creation of novel classifiers in children. Why did the subjects create novel classifiers during the early stages of classifier acquisition by themselves? And why were most of the newly created classifiers adjectives or nouns reflecting certain salient properties of the head nouns?

It is significant to note that all three subjects created novel classifiers randomly during their elicitation sessions. The creation of novel classifiers is not solely made by either the monolingual or the bilinguals alone. In fact, children created their own classifiers, regardless of how many languages they spoke. This finding reflects that the creation of novel words is a byproduct of the classifier acquisition in children through which each child has to experience. Therefore, the novel word creation does not cause difference or delay along the process of classifier acquisition in monolingual and bilingual children in the acquisition of classifiers at all.

For the monolingual subject, evidence suggests that she started using adjectives as classifiers when she was at the chronological age of 3;5, at the 2nd session of her elicitation series. She continued using adjectives as classifiers for various nouns from the list until the 6th session of her elicitation series, when her chronological age reached 3;9, and stopped creating new classifiers afterwards. The bilingual subject (UK), on the other hand, started creating new classifiers relatively late compared to her monolingual counterpart, but similarly produced adjectives which reflected dominant properties of the objects when she was at the age of 3;8 (during her 7th session of the elicitation series). She continued doing so until the 12th session when her chronological age reached 4;1. As the researcher acquired no data in the following months, it is not clear when she stopped creating new classifiers by using adjectives. The bilingual subject (TH), likewise, started using adjectives as classifiers when he was at the chronological age of 3;5 (during his 5th session of the elicitation series) and continued doing so until the last session of the series when he was 3;6. Regrettably, data from the following months have not been obtained in this present study.

Examples of classifiers made up by each subject are shown in the following tables:

Monolingual subj.				
Head nouns	**Chronological age (session)**	**Created classifier**	**Meaning**	**Adult classifiers**
Hat (*muak*)	3;5 (2nd)	klom (adj.)	round	bai
Tooth (*fun*)	3;7 (4th)	laem (adj.)	sharp	si
Paper (*kradad*)	3;7 (4th)	baen (adj.)	flat	paen
Candle (*tian*)	3;8 (5th)	laem (adj.)	sharp	taeng
Ring (*waen*)	3:9 (6th)	klom (adj.)	round	wong
Bilingual subj. (UK)				
Head nouns	**Chronological age (session)**	**Created classifier**	**Meaning**	**Adult classifiers**
Hat (*muak*)	3;8 (7th)	klom (adj.)	round	bai
Plate (*jan*)	3;8 (7th)	klom (adj.)	round	bai
Knife (*miid*)	3;9 (8th)	laem (adj.)	sharp	lem
Needle (*tian*)	3;9 (8th)	laem (adj.)	sharp	lem
Tooth (*fun*)	4;1 (12th)	laem (adj.)	sharp	si
Bilingual subj. (TH)				
Head nouns	**Chronological age (session)**	**Created classifier**	**Meaning**	**Adult classifiers**
Hat (*muak*)	3;5 (5th)	klom (adj.)	round	bai
Plate (*jan*)	3;5 (5th)	klom (adj.)	round	bai
Book (*nungsu*)	3;6 (6th)	baen (adj.)	flat	lem

Table 41: examples of the use of adjectives as classifiers that each subject created during their elicitation sessions

It is noticeable that there were only three adjectives the children chose to use, *klom* (round), *laem* (sharp), and *baen* (flat) and there is a striking consistency across all three subjects in their choice of adjectives. It can be assumed that at this stage the children knew that there was a relationship between a classifier and a head noun. The classifier in most cases reflects the most salient characteristics of the head noun. It is interesting to note that all three subjects similarly used *klom* (round) as a classifier at least twice in their elicitation sessions. This implies that 'roundness' may be the most basic attribute that children can conceptualise. Moreover, we can suggest that the children had acquired a rule that a classifier must reflect some feature of the head noun but had not yet acquired appropriate classifiers to use with particular objects, because the number of classifiers is so abundant. So the most straightforward way for them when they had not yet acquired appropriate classifiers was to create new ones which also denote properties of the objects.

According to Smith, 'children start learning nouns and adjectives in the very same way, with no knowledge about the differences between shape and other properties or the differences between nouns and adjectives' (Smith 1999:292). In other words, children cannot differentiate classifiers and adjectives when they are young; they simply use adjectives according to their meaning, in order to reflect the most salient properties of the head nouns. It is not only adjectives that children used as classifiers, they also occasionally created novel classifiers using nouns or verbs which reflected the shape, texture, or function of the head nouns. For example, when the monolingual subject was at the chronological age of 3;7 (her 4th session), she used the verb (*yep* – to sew) to classify 'needle' (*khem*) as it is no doubt functionally related to the object, and *laem*, an adjective meaning 'sharp', which she used to classify 'candle' (*tian*) is also analogical, related to a candle by virtue of its slim, pointed shape. Therefore, it can be concluded that the children sometimes used adjectives and other syntactic categories such as nouns and verbs because they were getting distracted by the semantic relationship between nouns and classifiers, and this is why they were mixing other types of syntactic categories into their classifier systems.

6.5 Why do bilingual children sometimes use English forms as classifiers?

As has been discussed in the literature review chapter, linguistic transference in bilingual children can be seen at different levels, namely syntactic, semantic, lexical and phonological. In this part of the research, I will attempt to ascertain whether any linguistic transference can be said to have occurred in the bilingual children's speech during the elicitation sessions and thus to determine whether the two languages interfered with each other at any point in either subject's classifier acquisition process.

According to the results of the study, no substantive claims can be made regarding syntactic, semantic or phonological transference. However, our two bilingual subjects demonstrated a certain degree of lexical transference as explained below.

According to the literature review, lexical transference can occur in a number of circumstances. Firstly, lexical transference happens when there is a 'vocabulary gap': the bilingual child cannot recall a vocabulary item in the language he is using, so the word with the same meaning in the other language is used instead (Saunders, 1982). In this first case, lexical transference is used consciously, as the child is aware that he is using a word from the other language. In the second case, it can happen when the bilingual child acquires a word in one language, but assumes that it can be used in both languages, so transference occurs unconsciously. The third case is when the child wants to make sure that he is using the word in the sense he intended.

Although it is reported by Saunders (1982) that lexical transfers are not frequent in children's speech, both the bilingual subjects in this study produced a few lexical transfers. It can be seen from the results that most of the subjects' lexical transfers occurred due to the vocabulary gap and were uttered consciously, as they were aware that they were using words from another language. Examples of lexical transference in our bilingual subjects are given below:

(1) **A. The bilingual subject (UK), and month 2 (age 3;3) month 3 (age 3;4)**

rod-jakkayan song *bicycle*
bicycle two *bicycle*
'two bicycles'

buri song *cigarette*
cigarette two *cigarette*
'two cigarettes'

B. The bilingual subject (UK),

tonmai song *tree*
tree two *tree*
'two trees'

C. The bilingual subject (UK), month 8 (age 3;9)

kow- ei song *chair*
chair two *chair*
'two chairs'

(2) **A. The bilingual subject (TH), month 2 (age 3;2) and , month 6 (age 3;6)**

dao song *star*
star two *star*
'two stars'

dokmai song *flower*
flower two *flower*
'two flowers'

Both examples suggest that the lexical transfers were used as repeaters because both subjects used English words to replace Thai classifiers. The reason I am convinced that the subjects had a 'vocabulary gap' and used the English words consciously is that every test item had been tested carefully before the elicitation series began, so that the subjects knew what they were called in both languages. Therefore, the assumption that the subjects had acquired the concept of a particular item in only one language and assumed that it was also the word in the other language is not possible in this case.

It is interesting to note that both subjects' difficulty in recalling particular words was not random. In the case of the bilingual subject (UK), the lexical transference occurred with 'bicycle' and 'cigarette' during Month 2 (age 3;3), and again in Month 3 (age 3;4). In the bilingual subject (TH)'s case, the lexical transference happened with 'star' in Month 2 (age 3;2) and Month 3 (age 3;3), and with 'flower' in Month 3 (age 3;3) and Month 6 (age 3;6). This suggests that the bilingual children may have had difficulty in recalling certain words in one language but had no trouble with others.

6.6 Conclusion

This thesis investigates the acquisition of the Thai classifier system in two three year old bilingual children and a monolingual child of approximately the same age. Results from the study indicate that there are no major differences in the sequence of the classifier acquisition among the monolingual subject and the bilingual subjects. It can be therefore suggested that bilingualism has no effect on the sequence of classifier acquisition in children. During the first few months of the elicitation sessions, it was evident that both bilingual subjects from this research had experienced a period of temporary delay which was reflected in their silent responses. Although the monolingual subject did not produce silent responses in this study, it cannot be concluded that the monolingual subject did not go through the phase of silent responses when she was younger and when her MLU matched her bilingual counterparts. The rest of the acquisition process among three subjects appears to be generally similar as they developed through phases of repeaters, overgeneralisation, overextensions and finally acquisition of the adult classifier system.

However, findings from the research indicate that there was a delay in the bilingual subject (TH)'s classifier acquisition process in comparison to the bilingual subject (UK). This evidence agrees with one of the hypotheses and supports Gathercole's (2002b) theory that the frequency of the input does affect time-scale of language acquisition. The bilingual subject (UK) had fewer opportunities to use Thai than her Thai counterpart; therefore her acquisition process lagged behind at the beginning even though the discrepancy was temporary.

The delay of time-scale in the classifier acquisition brought the issue of 'Nature – Nurture' into focus (*p.72*). The delay in acquisition of the bilingual (UK) will be evidence to show that Nurture (i.e. an environment) has a greater impact towards the subject's classifier acquisition, as suggested earlier in the literature review chapter. In spite of their approximately equal MLU scores from the start, the bilingual subject (UK) apparently obtained less input of Thai language from her environment, so the speed of her classifier acquisition was obviously slower than the bilingual subject (TH), who had greater Thai language input in her everyday life. Data from this study revealed that once she caught up with the bilingual subject (TH), there was almost no difference in the number of adult classifiers acquired by both at the end of the elicitation sessions.

This thesis also investigates overextensions, including the acquisition of object names in monolingual and bilingual children. The findings did not support Landau, Smith & Jones (1992) that young children rely heavily on perceptual properties, especially shape, when generalising words. Results from the study show that children do not depend solely on shape when they categorise nouns. In fact, shape is one among several properties children use when they categorise objects. Taxonomy, material, thematic relations, function, etc., are also important factors and take turns influencing children in their categorisation process. What the child perceives may also depend on what catches the child's eyes in a particular context, and children's overextensions change with age and maturity. Although findings from this thesis support the emergentist approach that a 'word meaning bias' emerges from the characteristics of the input, and children's knowledge of the possible meanings of words emerges from the children's accumulated experience in the language they are learning, the three subjects of this research, whether bilingual or not, tended to overextend nouns into groups by shape, as well as their preferences towards taxonomy, texture, materials, etc. in some occasions. It was also noticeable that children realised that there are relationships between nouns and classifiers so they attempted to use the semantic relations between the two. It was evident that the subjects acquired the generalisation that classifiers must reflect a salient characteristic of the head noun, therefore they tend to categorise and overextend a classifier with a noun which shares the similar properties, such as shape, taxonomy, texture, etc.

Although results from this study do not show that shape is the only constraint for children to make categorisation, the results are consistent with Markman's (1991) theory that, when facing novel count nouns, children tend to categorise objects on the basis of the shape bias. Findings suggest that, when children are asked to categorise objects that they have never seen before, they tend to make classifications based on both shape and taxonomy. On the other hand, when they are asked to categorise familiar objects in unconventional appearances, they seem to use the shape bias alone in categorising things, although they know the actual taxonomic class of the objects.

Findings from this study support the emergentist's competition hypothesis. The competition hypothesis explains why children use both regularised and irregular forms at times for a period of their classifier acquisition. The results are also consistent with Maratsos's (2000) findings that when the irregulars and regularised forms are learned, both of them are used randomly in the competition period as alternatives. According to this view, the irregular form is produced, because as the child grows older and experiences more input, the tendency for a child to use regular forms decreases gradually (only if the regular form is incorrect). It is rather common for irregulars and regularised forms to coexist during the process of language acquisition, as the results from this thesis have demonstrated.

The use of newly constructed classifiers by children, especially adjectives as classifiers, implies that children are mixing up the classifiers with other types of syntactic categories. Adjectives that children used as classifiers denoted the most salient properties of the given nouns so it is assumed that children were probably aware that a classifier should reflect characteristics of the head noun. When children had more input and gained more experience about language, they began to differentiate classifiers from adjectives and thus the use of adjectives as classifiers gradually disappeared.

Moreover, this present research found that there is no difference in the novel word acquisition between the monolingual subject and the bilingual subjects. All three subjects created their own novel classifiers, using nouns, adjectives, or even verbs as classifiers at some point of their classifier acquisition. The results confirm that there is no difference in the process of classifier acquisition. The use of novel classifiers in children is a byproduct of the overextensions in children; therefore they have to go through that in order to achieve the adult-like classifier usage.

References

Adams, K. L. and Conklin, N. F. (1973) Toward a theory of natural classification. *Papers from the Ninth Regional Meeting of the Chicago Linguistic Society*, 1-10.

Adams, K. L., Becker, A. and Conklin, N. F. (1975) Savoring the difference among classifier systems. *Paper presented at the Eighth International Conference on Sino-Tibetan Languages and Linguistics*. Berkeley, California.

Aikhenvald, A.Y. (2000). *Classifiers: A Typology of Noun Categorization Devices.* Oxford: Oxford University Press.

Allen, K. (1977). Classifiers. *Language* 53(2), 285-331.

Baldwin, D.A. (1989). Priorities in children's expectations about object label reference: Form over Color. *Child Development* 60, 1289-1306.

Bates, E., Elman, J., Johnson, M., Karmiloff-Smith, A., Parisi, D and Plunkett, K. (1998) Innateness and Emergentism. In William Bechtel & George Graham (Eds.), *A Companion to Cognitive Science*. Oxford: Basil Blackwell.

Bergman, C.R. (1976). Interference vs. interdependent development in infant bilingualism. In Keller, D., Teschner, R. and Viera, S. (eds.) (1976) *Bilingualism in the bicentennial and beyond*. New York: Bilingual Press/Editorial Bilingue, 86-96.

Bhatia, T.K. and Ritchie, W.C. (1999). The bilingual child: Some issues and perspectives. In Ritchie, W.C. and Bhatia, T.K. (eds.) (1996) *Handbook of child language acquisition.* New York: Academic Press.

Bialystock, E. (1991). Metalinguistic dimensions of bilingual language proficiency. In E. Biaystock (Ed.). *Language Processing in bilingual children:* Cambridge: Cambridge University Press, 113-140.

Bergman, C. R. (1976). Interference vs. interdependent development in infant bilingualism. In Keller, D., Teschner, R. and Viera, S. (eds.) (1976) *Bilingualism in the bicentennial and beyond.* New York: Bilingual Press/Editorial Bilingue, 86-96.

Bloom, P. (2000). *How children learn the meanings of words.* Cambridge, MA: MIT Press.

Borg, W.R. and Gall, M.D. (1989). *Educational Research.* NY: Longman.

Bowerman, M. (1994). From Universal to Language Specific in early grammatical development. *Philosophical Transactions of the Royal Society of London B* 346, 385-436.

Bowerman, M. (1996). The origins of children's spatial semantic categories: cognitive versus linguistic determinants. In J. J. Gumperz and S. C. Levinson (eds.), *Rethinking linguistic relativity.* Cambridge: Cambridge University Press, 145-176.

Bowerman, M. L., and S. Choi (2002). Shaping meanings for language: universal and language-specific in the acquisition of spatial semantic categories. In M. Bowerman and S.C. Levinson (eds.), *Language Acquisition and Conceptual development*. Cambridge: Cambridge University Press, 475-511.

Bowerman, M., L. de Leon, and S. Choi. (1995). Verbs, particles; and spatial semantics: learning to talk about spatial actions in typologically different languages. In E. V. Clark (ed.), *The proceedings of the 27th Annual Child Language Research Forum*. Stanford, CA: Centre for the study of Language and Information, 101-110.

Brown, R. (1973). *A first language*. Cambridge, MA: Harvard University Press.

Carey, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.

Carey, S. (1988). Lexical development. In Hirst, W. (ed.) (1988) *The making of cognitive science: Essays in honor of George A. Miller*. Cambridge, MA: Cambridge University Press.

Carpenter, K. (1986). Productivity and pragmatics of Thai classifiers. *Berkeley Linguistics Society: Proceedings of the Annual Meeting* 12, 14-25.

Carpenter, K. (1987). *How children learn to classify nouns in Thai*. PhD dissertation. Stanford University.

Carpenter, K. (1991). Later rather than sooner: Children's use of extra linguistic information in the acquisition of Thai classifiers. *Journal of Child Language* 18, 93-113.

Carpenter, K. (1992). Two dynamic views of classifier systems: Diachronic change and individual development. *Cognitive Linguistics* 3, 129-50.

Cazden, C. D. (1968). The acquisition of noun and verb inflections. *Child Development*, 39, 433-438.

Choi, S. and M. Bowerman. (1991). Learning to express motion events in English and Korean: the influence of language-specific lexicalization patterns. *Cognition,* 41, 83-121.

Chomsky, N. (1957). *Syntactic Structures*. The Hague: Mouton.

Chomsky, N. (1959). A Review of B. F. Skinner's 'Verbal Behavior'. *Language* 3, 26-58.

Chomsky, N. (1975). *Reflections on language*. New York: Parthenon Press.

Chomsky, N. (1981). *Lectures on Government and Binding*. Dordrecht: Foris Publications.

Chomsky, N. (1986). *Knowledge of Language: Its nature, origin, and use.* New York: Praeger.

Chomsky, N. (1988). *Language and Problems of Knowledge.* Cambridge, MA: MIT Press.

Clark, E. (1976). Universal categories: on the semantics of classifiers and children's early word meanings. In A. Juiliad (ed.), *Linguistic studies offered to Joseph Greenberg on the occasion of his sixtieth birthday*, vol 4: *Syntax*. Saratoga, CA: Anna Libri, 449-462.

Clark, E.V. (1973). What's in a word? On the child's acquisition of semantics in his first language. In Moore, T.E. (ed.) (1973) *Cognitive Development and the acquisition of language.* New York: Academic Press, 65-110.

Clark, E.V. (1977). Universal categories: on the semantics of classifiers and children's early word meanings. In Juilland, A. (ed.) (1977) *Linguistic Studies Offered to Joseph Greenberg.* Saratoga, CA: Anma Libri and Co.

Clark, E.V. (1993) *The lexicon in acquisition*. Cambridge, MA: Cambridge University Press.

Clyne, M. (1967). *Transference and Triggering: Observations on the Language Assimilation of Postwar German-Speaking Migrants in Australia.* The Hague: Nijhoff.

Conklin, N. (1981). *The semantics and syntax of numeral classification in Tai and Austronesian.* PhD dissertation. University of Michigan.

Crystal, D. (1974). Review of R. Brown, A first language, *Journal of Child Language* 1, 289-307.

De Houwer, A. (1987a). Gender marking in a young Dutch-English bilingual child. *Proceedings of the 1987 Child Language Seminar.* York: University of York, 53-65.

De Houwer, A. (1987b). *Two at a time: An exploration of how children acquire two languages from Birth.* PhD dissertation. Vrije Universiteit Brussels.

De Houwer, A. (1990). *The acquisition of two languages from birth: A case study.* Cambridge, England: Cambridge University Press.

De Houwer, A. (1995). Bilingual Language Acquisition. In Fletcher, P. and Macwhinney, B. (eds). (1995). *The handbook of child language.* Oxford: Blackwell Publishers.

Deepadung, S. (1997). Extension in the usage of the Thai classifier */tua/*. In Abramson, A.S. (ed.) (1997) *Southeast Asian Linguistic Studies in honour of Vichin Panupong.* Bangkok: Chulalongkorn University Press, 49-55.

Dixon, R. M. W. (1982). *Handbook of Australian Languages: 002.* John Benjabin Publishing Co.

Dromi, E., and Berman, R. (1982). A morphemic measure of early language development: Data from modern Hebrew. *Journal of Child Language*, 9, 403-424.

Dye, C. (1986). One lexicon or two? An alternative interpretation of early bilingual speech. *Journal of Child Language* 13, 591-93.

Eisele, J., & Aram, D., (1995). Lexical and grammatical development in children with early hemisphere damages: A cross-sectional view from birth to adoleslence. In Paul Fletcher & Brian MacWhinney (Eds.), *The Handbook of child language* (pp 664-689). Oxford: Basil Blackwell.

Elman, J., Bates, E., Johnson, M., Karmiloff-Smith, A., Parisi, D., & Plunkett, K. (in press). *Rethinking innateness: A connectionist perspective on development.* Cambridge, MA: MIT Press/Bradford Books.

Finlay, B., & Darlington, R. (1995). Linked regularities in the development and evolution of mammalian brains. *Science*, 268, 1578-1584.

Friedrich, P. (1970). Shape in grammar. *Language* 46(2), 379-407.

Gandour, J., Buckingjam, H., and Dardarananda, R. (1985). The dissolusion of numeral classifiers in Thai. *Linguistics* 23, 547-66.

Gandour, J., Petty, S. H., Dardarananda, R., Dechongkit, S., and Mukngoen, S. (1984). The acquisition of numeral classifiers in Thai. *Linguistics* 22, 455-79.

Garcia, E. (1983). *Early childhood bilingualism.* Albuquergue, NM: University of New Mexico Press.

Gathercole, V. C. M. (1986). Evaluating competing linguistic theories with child language data: the case of the mass-count distinction. *Linguistics and Philosophy*, 9, 151-190.

Gathercole, V. C. M. (1987). The contrastive hypothesis for the acquisition of word meanings: a reconsideration of the theory. *Journal of Child Language,* 14, 493-531.

Gathercole, V. C. M.(1989). Contrast: a semantic constraint? *Child Language,* 16, 685-701.

Gathercole, V. C .M. (2002a). Monolingual and bilingual acquisition: Learning different treatments of that-trace phenomena in English and Spanish. In D. Kimbrough Oller & R. E. Eilers (Eds.), *Language and literacy in bilingual children. Multilingual matters*, 220-254.

Gathercole, V. C. M. (2002b). Command of the mass/count distinction in bilingual and monolingual children: An English morphosyntactic distinction. In D. Kimbrough Oller & R. E. Eilers (Eds.), *Language and literacy in bilingual children.* Multilingual matters, 175-206.

Gathercole, V. C. M. (2002c). Grammatical gender in bilingual and monolingual children: A Spanish morphosyntactic distinction. In D. Kimbrough Oller & R. E. Eilers (Eds.), *Language and literacy in bilingual children*. Multilingual matters, 260-278.

Gathercole, V. C. M., Cramer, L. J., Somerville, S. C. and Jansen op de Harr, M. (1995). Ontological categories and function: Acquisition of new names. *Cognitive Development*, 10, 221-240.

Gathercole, V. C. M., and Cramer, L. (in submission). *The acquisition of word meaning: The development of a facility to coordinate information.*

Gathercole, V. C. M. and Min, E. (1997). Word meaning biases or language-specific effects? Evidence from English, Spanish, and Korean. *First Language*, 17, 31-56.

Genesee, F. (1989). Early bilingual language development: One language or two? *Journal of Child Language* 16, 161-79.

Genesee, F. (1989). Early bilingual development: One language or two? *Journal of Child Language*, 16, 161-179.

Genesee, F., Nicoladis, E. and Paradis, J. (1995). Language Differentiation in early bilingual development. *Child Language* 22, 611-31.

Gleitman, L. R. (1990). First principles organise attention to and learning about relevant data: Number and animate-inanimate distinction as examples. *Cognitive Science*, 14, 79-109.

Golinkoff, R.M., Mervis, C.B. and Hirsh-Pasek, K. (1994). Early object labels: The case for a development lexical principles framework. *Journal of Child Language* 21, 125-55.

Gopnik, A., and Meltzoff, A. N. (1987). The development of categorization in the second year and its relation to other cognitive and linguistic developments. *Child Development,* 58, 1523-1531.

Goral, D.R. (1978). Numeral classifier systems: a Southeast Asian cross-linguistic analysis. *Linguistics of the Tibeto-Burman Area* 4(1), 1-72.

Greenberg, J.H. (1972). Numeral classifiers and substantial number: problems in the genesis of a linguistic type. *Stanford University Working Papers on Language Universals* 9, 1-39.

Grosjean, F. (1982). *Life with two languages*. Cambridge, MA: Cambridge University Press.

Haas, M. R. (1942). The use of numeral classifiers in Thai. *Language* 18, 201-5.

Haugen, E. (1972). The stigmata of bilingualism. In Dil, A.S. (ed.) *The Ecology of Language*. Stanford: Stanford University Press, 307-44.

Hiranburana, S. (1979). A classification of Thai classifiers. In Nyuyen Dang Liem (ed.) (1979) *Southeast Asian Linguistic Studies, Vol. 4*. Canberra: Australian National University, 39-54.

Hundius, H., and Kolver, U. (1983). Syntax and semantics of numeral classifiers in Thai. *Studies in Language* 7, 165-214.

Huttenlocher, J. and Smiley, P. (1987). Early word meanings: The case of object names. *Cognitive Psychology* 19, 63-89.

Hyams, N. (1986). *Language Acquisition and the Theory of Parameters.* Dordrecht: Reidel.

Hyltenstam, K. and Obler, L. (eds.) (1989). *Bilingualism across lifespan: Aspects of acquisition, maturity and loss.* Cambridge: Cambridge University Press, 13-40.

Ingris, D. (2003). Conceptual structure of numeral classifiers in Thai. In Eugene H. Casad and Gary B. Palmer (eds.) (2003) *Cognitive Linguistics and Non-Indo-European Languages*. Mouton de Gruyter: New York, 223-246.

Jantanamalaga, P. (1989). Social Issue in Thai Classifier Usage. *Language Science* 10 (2), 313-330.

Jaturongkachoke, K. (1995). *Semantics of the Thai Classifier System.* Ph.D dissertation. Arizona State University.

Jones, R. B. Jr. (1970). Classifier constructions in Southeast Asia. *Journal of American Oriental Society* 90, 1-12.

Jones, S. S., Smith, L.B. and Landau, B. (1991). Object properties and knowledge in early lexical learning. *Child Development* 62, 499-516.

Jones, S., and Smith, L. B. (1993). The place of perceptions in children's concepts. *Cognitive Development,* 8, 113-140.

Karmiloff-Smith, A. (1994). Innate constraints and developmental change. In Paul Bloom (ed.), *Language Acquisition: Core readings.* Cambridge, MA: MIT Press.

Katz, J. J. (1972). *Semantic Theory.* New York: Harper and Row.

Kessler, C. (1984). Language acquisition in bilingual children. In Miller, N. (ed.) (1984) *Bilingualism and language disability: Assessment and remedy.* London: Croom Helm, 26-54.

Klausen, T. and Hayashi, M. (1990). A cross linguistic study of the development of bilingualism – reorganization in early lexical development. *The European Journal of Intercultural Studies* 1, 31-41.

Kuczaj, S. A. (1977). The acquisition of regular and irregular past tense forms. *Journal of Verbal learning and verbal behaviour,* 16, 319-326.

Lakoff, G. (1987a). Cognitive models and prototype theory. In U. Neisser (ed.) *Emory Symposia in Concepts and Conceptual development: Ecological and Intellectual factors in Categorization.* Cambridge: Cambridge University Press.

Lakoff, G. (1987b). *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind.* The University of Chicago Press.

Landau, B., Smith, L., and Jones, S. (1992). *Syntactic context and the shape bias in children and adult's lexical learning. Journal of Memory and Language,* 31, 807-825.

Landau, B., Smith, L.B. and Jones, S.S. (1988). The importance of shape in early lexical learning. *Cognitive Development* 3, 299-31.

Landau, B., Smith, L.B. and Jones, S.S. (1998). Object shape, object function, and object name. *Journal of Memory and Language* 38, 1-27.

Lanza, E. (1997). *Language mixing in infant bilingualism: A sociolinguistic perspective.* Oxford: Oxford University Press.

Lehman, F. K. (1979). Aspects of a formal theory of noun classifiers. *Studies in Language* 3, 153-80.

Lenneberg, E. (1964). The capacity for language acquisition. In Fodor, J.A. and Katz, J.J. (eds.) (1964) *The structure of language: Readings in the philosophy of language.* Englewood Cliffs, NJ: Prentice-Hall.

Li Wei (2000). *The bilingualism reader*. London: Routledge.

Lindham, K. and Padilla, A. (1978). Language mixing in bilingual children. *Journal of Child Language* 5, 327-35.

Locke, J. (1965). *An essay concerning human understanding.* New York: Macmillan (originally published 1706).

Macwhinney, B. (eds.) (1995). *The handbook of Child Language.* Oxford: Blackwell Publishers.

Maratsos, M. (1999). More overregularisations after all: new data and discussion on Marcus, Pinker, Ullman, Hollander, Rosen & Xu. *Child Language*, 27, 183-212.

Maratsos, M. (2000). More overregularisations after all. *Journal of Child Language,28*, 32-54.

Marcus, G., Pinker, S., Ullman, M., Hollander, M., Rosen, T. and Xu Fei (1992). Overregularisations in language acquisition. *Monograph of the society for research in child development*, Serial no. 228, Vol. 57.

Markman, E. M. (1989). *Categorization and naming in children: Problems of induction.* Cambridge, MA: MIT Press.

Markman, E. M. (1990). Constraints children place on word meanings. *Cognitive Science*, 14, 57-77.

Markman, E.M. (1991). *Categorization and naming in children: Problems of induction*. Cambridge, MA: MIT Press.

Markman, E. M. (1992). The whole object, taxonomic, and mutual exclusivity assumptions as initial constraints on word meaning. In S. A. Gelman and J. P. Byrnes (eds.), *Perspectives on language and thought: interrelations in development.* Cambridge: Cambridge University Press, 72-106.

Markman, E. M. (1994). Constraints children place on word meanings. In P. Bloom (ed.) *Language acquisition: Core readings*. Cambridge: Cambridge University Press, 154-173.

Markman, E. M. and Hutchison, J.E. (1984). Children's sensitivity to constraints on word meaning: Taxonomic vs. thematic relations. *Cognitive Psychology* 16, 1-27.

McLaughlin, B. (1978). *Second language acquisition in childhood. Vol. 1: Preschool children*. Hillsdale, NJ: Erlbaum.

Meisel, J. M. (1985). Les phases initiales du development des notions temporelles, aspectuelles et de modes d'action. *Lingua* 66, 321-74.

Meisel, J. M. (1986). Word order and case marking in early child language, Evidence from simultaneous acquisition of two first languages: French and German. *Linguistics* 24, 123-83.

Meisel, J. M. (1990). INFL-ection: Subjects and subject-verb agreement. In Meisel, J.M. (ed.) (1990) *Two first languages: Early grammatical development in bilingual children*. Dordrecht: Foris, 237-98.

Meisel, J.M. (1994). Code-switching in young bilingual children. *Studies in second Language Acquisition* 16, 413-39.

Merrian, S. and Simpson, E. (1995). *A Guide to Research for Educators and Trainers of Adults (second Edition)*. Malabar, Florida: Krieger Publishing Company.

Merriman, W. E. (1999). Competition, Attention, and Young Children's Lexical Processing. In B. MacWhinney (ed) (1999) *The Emergence of Language.* Lawrence Erlbaum Associates, Inc., 331-358.

Nelson, K. (1974). Concepts, word, and sentence: Intercorrelations in acquisition and development. *Psychological Review*, 81, 267-285.

Nicoladis, E. (1994). Simultaneous and sequential acquisition in Nigerian children. *First Language* 5, 57-73.

Nicoladis, E. and Genesee, F. (1996). A longitudinal study of pragmatic differentiation in young bilingual children. *Language Learning* 46, 439-64.

Padilla, A. and Liebman, E. (1975) Language acquisition in the bilingual child. *Bilingual Review* 2, 34-55.

Palakornkul, A. (1976). Some observations on variation and changes in the use of classifiers in Thai. *Pasaa* 6, 189-99.

Peccei, J. S. (1994). *Child Language*. London: Routledge.

Pinker, S. (1984). *Language learnability and language development*. Cambridge, MA: Harvard University Press.

Pinker, S. (1994). *The language instinct*. New York: HarperCollins.

Pinker, S. (1997). *How the mind works*. New York: Norton.

Pinker, S. (1999). *Words and Rules: The ingredients of language*. London: Phoenix.

Pinker, S. (2000). *Words and Rules: The Ingredients of Language (Science Masters S.)*. London, Phoenix Mass Market P/bk.

Placzek, J. (1983a). *Classifier Categorization for Books, Oxcarts and Tools in Certain Tai.* Paper Presented at the Sin-Tibetan Conference 16, University of Washington, Seattle.

Placzek, J. (1983b). *A Southeast Asian Basic Shape Metaphor and the Standard Thai Noun Classifiers for Artifacts.* M.S. Dissertation. University of British Columbia, Vancouver.

Placzek, J. (1983c). *Semantic Relations between Nouns with a Common classifier in Standard Thai.* Paper Presented at the Symposium on Categorization and Noun Classification, University of Oregon.

Placzek, J. (1992). The Perceptual Foundation of the Thai Classifier System. In Compton, C.J. and Hartman, J.F. (eds) (1992) *Paper on Tai Languages, Linguistics and literature*, Centre of Southeast Asian Studies, Northern Illinois University, De Kalb, 154-67.

Quay, S. (1993). *Explaining language choice in early infant bilingualism.* Paper presented at the Ninth Sociolinguistics Symposium, University of Reading, England.

Quine, W.V.O. (1960). *Word and object.* Cambridge, MA: MIT Press.

Redlinger, W.E. and Park, T. (1980). Language mixing in young bilinguals. *Journal of Child Language* 7, 337-52.

Rescorla, L. (1980). Overextensions in early language development. *Journal of Child Language* 7, 321-25.

Rescorla, L. (1981). Category development in early language. *Journal of Child Language* 8, 350-75.

Romaine, S. (1989). *Bilingualism*. Oxford: Blackwell.

Romaine, S. (1999). Bilingual language development. In Barrett, M. (ed.) *The Development of Language: Studies in Developmental Psychology*. Sussex: Psychology Press, 251-276.

Rosch, E. (1975). Natural Categories. *Cognitive Psychology* 4, 328-50.

Sharwood-Smith, M. and Kellerman, E. (1986). *Crosslinguistic influence in second language acquisition: an introduction.* NY: Pergamon Institute of English, 1-9.

Slobin, D. I. (2002). Form-function relations: how do children find out what they are? In M. Bowerman and S.C. Levinson (eds.), *Language Acquisition and Conceptual development*. Cambridge: Cambridge University Press, 101-131.

Slobin, D. I. (1973). Cognitive prerequisites for the development of grammar. In Ferguson, C.A. and Slobin, D.I. (eds.) (1973) *Studies of Child Language Development*. New York: Holt, Rinehart and Winston.

Smith, L. B. (1995). Self-organizing processes in learning to learn words: Development is not induction. *The Minnesota Symposia on Child Psychology, Volume 28. Basic and applied perspectives on learning, cognition and development* (page 1-32). Mahwah, NJ: Lawrence Erlbaum Associates.

Smith, L. B. (1999). Children's Noun Learning: How General Learning Processes Make Specialized Learning Mechanisms. In B. MacWhinney (ed) (1999) *The Emergence of Language.* Lawrence Erlbaum Associates, Inc., 278-303.

Smith, L. B., Jones, S.S. and Landau, B. (1992). Count nouns, adjectives, and perceptual properties in children's novel interpretations. *Developmental Psychology* 28, 273-86.

Smith, L. B., Jones, S.S. and Landau, B. (1996). Naming in young children: A dumb attentional mechanism? *Cognition* 60, 143-71.

Suanders, G. (1982). *Bilingual Children: Guidance for the family.* Bath: Pitman Press.

Sunkaburanuruk, S. (1999). *Use of classifiers in modern standard Thai by speakers of different ages.* M.A. dissertation. Chulalongkorn University, Bangkok.

Swain, M. (1972). *Bilingualism as a first language.* PhD dissertation. University of California, Irvine.

Taeschner, T. (1983). *The sun is feminine: A study on language acquisition in bilingual children*. Berlin, Germany: Springer.

Thompson, J. and Chapman, R. (1977). Who is "daddy"? revisited: the status of two year olds' overextended words in use and comprehension. *Journal of Child Language* 4, 359-75.

Toribio, A. and Brown, B. (1994). Feature checking and the syntax of language contact. In McLaughlin. D. and McEwan, S. (eds.) (1994) *Proceedings of the 19th Boston University Conference on Language Development.* Somerville. MA: Cascadilla, 629-42.

Tuaycharoen, P. (1984). Developmental strategic in the acquisition of numeral classifiers in Thai. *Selected papers from the International Symposium on Language and Linguistics at Chiangmai University*. Chiangmai, Thailand, 203-22.

Tversky, B. (1985). The development of taxonomic organization of normal and pictured categories. *Developmental Psychology* 21, 1111-19.

Uppakitsilapasarn. (1981). *Principles of the Thai language*. Bangkok: Thai Press.

Valian, V. (1990). Null subjects: A problem for parameter setting models of language acquisition. *Cognition*, 35, 105-122.

Vihman, M. (1982). The acquisition of morphology by a bilingual child, a whole-word approach. *Applied Psycholinguistics* 3, 141-60.

Vihman, M. (1985). Language differentiation by the bilingual infant. *Journal of Child Language* 12, 297-324.

Vihman, M. (1986). More on language differentiation. *Journal of Child Language* 13, 595-97.

Volterra, V. and Taeschner, T. (1978). The acquisition and development of language by bilingual children. *Journal of child language* 5, 311-26.

Vygotsky, L.S. (1962). *Thought and Language.* Cambridge, MA: M.I.T Press (originally published, 1934).

Waxman, S. R. (1994). The development of an appreciation of specific linkages between linguistic and conceptual organization. *Lingua* 92, 229-57.

Whorf, B.L. (1956). The relation of habitual thought and behavior to language. In Carroll, J.B. (ed.) (1956) *Language, Thought and Reality.* Cambridge: The M.I.T Press, 134-59.

Wray, D. and Medwell, J. (1998). *Teaching English in Primary Schools: a handbook of teaching strategies and key ideas in literacy* London: Letts Educational

Appendix 1 Experimental data of the monolingual subject

	Test item	Gloss	Target	Test 1	Test 2	Test 3	Test 4
1	bird	/nok/	tua	nok	tua	tua	tua
2	chicken	/kai/	tua	kai	tua	tua	tua
3	elephant	/chang/	tua	chang	tua	tua	tua
4	child	/dek/	kon	kon	kon	kon	kon
5	priest	/pra/	ong	kon	kon	kon	kon
6	horse	/ma/	tua	ma	tua	tua	tua
7	soldier	/tahan/	kon	kon	kon	kon	kon
8	orange	/som/	lug,phon	phon	phon	lug	an
9	banana	/kluai/	lug,bai	kluai	phon	bai	an
10	grape	angun/	puang	angun	puang	puang	puang
11	bananas	/kluai/	wi	kluai	fong	puang	an
12	spoon and fork	/chonsom/	khu	bai	taeng	taeng	an
13	shoe	/rongtao/	khu	rongtao	tua	an	an
14	sock	/tungtao/	khu	bai	tua	an	puang
15	house	/ban/	lung	ban	ban	ban	an
16	tent	/tent/	lung	tent	ban	ban	tua
17	castle	/prasard/	lung	prasard	raka	ban	ban
18	hat	/muak/	bai	muak	klom	an	bai
19	plate	/jan/	bai	jan	jan	bai	bai
20	cup	/tuai/	bai	bai	tuai	bai	tua
21	playing card	/pai/	bai	bai	kradard	an	an
22	chair	/kawii/	tua	kawii	ka	an	tua
23	table	/toh/	tua	bai	toh	an	tua
24	shirt	/sya/	tua	sya	pa	an	tua
25	match	maikidfai/	klong	maikid	thoop	klong	kid
26	tooth	/fun/	si	fun	fun	an	laem
27	watch	/nalika/	ryan	bai	nalika	an	an
28	train	/rodfai/	khabuan	rodfai	rodfai	rod	lam
29	milk	/nom/	krapong	nom	nom	klong	klong
30	7-Up	/seven up/	kuad	seven-up	kuad	kuad	kuad
31	star	/dao/	duang	dao	tua	tua	duang
32	stamp	/stamp/	duang	bai	kradard	an	an
33	cigarette	/buri/	muan	buri	thoop	taeng	taeng
34	button	/kradum/	med	kradum	tua	tua	med
35	paracetamol	/yapara/	med	ya	tua	med	ya
36	pearl	/kaimuk/	med	muk	tua	tua	an
37	cloud	/meg/	korn	meg	korn	korn	korn
38	flashlight battery	/tanfaichai/	korn	tanfai	bai	bai	korn
39	marble	/lukhin/	korn	lughin	korn	med	korn
40	boat	/rua/	lam	bai	bai	bai	lam
41	bicycle	/rodjakkayan/	khan	jakyan	rod	tua	khan
42	car	/rodyon/	khan	rod	rod	tua	an
43	airplane	/kruengbin/	lam	bai	kryng	tua	lam
44	paper	/kradard/	paen	kradard	kradard	kradard	baen
45	handkerchief	/pachedna/	phun	pacedna	pa	pa	an
46	rug	/promchedtao/	phun	prom	pa	pa	an
47	towel	/pachedtua/	phun	pa	tua	tua	phun
48	knife	/miid/	lem	miid	tua	taeng	an
49	needle	/khem/	lem	khem	khem	taeng	yep

Appendix 1 Experimental data of the monolingual subject (cont.)

	Test item	Gloss	Target	Test 1	Test 2	Test 3	Test 4
50	candle	/tian/	lem	tian	taeng	taeng	new
51	book	/nungsu/	lem	nungsu	lem	lem	lem
52	pen	/pakka/	dam	pakka	taeng	taeng	taeng
53	ice cream	/itim/	taeng	itim	taeng	taeng	taeng
54	tree	/tonmai/	ton	tonmai	ton	ton	taeng
55	pole	/sao/	ton	sao	an	an	sao
56	hair	/pom/	sen	pom	tua	pom	sen
57	belt	/kemkud/	sen,sai	kud	ton	an	sen
58	necklace	/saisoi/	sen,sai	soi	tua	an	an
59	rope	/chuak/	sen	chuak	chuak	chuak	chuak
60	chain	/so/	sen	soi	tua	an	an
61	road	/thanon/	sai	thanon	thanon	thanon	lu
62	door	/pratu/	ban	pratu	ban	pratu	ban
63	radio	/wittayu/	kruang	wittayu	wittayu	wittayu	an
64	telephone	/torasap/	kruang	bai	an	an	an
65	toilet paper	/kadchamra/	muan	kradard	pa	tua	korn
66	toothpaste	/yasifun/	lod	bai	taeng	taeng	an
67	key	/khunjae/	dok	jae	jae	jae	an
68	rose	/dogkularp/	dok	dokmai	dokmai	dokmai	an
69	tulip	/dogtulip/	dok	dokmai	dokmai	dokmai	an
70	arrow	/lukthanu/	dok	bai	taeng	taeng	an
71	ring	/waen/	wong	waen	waen	waen	klom
72	keys	/phuangkunja/	phuang	jae	an	puang	an

Appendix 1 Experimental data of the monolingual subject (cont.)

	Test item	Gloss	Target	Test 5	Test 6	Test 7	Test 8
1	bird	/nok/	tua	tua	tua	tua	tua
2	chicken	/kai/	tua	tua	tua	tua	tua
3	elephant	/chang/	tua	tua	tua	tua	tua
4	child	/dek/	kon	kon	kon	kon	kon
5	priest	/pra/	ong	kon	kon	kon	kon
6	horse	/ma/	tua	tua	tua	tua	tua
7	soldier	/tahan/	kon	kon	kon	kon	kon
8	orange	/som/	lug,phon	phon	lug	lug	phon
9	banana	/kluai/	lug,bai	puak	an	an	phon
10	grape	angun/	puang	phon	puang	puang	puang
11	bananas	/kluai/	wi	ruam	puang	wi	wi
12	spoon and fork	/chonsom/	khu	an	an	an	an
13	shoe	/rongtao/	khu	an	an	an	kang
14	sock	/tungtao/	khu	an	an	an	tung
15	house	/ban/	lung	lung	an	lung	lung
16	tent	/tent/	lung	ban	lung	an	lung
17	castle	/prasard/	lung	lung	tua	ong	khan
18	hat	/muak/	bai	suam	bai	bai	bai
19	plate	/jan/	bai	bai	an	an	ban
20	cup	/tuai/	bai	an	bai	an	kaew
21	playing card	/pai/	bai	an	an	an	paen
22	chair	/kawii/	tua	an	an	an	tua
23	table	/toh/	tua	an	an	an	an
24	shirt	/sya/	tua	an	an	tua	an
25	match	maikidfai/	klong	klong	klong	an	an
26	tooth	/fun/	si	an	an	an	taeng
27	watch	/nalika/	ryan	sai	an	an	an
28	train	/rodfai/	khabuan	khan	khan	kabuan	kabuan
29	milk	/nom/	krapong	klong	klong	klong	klong
30	7-Up	/seven up/	kuad	an	an	an	kuad
31	star	/dao/	duang	duang	tua	duang	duang
32	stamp	/stamp/	duang	bai	an	an	an
33	cigarette	/buri/	muan	an	an	an	taeng
34	button	/kradum/	med	an	an	an	med
35	paracetamol	/yapara/	med	med	an	an	ya
36	pearl	/kaimuk/	med	an	an	korn	med
37	cloud	/meg/	korn	an	an	korn	mog
38	flashlight	/tanfaichai/	korn	an	an	an	an
39	marble	/lukhin/	korn	med	an	korn	an
40	boat	/rua/	lam	lam	an	an	khan
41	bicycle	/rodjakkayan/	khan	an	an	an	khan
42	car	/rodyon/	khan	an	an	an	khan
43	airplane	/kruengbin/	lam	lam	lam	an	khan
44	paper	/kradard/	paen	bai	an	paen	paen
45	handkerchief	/pachedna/	phun	an	an	paen	paen
46	rug	/promchedtao/	phun	an	an	phun	bai
47	towel	/pachedtua/	phun	an	tua	an	phun
48	knife	/miid/	lem	an	an	an	an
49	needle	/khem/	lem	an	an	an	an

Appendix 1 Experimental data of the monolingual subject (cont.)

	Test item	Gloss	Target	Test 5	Test 6	Test 7	Test 8
50	candle	/tian/	lem	laem	an	an	an
51	book	/nungsu/	lem	bai	an	lem	lem
52	pen	/pakka/	dam	taeng	taeng	an	taeng
53	ice cream	/itim/	taeng	taeng	taeng	an	an
54	tree	/tonmai/	ton	ton	ton	ton	ton
55	pole	/sao/	ton	taeng	an	an	thong
56	hair	/pom/	sen	sen	an	an	an
57	belt	/kemkud/	sen,sai	an	an	an	sen
58	necklace	/saisoi/	sen,sai	sen	soi	an	soi
59	rope	/chuak/	sen	an	an	an	sen
60	chain	/so/	sen	an	an	an	an
61	road	/thanon/	sai	an	an	an	taeng
62	door	/pratu/	ban	an	an	an	ban
63	radio	/wittayu/	kruang	an	an	an	an
64	telephone	/torasap/	kruang	an	an	an	an
65	toilet paper	/kadadcamra/	muan	an	an	an	paen
66	toothpaste	/yasifun/	lod	an	taeng	an	sen
67	key	/khunjae/	dok	an	an	an	sen
68	rose	/dogkularp/	dok	dok	an	an	dok
69	tulip	/dogtulip/	dok	dok	an	an	dok
70	arrow	/lukthanu/	dok	an	an	an	taeng
71	ring	/waen/	wong	an	klom	an	an
72	keys	/puangkhunja/	phuang	an	an	an	ruam

Appendix 1 **Experimental data of the monolingual subject (cont.)**

	Test item	Gloss	Target	Test 9	Test 10	Test 11	Test 12
1	bird	/nok/	tua	tua	tua	tua	tua
2	chicken	/kai/	tua	tua	tua	tua	tua
3	elephant	/chang/	tua	tua	tua	tua	tua
4	child	/dek/	kon	dek	kon	kon	kon
5	priest	/pra/	ong	ong	kon	ong	ong
6	horse	/ma/	tua	tua	tua	tua	tua
7	soldier	/tahan/	kon	kon	kon	kon	kon
8	orange	/som/	lug,phon	phon	phon	lug	phon
9	banana	/kluai/	lug,bai	phon	lug	phon	phon
10	grape	angun/	puang	puang	puang	puang	puang
11	bananas	/kluai/	wi	puang	wi	wi	wi
12	spoon and fork	/chonsom/	khu	an	an	an	an
13	shoe	/rongtao/	khu	an	khu	an	khu
14	sock	/tungtao/	khu	tung	an	an	an
15	house	/ban/	lung	lung	lung	lung	lung
16	tent	/tent/	lung	lung	ban	lung	lung
17	castle	/prasard/	lung	lung	lung	lung	lung
18	hat	/muak/	bai	bai	bai	bai	bai
19	plate	/jan/	bai	bai	bai	bai	bai
20	cup	/tuai/	bai	an	bai	an	bai
21	playing card	/pai/	bai	bai	phun	phun	bai
22	chair	/kawii/	tua	tua	tua	tua	tua
23	table	/toh/	tua	tua	an	an	tua
24	shirt	/sya/	tua	tua	tua	tua	tua
25	match	maikidfai/	klong	klong	an	klong	klong
26	tooth	/fun/	si	fun	si	si	si
27	watch	/nalika/	ryan	tua	an	an	sen
28	train	/rodfai/	khabuan	kabuan	kabuan	kabuan	kabuan
29	milk	/nom/	krapong	klong	klong	klong	klong
30	7-Up	/seven up/	kuad	kuad	kuad	kuad	kuad
31	star	/dao/	duang	duang	duang	duang	duang
32	stamp	/stamp/	duang	an	an	an	an
33	cigarette	/buri/	muan	an	taeng	an	an
34	button	/kradum/	med	med	med	med	an
35	paracetamol	/yapara/	med	med	med	med	med
36	pearl	/kaimuk/	med	med	med	med	med
37	cloud	/meg/	korn	klum	korn	korn	korn
38	flashlight	/tanfaichai/	korn	korn	korn	korn	korn
39	marble	/lukhin/	korn	korn	korn	korn	korn
40	boat	/rua/	lam	bai	khan	khan	khan
41	bicycle	/rodjakkayan/	khan	teep	khan	khan	khan
42	car	/rodyon/	khan	khan	khan	khan	khan
43	airplane	/kruengbin/	lam	lam	lam	lam	khan
44	paper	/kradard/	paen	paen	bai	paen	paen
45	handkerchief	/pachedna/	phun	phun	phun	phun	phun
46	rug	/promchedtao/	phun	phun	phun	phun	phun
47	towel	/pachedtua/	phun	phun	phun	phun	phun
48	knife	/miid/	lem	an	an	taeng	taeng
49	needle	/khem/	lem	an	taeng	taeng	lem

Appendix 1 Experimental data of the monolingual subject (cont.)

	Test item	Gloss	Target	Test 9	Test 10	Test 11	Test 12
50	candle	/tian/	lem	korn	korn	taeng	taeng
51	book	/nungsu/	lem	lem	lem	lem	lem
52	pen	/pakka/	dam	taeng	taeng	taeng	taeng
53	ice cream	/itim/	taeng	an	an	taeng	taeng
54	tree	/tonmai/	ton	ton	ton	ton	ton
55	pole	/sao/	ton	an	taeng	taeng	an
56	hair	/pom/	sen	sen	sen	sen	sen
57	belt	/kemkud/	sen,sai	an	sen	sen	sen
58	necklace	/saisoi/	sen,sai	sen	sen	sen	sen
59	rope	/chuak/	sen	muan	sen	sen	sen
60	chain	/so/	sen	an	sen	sen	sen
61	road	/thanon/	sai	sen	sen	sen	sen
62	door	/pratu/	ban	pratu	ban	an	an
63	radio	/wittayu/	kruang	an	klong	an	an
64	telephone	/torasap/	kruang	an	an	an	an
65	toilet paper	/kadadchamra/	muan	muan	muan	muan	muan
66	toothpaste	/yasifun/	lod	an	an	an	an
67	key	/khunjae/	dok	an	an	an	an
68	rose	/dogkularp/	dok	dok	dok	dok	dok
69	tulip	/dogtulip/	dok	dok	dok	dok	dok
70	arrow	/lukthanu/	dok	an	taeng	an	an
71	ring	/waen/	wong	an	an	wong	an
72	keys	/puangkhunja/	phuang	an	an	puang	an

Appendix 2 Experimental data of the bilingual subject (UK)

	Test item	Gloss	Target	Test 1	Test 2	Test 3	Test 4
1	bird	/nok/	tua	-	-	tua	tua
2	chicken	/kai/	tua	-	-	tua	tua
3	elephant	/chang/	tua	-	-	tua	tua
4	child	/dek/	kon	tua	tuai	kon	kon
5	priest	/pra/	ong	tua	tuai	tua	tua
6	horse	/ma/	tua	-	-	tua	tua
7	soldier	/tahan/	kon	tua	tuai	tua	tua
8	orange	/som/	lug,phon	-	(numeral)	som	an
9	banana	/kluai/	lug,bai	-	(numeral)	kluai	an
10	grape	angun/	puang	-	-	angun	an
11	bananas	/kluai/	wi	-	(numeral)	kluai	an
12	spoon & fork	/chonsom/	khu	tua	(numeral)	-	an
13	shoe	/rongtao/	khu	-	(numeral)	-	an
14	sock	/tungtao/	khu	-	-	-	an
15	house	/ban/	lung	-	ban	ban	ban
16	tent	/tent/	lung	-	tent	tua	tent
17	castle	/prasard/	lung	-	(numeral)	ban	prasard
18	hat	/muak/	bai	-	muak	tua	muak
19	plate	/jan/	bai	tua	jan	tua	jan
20	cup	/tuai/	bai	-	tuai	tua	an
21	playing card	/pai/	bai	-	-	-	pai
22	chair	/kawii/	tua	-	(numeral)	kawii	kawi
23	table	/toh/	tua	-	(numeral)	toh	toh
24	shirt	/sya/	tua	-	(numeral)	tua	an
25	match	maikidfai/	klong	-	(numeral)	tua	an
26	tooth	/fun/	si	-	(numeral)	-	an
27	watch	/nalika/	ryan	-	nalika	tua	an
28	train	/rodfai/	khabuan	-	rodfai	rodfai	an
29	milk	/nom/	krapong	-	(numeral)	tua	an
30	7-Up	/seven up/	kuad	-	(numeral)	cola	an
31	star	/dao/	duang	-	-	dao	an
32	stamp	/stamp/	duang	-	stamp	-	an
33	cigarette	/buri/	muan	-	cigaret	cigaret	buri
34	button	/kradum/	med	-	(numeral)	-	kradum
35	paracetamol	/yapara/	med	-	(numeral)	ya	an
36	pearl	/kaimuk/	med	-	-	tua	an
37	cloud	/meg/	korn		meg	tua	meg
38	flashlight	/tanfaichai/	korn	-	(numeral)	-	an
39	marble	/lukhin/	korn	-	lukhin	tua	lukhin
40	boat	/rya/	lam	tua	rya	rya	an
41	bicycle	/jakayan/	khan	tua	bicycle	bicycle	an
42	car	/rodyon/	khan	tua	rodyon	rodyon	an
43	airplane	/kryngbin/	lam	tua	kungbin	kungin	an
44	paper	/kradard/	paen	-	-	tua	an
45	handkerchief	/pachedna/	phun	-	(numeral)	tua	an
46	rug	/prom/	phun	-	prom	prom	prom
47	towel	/pacedtua/	phun	-	-	-	an
48	knife	/miid/	lem	-	(numeral)	tua	miid
49	needle	/khem/	lem	-	-	tua	khem

Appendix 2 Experimental data of the bilingual subject (UK) (cont.)

	Test item	Gloss	Target	Test 1	Test 2	Test 3	Test 4
50	candle	/tian/	lem	-	tian	tua	an
51	book	/nungsu/	lem	-	nungsu	nungsu	an
52	pen	/pakka/	dam	-	pakka	tua	an
53	ice cream	/itim/	taeng	-	(numeral)	icecream	itim
54	tree	/tonmai/	ton	-	-	tua	an
55	pole	/sao/	ton	-	-	tua	an
56	hair	/pom/	sen	-	(numeral)	tua	pom
57	belt	/kemkud/	sen,sai	-	-	tua	an
58	necklace	/saisoi/	sen,sai	-	(numeral)	tua	an
59	rope	/chuak/	sen	-	chuak	chuak	chuak
60	chain	/so/	sen	-	so	tua	an
61	road	/thanon/	sai	-	thanon	thanon	an
62	door	/pratu/	ban	-	(numeral)	tua	an
63	radio	/wittayu/	kruang	-	wittayu	tua	witayu
64	telephone	/torasap/	kruang	-	torasap	tua	toasap
65	toilet paper	/kadadchamra/	muan	-	-	tua	an
66	toothpaste	/yasifun/	lod	-	(numeral)	tua	an
67	key	/khunjae/	dok	-	khunjae	key	an
68	rose	/dogkularp/	dok	-	-	dok	dok
69	tulip	/dogtulip/	dok	-	-	dok	dok
70	arrow	/lukthanu/	dok	-	-	tua	an
71	ring	/waen/	wong	-	waen	-	an
72	keys	/phuangkhunja/	phuang	-	(numeral)	key	an

Appendix 2 Experimental data of the bilingual subject (UK) (cont.)

	Test item	Gloss	Target	Test 5	Test 6	Test 7	Test 8
1	bird	/nok/	tua	tua	tua	tua	tua
2	chicken	/kai/	tua	tua	tua	tua	tua
3	elephant	/chang/	tua	tua	tua	tua	tua
4	child	/dek/	kon	kon	kon	kon	kon
5	priest	/pra/	ong	tua	kon	an	ong
6	horse	/ma/	tua	tua	tua	tua	tua
7	soldier	/tahan/	kon	tua	tua	kon	kon
8	orange	/som/	lug,phon	wi	an	an	an
9	banana	/kluai/	lug,bai	wi	wi	an	an
10	grape	angun/	puang	wi	wi	wi	wi
11	bananas	/kluai/	wi	wi	wi	wi	wi
12	spoon & fork	/chonsom/	khu	an	an	an	an
13	shoe	/rongtao/	khu	an	an	an	an
14	sock	/tungtao/	khu	an	an	an	an
15	house	/ban/	lung	lung	an	an	lung
16	tent	/tent/	lung	an	tent	an	an
17	castle	/prasard/	lung	an	an	an	an
18	hat	/muak/	bai	tua	an	klom	an
19	plate	/jan/	bai	an	tua	klom	an
20	cup	/tuai/	bai	kaew	tua	an	kaew
21	playing card	/pai/	bai	an	an	an	paen
22	chair	/kawii/	tua	an	an	an	chair
23	table	/toh/	tua	toh	an	paen	toh
24	shirt	/sya/	tua	an	an	an	an
25	match	maikidfai/	klong	an	an	an	an
26	tooth	/fun/	si	an	fun	fun	ngub
27	watch	/nalika/	ryan	an	an	an	an
28	train	/rodfai/	khabuan	rodfai	tua	kabuan	khan
29	milk	/nom/	krapong	an	an	an	an
30	7-Up	/seven up/	kuad	an	an	kuad	an
31	star	/dao/	duang	an	an	an	an
32	stamp	/stamp/	duang	an	stamp	an	an
33	cigarette	/buri/	muan	an	an	an	an
34	button	/kradum/	med	an	an	klom	an
35	paracetamol	/yapara/	med	an	an	an	an
36	pearl	/kaimuk/	med	an	an	an	an
37	cloud	/meg/	korn	an	an	korn	an
38	flashlight	/tanfaichai/	korn	an	an	an	an
39	marble	/lukhin/	korn	an	an	an	an
40	boat	/rya/	lam	an	an	an	an
41	bicycle	/jakkayan/	khan	an	an	an	khan
42	car	/rodyon/	khan	an	an	an	khan
43	airplane	/kryngbin/	lam	an	an	an	khan
44	paper	/kradard/	paen	an	an	an	phun
45	handkerchief	/pachedna/	phun	an	an	an	paen
46	rug	/prom/	phun	an	an	an	paen
47	towel	/pacedtua/	phun	an	paen	an	paen
48	knife	/miid/	lem	an	an	an	laem
49	needle	/khem/	lem	an	an	juk	laem

Appendix 2 Experimental data of the bilingual subject (UK) (cont.)

	Test item	Gloss	Target	Test 5	Test 6	Test 7	Test 8
50	candle	/tian/	lem	an	an	an	an
51	book	/nungsu/	lem	an	an	an	an
52	pen	/pakka/	dam	an	an	an	an
53	ice cream	/itim/	taeng	an	an	an	an
54	tree	/tonmai/	ton	tua	an	an	an
55	pole	/sao/	ton	an	an	an	an
56	hair	/pom/	sen	an	tua	an	yao
57	belt	/kemkud/	sen,sai	an	an	an	an
58	necklace	/saisoi/	sen,sai	an	an	an	an
59	rope	/chuak/	sen	an	an	an	an
60	chain	/so/	sen	an	an	an	an
61	road	/thanon/	sai	thanon	an	an	an
62	door	/pratu/	ban	an	pratu	an	an
63	radio	/wittayu/	kruang	an	an	an	fung
64	telephone	/torasap/	kruang	an	tua	an	an
65	toilet paper	/kadadcamra/	muan	an	an	an	paen
66	toothpaste	/yasifun/	lod	an	an	an	an
67	key	/khunjae/	dok	an	an	an	an
68	rose	/dogkularp/	dok	an	dok	an	taeng
69	tulip	/dogtulip/	dok	an	dok	an	taeng
70	arrow	/lukthanu/	dok	tua	an	an	taeng
71	ring	/waen/	wong	tua	an	waen	an
72	keys	/puangkunja/	phuang	an	an	an	puak

Appendix 2 Experimental data of the bilingual subject (UK) (cont.)

	Test item	Gloss	Target	Test 9	Test 10	Test11	Test 12
1	bird	/nok/	tua	tua	tua	tua	tua
2	chicken	/kai/	tua	tua	tua	tua	tua
3	elephant	/chang/	tua	tua	tua	tua	tua
4	child	/dek/	kon	kon	kon	kon	kon
5	priest	/pra/	ong	kon	praong	kon	kon
6	horse	/ma/	tua	ma	tua	tua	tua
7	soldier	/tahan/	kon	kon	kon	kon	kon
8	orange	/som/	lug,phon	phon	an	an	klom
9	banana	/kluai/	lug,bai	klib	wi	wi	an
10	grape	angun/	puang	wi	an	phon	wi
11	bananas	/kluai/	wi	wi	wi	wi	wi
12	spoon & fork	/chonsom/	khu	an	an	an	an
13	shoe	/rongtao/	khu	an	an	an	an
14	sock	/tungtao/	khu	an	an	an	an
15	house	/ban/	lung	an	lung	lung	lung
16	tent	/tent/	lung	kang	an	phun	lung
17	castle	/prasard/	lung	an	lung	lung	lung
18	hat	/muak/	bai	an	an	hua	klom
19	plate	/jan/	bai	an	an	wong	klom
20	cup	/tuai/	bai	kaew	bai	an	an
21	playing card	/pai/	bai	bai	bai	paen	paen
22	chair	/kawii/	tua	an	an	an	tua
23	table	/toh/	tua	an	tua	shun	tua
24	shirt	/sya/	tua	an	an	shud	phun
25	match	maikidfai/	klong	klong	klong	an	klong
26	tooth	/fun/	si	ngub	laem	si	laem
27	watch	/nalika/	ryan	an	an	an	an
28	train	/rodfai/	kabuan	kabuan	kabuan	kabuan	kabuan
29	milk	/nom/	kapong	klong	an	an	klong
30	7-Up	/seven up/	kuad	an	an	an	kuad
31	star	/dao/	duang	an	luk	dao	an
32	stamp	/stamp/	duang	an	paen	an	an
33	cigarette	/buri/	muan	an	an	taeng	an
34	button	/kradum/	med	med	an	an	med
35	paracetamol	/yapara/	med	med	an	med	med
36	pearl	/kaimuk/	med	an	an	an	an
37	cloud	/meg/	korn	an	an	korn	korn
38	flashlight	/tanfaichai/	korn	korn	an	korn	korn
39	marble	/lukhin/	korn	korn	korn	korn	korn
40	boat	/rya/	lam	an	khan	lam	lam
41	bicycle	/jakkayan/	khan	pun	khan	wong	lam
42	car	/rodyon/	khan	khan	khan	lam	lam
43	airplane	/kryngbin/	lam	lam	khan	lam	lam
44	paper	/kradard/	paen	paen	pa	phun	phun
45	handkerchief	/pachedna/	phun	an	an	phun	phun
46	rug	/prom/	phun	an	phun	phun	phun
47	towel	/pacedtua/	phun	phun	phun	phun	phun
48	knife	/miid/	lem	an	an	taeng	taeng
49	needle	/khem/	lem	an	an	an	taeng

	Appendix 2	Experimental data of the bilingual subject (UK)					(cont.)
	Test item	**Gloss**	**Target**	**Test 9**	**Test 10**	**Test11**	**Test 12**
50	candle	/tian/	lem	an	taeng	an	ton
51	book	/nungsu/	lem	an	an	an	an
52	pen	/pakka/	dam	an	taeng	taeng	taeng
53	ice cream	/itim/	taeng	taeng	taeng	taeng	taeng
54	tree	/tonmai/	ton	taeng	ton	ton	taeng
55	pole	/sao/	ton	an	an	taeng	taeng
56	hair	/pom/	sen	an	an	an	an
57	belt	/kemkud/	sen,sai	an	an	an	an
58	necklace	/saisoi/	sen,sai	an	an	puang	an
59	rope	/chuak/	sen	an	bai	sen	sen
60	chain	/so/	sen	an	bai	an	an
61	road	/thanon/	sai	an	an	paen	an
62	door	/pratu/	ban	an	an	an	an
63	radio	/wittayu/	kruang	an	an	an	fung
64	telephone	/torasap/	kruang	an	an	an	tho
65	toilet paper	/kadadcamra/	muan	an	an	an	mang
66	toothpaste	/yasifun/	lod	an	an	klong	an
67	key	/khunjae/	dok	an	an	an	an
68	rose	/dogkularp/	dok	dok	dok	dok	dok
69	tulip	/dogtulip/	dok	dok	dok	dok	dok
70	arrow	/lukthanu/	dok	taeng	an	taeng	an
71	ring	/waen/	wong	klom	wong	wong	wong
72	keys	/puangkunja/	phuang	an	an	an	an

Appendix 3 Experimental data of the bilingual subject (TH)

	Test item	Gloss	Target	Test 1	Test 2	Test 3
1	bird	/nok/	tua	-	nok	tua
2	chicken	/kai/	tua	-	kai	tua
3	elephant	/chang/	tua	-	chang	tua
4	child	/dek/	kon	-	kon	kon
5	priest	/pra/	ong	-	pratu	kon
6	horse	/ma/	tua	-	ma	tua
7	soldier	/tahan/	kon	-	tahan	kon
8	orange	/som/	lug,phon	-	-	tua
9	banana	/kluai/	lug,bai	-	-	tua
10	grape	angun/	puang	angun	-	tua
11	bananas	/kluai/	wi	-	-	tua
12	spoon and fork	/chonsom/	khu	-	-	tua
13	shoe	/rongtao/	khu	-	-	tua
14	sock	/tungtao/	khu	tungtao	-	tua
15	house	/ban/	lung	-	ban	tua
16	tent	/tent/	lung	-	tent	tua
17	castle	/prasard/	lung	prasard	-	tua
18	hat	/muak/	bai	-	muak	tua
19	plate	/jan/	bai	-	jan	tua
20	cup	/tuai/	bai	-	tuai	tua
21	playing card	/pai/	bai	pai	pai	tua
22	chair	/kawii/	tua	-	kawi	tua
23	table	/toh/	tua	-	toh	toh
24	shirt	/sya/	tua	-	sua	sua
25	match	maikidfai/	klong	-	maikidfai	tua
26	tooth	/fun/	si	fun	fun	tua
27	watch	/nalika/	ryan	nalika	-	tua
28	train	/rodfai/	khabuan	rodfai	rodfai	tua
29	milk	/nom/	krapong	-	nom	tua
30	7-Up	/seven up/	kuad	-	-	tua
31	star	/dao/	duang	dao	dao	tua
32	stamp	/stamp/	duang	stamp	-	tua
33	cigarette	/buri/	muan	buri	buri	tua
34	button	/kradum/	med	kradum	kradum	tua
35	paracetamol	/yapara/	med	-	ya	tua
36	pearl	/kaimuk/	med	-	ped	tua
37	cloud	/meg/	korn	meg	-	tua
38	flashlight	/tanfaichai/	korn	tanfaijai	tanfai	tua
39	marble	/lukhin/	korn	-	lughin	tua
40	boat	/rya/	lam	-	rua	tua
41	bicycle	/rodjakkayan/	khan	-	jakyan	tua
42	car	/rodyon/	khan	rod	rod	rod
43	airplane	/kryngbin/	lam	-	ruabin	tua
44	paper	/kradard/	paen	-	kradard	tua
45	handkerchief	/pachedna/	phun	-	pached	tua
46	rug	/promchedtao/	phun	prom	prom	tua
47	towel	/pachedtua/	phun	pached	pached	tua
48	knife	/miid/	lem	-	miid	tua
49	needle	/khem/	lem	-	khem	kem

Appendix 3 Experimental data of the bilingual subject (TH) (cont.)

	Test item	Gloss	Target	Test 1	Test 2	Test 3
50	candle	/tian/	lem	tian	tian	tian
51	book	/nungsu/	lem	-	nungsu	tua
52	pen	/pakka/	dam	-	-	tua
53	ice cream	/itim/	taeng	itim	itim	itim
54	tree	/tonmai/	ton	tonmai	tonmai	tua
55	pole	/sao/	ton	-	sao	tua
56	hair	/pom/	sen	-	pom	tua
57	belt	/kemkud/	sen,sai	-	kemkud	tua
58	necklace	/saisoi/	sen,sai	soi	soi	tua
59	rope	/chuak/	sen	-	-	tua
60	chain	/so/	sen	-	soi	tua
61	road	/thanon/	sai	-	tanon	tua
62	door	/pratu/	ban	pratu	pratu	tua
63	radio	/wittayu/	kruang	-	witayu	tua
64	telephone	/torasap/	kruang	-	tosap	tua
65	toilet paper	/kradadchamra/	muan	tissue	tissue	tua
66	toothpaste	/yasifun/	lod	yasifun	yasifun	tua
67	key	/khunjae/	dok	kunjae	khunjae	tua
68	rose	/dogkularp/	dok	dokmai	dokmai	tua
69	tulip	/dogtulip/	dok	-	dokmai	tua
70	arrow	/lukthanu/	dok	-	tanu	tua
71	ring	/waen/	wong	-	waen	tua
72	keys	/phuangkhunjae/	phuang	-	khunjae	tua

Appendix 3 Experimental data of the bilingual subject (TH) (cont.)

	Test item	Gloss	Target	Test 4	Test 5	Test 6
1	bird	/nok/	tua	tua	tua	tua
2	chicken	/kai/	tua	tua	tua	tua
3	elephant	/chang/	tua	tua	tua	tua
4	child	/dek/	kon	kon	kon	kon
5	priest	/pra/	ong	kon	kon	kon
6	horse	/ma/	tua	tua	tua	tua
7	soldier	/tahan/	kon	kon	kon	kon
8	orange	/som/	lug,phon	lug	lug	lug
9	banana	/kluai/	lug,bai	lug	lug	puang
10	grape	angun/	puang	ruam	lug	puang
11	bananas	/kluai/	wi	ruam	lug	puang
12	spoon and fork	/chonsom/	khu	an	ruam	an
13	shoe	/rongtao/	khu	an	an	an
14	sock	/tungtao/	khu	an	an	an
15	house	/ban/	lung	lung	an	an
16	tent	/tent/	lung	an	an	an
17	castle	/prasard/	lung	an	an	an
18	hat	/muak/	bai	an	klom	an
19	plate	/jan/	bai	an	klom	an
20	cup	/tuai/	bai	an	an	an
21	playing card	/pai/	bai	an	an	an
22	chair	/kawii/	tua	an	an	an
23	table	/toh/	tua	an	an	an
24	shirt	/sya/	tua	an	an	an
25	match	maikidfai/	klong	an	an	an
26	tooth	/fun/	si	an	an	si
27	watch	/nalika/	ryan	an	an	an
28	train	/rodfai/	khabuan	an	an	an
29	milk	/nom/	krapong	nom	an	an
30	7-Up	/seven up/	kuad	an	an	kuad
31	star	/dao/	duang	dao	an	an
32	stamp	/stamp/	duang	stamp	an	an
33	cigarette	/buri/	muan	an	an	an
34	button	/kradum/	med	an	an	an
35	paracetamol	/yapara/	med	an	lug	an
36	pearl	/kaimuk/	med	an	lug	an
37	cloud	/meg/	korn	meg	an	an
38	flashlight	/tanfaichai/	korn	an	an	an
39	marble	/lukhin/	korn	an	an	an
40	boat	/rya/	lam	an	lam	an
41	bicycle	/rodjakkayan/	khan	an	lam	an
42	car	/rodyon/	khan	an	lam	an
43	airplane	/kryngbin/	lam	an	lam	an
44	paper	/kradard/	paen	an	an	an
45	handkerchief	/pachedna/	phun	an	an	an
46	rug	/promchedtao/	phun	an	an	an
47	towel	/pachedtua/	phun	an	an	an
48	knife	/miid/	lem	an	an	taeng
49	needle	/khem/	lem	an	an	taeng

Appendix 3 Experimental data of the bilingual subject (TH) (cont.)

	Test item	Gloss	Target	Test 4	Test 5	Test 6
50	candle	/tian/	lem	an	an	taeng
51	book	/nungsu/	lem	an	an	an
52	pen	/pakka/	dam	an	an	an
53	ice cream	/itim/	taeng	an	an	taeng
54	tree	/tonmai/	ton	an	taeng	taeng
55	pole	/sao/	ton	an	an	taeng
56	hair	/pom/	sen	an	an	an
57	belt	/kemkud/	sen,sai	an	an	an
58	necklace	/saisoi/	sen,sai	an	an	an
59	rope	/chuak/	sen	tua	an	an
60	chain	/so/	sen	an	an	an
61	road	/thanon/	sai	tua	an	an
62	door	/pratu/	ban	an	tua	an
63	radio	/wittayu/	kruang	an	an	an
64	telephone	/torasap/	kruang	an	an	an
65	toilet paper	/kradadchamra/	muan	an	an	an
66	toothpaste	/yasifun/	lod	an	an	taeng
67	key	/khunjae/	dok	an	an	an
68	rose	/dogkularp/	dok	dokmai	dokmai	dokmai
69	tulip	/dogtulip/	dok	dokmai	dokmai	dokmai
70	arrow	/lukthanu/	dok	an	an	taeng
71	ring	/waen/	wong	waen	an	an
72	keys	/phuangkhunjae/	phuang	ruam	ruam	ruam