

Lexical Development and Word Association:
Can Japanese L2 language development be observed
through the results of word association tests?

by

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ABSTRACT

Three different levels of Japanese students were administered word association tests in an effort to determine if a syntagmatic-paradigmatic shift occurs as development takes place, whether there is gender difference in response type and whether the type of test given, oral or written, has any effect on response patterns. Overall findings in these areas showed no significant differences between the groups to indicate that development could be observed using word association tests. A previous study determined Japanese respondents favored noun responses to all word classes, a so called 'noun bias.' A secondary data analysis did show a 'noun bias' in responses to all stimuli regardless of word class at significant levels. A finding not part of the original study was that the number of responses and non-responses from a given group might be an indicator of development other than the syntagmatic-paradigmatic shift. The study suggested further research be conducted with larger sample sizes at the University level in an effort to determine if the findings in this study are consistent and valid. Also suggested were better definitions of what define syntagmatic and paradigmatic responses and possibly the development of a classification that takes into account the functional use of language.

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CONTENTS

Chapter 1 Language Development and Word Association	1
1.1 Introduction	1
1.2 Purpose of the Study	2
Chapter 2 Research in Word Association and Language Development	4
2.1 Vocabulary: An Important Part of Language	4
2.2 Word Association: A Glimpse into the Mental Lexicon	5
2.3 Word Association Research	6
2.4 The Paradigmatic Syntagmatic Response Pattern in L2 Learners	8
2.5 Other Response Categories Provided in Various Research	10
2.6 Less frequently discussed findings - A “Noun Bias”?	13
2.7 Noun Bias in Native Speakers?	15
Chapter 3 Method, Procedure and Survey	19
3.1 Choosing the Stimuli	19
3.1.1 The Polysemy Problem	20
3.1.2 Forms of Testing	22
3.2 Subjects	22
3.3 Procedure	23
3.4 Survey	24
3.5 Survey Results	26
Chapter 4 The Data	31
4.1 Defining the Categories	31
4.2 Collection and Separation of Word Association Test Response Sheets	33

4.3	Compilation of Responses	34
4.4	Statistics Explanation	35
Chapter 5	Analysis and Discussion of the Data	39
5.1	General Paradigmatic Syntagmatic Data Analysis	39
5.2	Paradigmatic Response – Development Analysis	43
5.3	Gender Difference Analysis	44
5.4	Oral and Written Test Difference Analysis	47
5.5	Noun Bias Data Analysis	48
5.6	Unexpected Finding	53
Chapter 6	Conclusion	55
Appendix I	Instruction Sheet	59
Appendix II	Test Answer Sheet for Oral Test	61
Appendix III	Test Answer Sheet for Written Test	62
Appendix IV	Word List for Oral Test	63
Appendix V	Survey	64
Appendix VI	Breakdown of Responses & Percentages for M JHS Respondents	65
Appendix VII	Breakdown of Responses & Percentages for F JHS Respondents	66
Appendix VIII	Breakdown of Responses & Percentages for M HS Respondents	67
Appendix IX	Breakdown of Responses & Percentages for F HS Respondents	68
Appendix X	Breakdown of Responses & Percentages for M Univ Respondents	69
Appendix XI	Breakdown of Responses & Percentages for F Univ Respondents	70
Appendix XII	Total Number & Percentages of Word Class Responses, Total Responses and Non-responses for JHS, HS and Univ Respondents	71
Appendix XIII	Wald CI Data and Test Results for Paradigmatic Responses	73
Appendix XIV	Wald CI Data and Test Results for ‘Noun Bias’	74
Appendix XV	Wald CI Data and Test Results for Response-Non-response	75
	References	76

LIST OF TABLES

Table 2.1	Syntagmatic and Paradigmatic Research Results	8
Table 2.2	Paradigmatic – Syntagmatic Response Rates for Wolter (1999)	9
Table 2.3	Paradigmatic – Syntagmatic Response Rates for Orita (2002a, 2002b)	10
Table 2.4	Paradigmatic – Syntagmatic Response Rates for Yoneoka (1987)	10
Table 2.5	Noun Bias Figures	14
Table 2.6	Entwisle, Forsyth & Muuss: Noun Bias Figures	16
Table 2.7	Selected Responses Not Matching the Form Class of the Stimulus	17
Table 2.8	Fillenbaum & Jones: Noun Bias Figures	18
Table 3.1	Survey Answer Key	25
Table 3.2	Junior High School Survey Results	26
Table 3.3	High School Survey Results	27
Table 3.4	University Survey Results	27
Table 5.1	Percentage of Paradigmatic and Syntagmatic Responses by Gender, Test and Level	39
Table 5.2	Japanese and Korean Language Syntagmatic and Paradigmatic Research Results	42
Table 5.3	Paradigmatic - Development Analysis	43
Table 5.4	Gender - Paradigmatic Analysis Results	45
Table 5.5	Oral/Written Test - Paradigmatic Analysis	47
Table 5.6	Percentages of Noun Responses for Each Word Class Separated by Level and Gender	48
Table 5.7	Significant Noun Bias Findings From Wald CI Analysis	49
Table 5.8	Response and Non-Response Totals for All Data Sets	53

CHAPTER 1

Language Development and Word Association

1.1 Introduction

The mind with all its bends, folds and regions is like a vast Grand Canyon. Its many wonders and mysteries are looked upon in awe by anyone who stops to ponder just what the mind does. This is even more so with language. Pinker (1994) and others (see Aitchison 1994; McCarthy 1990; Carter 1987) have written about the healthy brain's capacity to instantly understand spoken discourse and appropriately reply in a blink of an eye. Many believe (Pinker 1994; Aitchison 1994; McCarthy 1990) this would not be possible were it not for the healthy brain's capacity to store vocabulary in a seemingly ever-expanding neuro-network. It is widely accepted that it is this neuro-network that allows us to use language so quickly, so smoothly in normal day-to-day activities, whether it be to order a pizza or to lecture on the finer points of second language acquisition; whether it be to read a bedtime story to our children or to read the daily newspaper.

Of course we are not fluent speakers of our native language at birth (Pinker 1994; Aitchison 1994; Venkatagiri 2003). Language skills start to occur very early in childhood development and develop rapidly and reach adult-like fluency at around seven years of age (Pinker 1994; Carter 1987; Bruner 1983). After seven years of age vocabulary acquisition continues to grow, some say throughout our lifetime (Aitchison 1994; McCarthy 1990). Some have estimated that, on average, an adult native English speaker has a working knowledge of over 140,000 words (Aitchison 1994; McCarthy 1990; Venkatagiri 2003). However, for most second language (SL) learners, native-like fluency is a difficult thing to achieve. It takes SL learners many years of study just to become capable in the second language and yet still not achieve native-like fluency.

One area of second language acquisition linked to fluency is lexical development (Richards 1976; Meara 1999).

Meara (1983) and others (see, Schmitt and Meara 1997; Söderman 1989; Sökmen 1993; Wolter 1999; Farooq 1998; Orita 2002a; Yoneoka 1987) have conducted research into second language lexical development utilizing word association tests. In these tests several words are presented to test subjects one at a time with the respondents indicating the first word or words that come to mind. A great deal of research in word association tests done by native speakers of English has determined that responses usually fall into two categories, either paradigmatic or syntagmatic, with native adult English speakers favoring paradigmatic responses over syntagmatic ones (Carter 1987). Native English speaking children under seven years of age favor syntagmatic responses (Carter 1987; Deese 1962; Entwisle et al 1964). This is also true for English as a second language (ESL) learners (Carter 1987; Orita 2002a, 2002b; Yoneoka 1987). With these findings an assumption can be made that the more developed a second language learner in English becomes the more native-like responses will be observed in word association tests, that is, there will be more paradigmatic responses and fewer syntagmatic ones as development takes place. This assumption has held somewhat true when test results of advanced ESL learners have been compared to those of native speakers of English (Orita 2002a, 2002b; Wolter 1999; Yoneoka 1987).

1.2 Purpose of the Study

By utilizing three different groups of Japanese students, junior high school, high school and university, the primary purpose of this study is to investigate the development of lexical knowledge by using word association tests. The design of this study will attempt to answer the following research questions:

1. Does a syntagmatic-paradigmatic shift occur as development takes place between

the three groups?

2. Are there gender differences in the test results between and within the groups?
3. It is well known that in Japan most testing of English is conducted with written based tests with very little testing presented orally (Brown 1995). Do test results differ depending on whether the word association test was presented orally or as a written test?
4. In a limited study (Edwards 1998) it was observed that nouns represented a far greater percentage of responses to stimuli than other word classes. Do the test results show a “noun bias” in response to stimuli?
5. If the above is true, does this noun bias change as development occurs?

This study will first look at research in lexical development, word association and related areas. Then, it will discuss the methods and procedures followed in the development of the word association test and the selection of respondents as well as reporting the results of a respondent’s survey. A discussion concerning the separation of the data and an explanation of the statistical test utilized in the analysis of the data then follows. Subsequently, a discussion of the findings from the analyses will be presented. Finally, concluding remarks will be provided.

Consequently, to facilitate this study a look at research in language development and word association is necessary. Past and current research in these areas are discussed in the following chapter.

CHAPTER 2

Research in Word Association and Language Development

2.1 Vocabulary: An Important Part of Language

‘The way language works, then, is that each person’s brain contains a lexicon of words and the concepts they stand for (a mental dictionary) and a set of rules that combine the words to convey relationships among concepts (a mental grammar).’ (Pinker 1994: 85)

Pinker underscores the importance of vocabulary in language. Without individual words to convey the names of things or ideas we would not be able to speak or write coherently. However, just how we store all the vocabulary we learn in our minds is truly unknown. Aitchison (1994: 10) indicates that the mental lexicon has been referred to as a “mental dictionary.” However, this simplistic idea as though our minds were like a dictionary with words stored alphabetically is a notion that is not accepted because of the speed in which we are able to access the words we need and subsequently use them (Aitchison 1994; Pinker 1994). Most researchers (see Aitchison 1994; Pinker 1994, 1997; Carter: 1987; McCarthy 1990 for a thorough discussion) believe that the mind stores words in a neuro-network which is linked together by millions of neurons. Words that have syntactic ties are linked together more strongly than other words. This web-like neuro-network allows us to access and retrieve the words that we want to use during a conversation without hesitation.

Some of the ways in which words have been observed to be linked are co-ordination, collocation, superordination, and synonymy (Aitchison 1994; McCarthy 1990). Co-ordinate links or co-hyponyms are words “which cluster on the same level of detail” (Aitchison 1994: 84), for example *knife* and *fork*. This group also includes opposites, *boy* and *girl* for example. Collocation links are words that are usually found

with each other connected in speech (ibid). An example of collocation described this way might be *blue sky*. Superordinate links, also referred to as hyperonyms, are words considered to be “the cover term which includes the stimulus word” (ibid). An example of this type of link might be the answer of *animal* for the stimulus *horse*. Words that are subordinates of superordinates, for example: *horse*, *cow*, *goat*, *pig* for the superordinate *animal* are referred to as hyponyms.

2.2 Word Association: A Glimpse into the Mental Lexicon

Psychologists like Galton, Wundt and Jung felt that the way words are associated in the mind had important psychological implications (Deese 1965; Stern 1983). By understanding mental associations it was felt that the secrets of the mind could be unlocked. The early psychologists used language to study memory and mental associations and were the first to use word association tests as a diagnostic tool (ibid).

‘Word association experiments, first undertaken by Galton (1883), demonstrated that subjects can respond spontaneously and in predictable ways to separate words (verbal ‘stimuli’) with words (verbal ‘responses’ or ‘reactions’). Such experiments increased not only the psychologists’ understanding of the human mind, they also suggested principles that govern verbal repertoires in the first language. They are therefore also studies of language behavior.’ (Stern 1983: 292)

Further experimentation revealed that answers to word associations were predictable and that answers from a common speech community were similar. This led psychologists, like Carl Jung, to theorize that word associations that deviated from the norm could point to emotional or mental problems (Stern 1983; Moss and Older 1996). In 1910, Kent and Rosanoff, two clinical psychologists developed a list of 100 English words to be used in a word association test in order to assess mental patients (Jenkins

1970; Meara 1983). Although word association was first looked at from a psychological perspective, it is obvious to see the linguistic application of word association tests as a way to look at the mental lexicon of a person. Since then, the Kent-Rosanoff list has been utilized by many researchers to study results both in English and other languages (See Meara 1983; Jenkins 1970; Söderman 1989; Riegel 1968 for example).

2.3 Word Association Research

Word association tests have been widely used in a lot of linguistic research especially with second language acquisition and vocabulary (see Moran 1973; Meara 1983; Yoneoka 1987; Schmitt and Meara 1997; Wolter 1999; Orita 2002a; for example). The typical word association test consists of a word list which is verbally presented to subjects one word at a time with subjects asked to say or write down the first word that comes to mind. Most researchers then compare the results with results obtained from native speakers (see Schmitt and Meara 1997; Orita 2002a, 2002b; Wolter 1999; Yoneoka 1987 for example). This research has revealed some interesting findings which will be discussed later.

Aitchison (1994) and McCarthy (1990) point out that native speaker responses to word association are very common and can be placed into four different categories which were mentioned above. They are, from most to least common, co-ordination, collocation, superordination and synonymy. Co-ordination responses or co-hyponyms are words that are closely related (*spring – summer*) or found together such as antonyms (e.g. *hot – cold*) (Aitchison 1994; McCarthy 1990). Collocation responses are words that are collocated or found together in connected spoken or written discourse (e.g. *pretty – girl* or *bad - boy*) (Aitchison 1994; McCarthy: 1990) usually in a left-to-right connection (Carter and McCarthy 1988). This “left-to-right” connection will be

discussed further in Chapter 4. Responses which are at the head of the category from which the stimulus word is listed (e.g.: *daisy – flower* or *fork – silverware*) are high – level superordinates and fall into the superordination category (Aitchison 1994; McCarthy 1990). Synonymy responses are words that could be used as possible synonyms for the stimulus word (e.g. *afraid – scared*) (Aitchison 1994; McCarthy 1990).

Another classification for the phenomena described above is the so-called paradigmatic and syntagmatic shift. Paradigmatic responses are those that are from the same grammatical class as the stimulus word (e.g. *house – cabin, apartment*), and syntagmatic responses are those that form an obvious sequential relationship with the stimulus word (e.g. *house – vacant, big*) (Meara 1983; Carter 1987; Carter and McCarthy 1988), and “as a rule belong to a word class different from the stimulus” (Söderman 1989: 115). One of the interesting findings concerning the paradigmatic-syntagmatic response pattern is that adult native English speakers (as well as adults in some other languages) tend to provide paradigmatic answers to word association tests, whereas native English speaking children under the age of seven tend to do the opposite, they provide more syntagmatic responses (McNeill 1963; Carter 1987; Carter and McCarthy 1988; Yoneoka 1987).

Yoneoka (1987: 6) found in her study that 3 to 5 year-old native English speakers answered with syntagmatic responses 66.7% of the time while paradigmatic responses were provided 13.7% of the time. However, her 8 to 12 year-old and adult native English speakers answered somewhat the opposite, 33.3% and 31.1% syntagmatic responses respectively and 55.6% and 60.7% paradigmatic responses respectively (ibid). Table 2.1 below shows a comparison of her findings with the findings of other similar research.

Table 2.1 Syntagmatic and Paradigmatic Research Results

Native English	Syntagmatic	Paradigmatic
Yoneoka (1987)		
3-5 year-olds	66.7	13.7
8-11 year-olds	33.3	55.6
Adults	31.1	60.7
Yoneoka (2001)		
Adults	33.9	66.1
Wolter (1999)		
Adults Low Frequency Stimuli	18.9	78.4
Adults High Frequency Stimuli	21.4	77.1
Average	20.6	77.6
Orita (2002a)		
Adults	50.1	46.9
Orita (2002b)		
Adults	50.2	47.0

(All figures are in percentages)

Another finding in tests conducted with children is that they also answer with what has been termed as “clang associations” or answering with words that rhyme or have very similar sounds to the stimulus word (Meara 1983; Carter 1987; Carter and McCarthy 1988; Söderman 1989). ESL learner responses to English word association tests tend to follow those of native children’s responses; they are primarily syntagmatic (Meara 1983; Carter 1987). This phenomenon will be explained further in the following section.

2.4 The Paradigmatic Syntagmatic Response Pattern in L2 Learners

The difference in the paradigmatic-syntagmatic response pattern in L2 learners of English as opposed to native speakers is fairly dramatic. In a study conducted by Wolter (1999), his data (see Table 2.2) reveals that his Japanese students answered with paradigmatic responses about 54.8% of the time, whereas the native English speaking sample did so about 77% of the time. Syntagmatic responses accounted for 33.1% of

responses for his Japanese group whereas about 20% of his native speaking group responded with syntagmatic responses. It should be noted that in Wolter's tests he used seven high frequency stimuli and only four low frequency stimuli for testing both Japanese students and native English speakers. Therefore, the high number of paradigmatic responses given for the high frequency stimuli over the low frequency responses skewed the total results.

Table 2.2 Paradigmatic – Syntagmatic Response Rates for Wolter (1999)

Japanese Students/English Test				Japanese Test		Native English Speakers			
High Freq		Low Freq				Low Freq		High Freq	
Syn	Para	Syn	Para	Syn	Para	Syn	Para	Syn	Para
37	55.5	63.9	19.4	62.2	36.1	18.9	78.4	21.4	77.1
Averages						Averages			
		Syn	Para					Syn	Para
		33.1	54.8					20.6	77.6

(All figures are in percentages)

In a study of two L2 learner groups, novice and advanced as compared to native speakers, Orita (2002a: 117) found that the syntagmatic responses for the three groups were 64.5%, 59.6% and 50.1% respectively, and that paradigmatic responses for the three groups were 29%, 36.4% and 46.9% respectively. In an expanded study (Orita 2002b), he tested five different groups, novice-low, novice-high, intermediate, advanced and native. The results were very similar to his previous study (Orita 2002a) (see Table 2.3 below); syntagmatic responses for the five groups were 65.5%, 65.5%, 67.5%, 60.3% and 50.2% respectively and 29.2%, 29.4%, 29.6%, 36.9% and 47.0% respectively for paradigmatic responses. The slight increase in percentages for the paradigmatic responses from group to group would seem to indicate language development, i.e. as development occurs, novice-low to advanced, there is an increase in paradigmatic responses.

	Paradigmatic – Syntagmatic Response Rates for Orita (2002a, 2002b)				
	Orita (2002a)		Orita (2002b)		
	Syn	Para		Syn	Para
Jpn Novice	64.5	29.0	Jpn Novice-Low	65.5	29.2
			Jpn Novice-High	65.5	29.4
			Intermediate	67.5	29.6
Jpn Advanced	59.6	36.4	Jpn Advanced	60.3	36.9
Native Eng.	50.1	46.9	Native Eng.	50.2	47.0

(All figures are in percentages)

Yoneoka (1987: 6) found in her study (see Table 2.4) that her Japanese L2 intermediate and advanced learner groups gave syntagmatic answers to stimuli 60.7% and 66.7% of the time respectively and 31.9% and 31.1% respectively for paradigmatic responses. However, her Japanese L2 expert group responded with syntagmatic responses 41.5% of the time while answering with paradigmatic responses 57.8% of the time, which is only about 3% different from the adult native speaker group. Therefore, this research shows that expert L2 learners' mental lexicons do shift towards a native speaker's mental lexicon but not quite at the same level. Further, this research as well as Orita's above seems to indicate that as language development occurs in L2 learners, a shift from primarily syntagmatic responses to paradigmatic ones also occurs as is the case for native English speakers.

Table 2.4	Paradigmatic – Syntagmatic Response Rates for Yoneoka (1987)						
	Native English		Native Japanese			Jpn/Eng Test	
	Syn	Para	Syn	Para		Syn	Para
3-5 yrs	66.7	13.7	70.7	6.7	Int.	60.7	31.9
8-11yrs	33.3	55.6	81.1	17.8	Adv.	66.7	31.1
Adult	31.1	60.7	77.0	22.2	Exp.	41.5	57.8
(All figures are in percentages) (Int – Intermediate/Adv – Advanced/Exp – Expert)							

2.5 Other Response Categories Provided in Various Research

Sökmen (1993) described an “affective” response for those responses to word

association that did not fit the standard paradigmatic and syntagmatic response pattern. She describes this “affective” category as “associations which showed a visual image, an opinion, an emotional response, or a personal past experience” (ibid: p.139). Sökmen’s “affective” category is very similar to what Aitchison (1994) and Farooq (1998) have termed as “world or encyclopedic knowledge.” The obvious interpretation is that people attach other meanings to words because of events that happen to them and the environment in which they live. It should be a matter of fact that these events and environmental factors would attach special meanings unique to an individual to some vocabulary. An example of this might be *hurt* for the stimulus *boy* for a girl who had just broken up with her boyfriend. The problem with this type of category is that this could be considered collocational or syntagmatic, too, i.e.

The boy hurt his leg.

One of Sökmen’s examples for an affective response is the stimulus response pair *dark - scared*; however, there are two different possible ways of looking at the pair which could be thought of as syntagmatic or collocational responses.:

The dark scared him.

He is scared of the dark.

In a study of comparative growth of cognitive dictionaries between Japanese and North Americans, Moran (1973: 863) used a four-category system for grouping responses: Iconic, Enactive, Functional and Logical. Moran described the iconic category as word pairs “that ascribed a quality to the referent” and “were adjective-noun or noun-adjective pairs yielding (a) sensory predicate (e.g. apple-red, sour-lemon), and (b) nonsensory predicate (e.g. eagle-bold, beautiful-flower)” (ibid). This category would obviously be collocation or syntagmatic. Stimulus-response pairs that are “descriptive of action upon the referent” are called enactive and are “noun-verb or verb-noun pairs (e.g. apple-eat, rip-pants)” (ibid). These associations would also be

classified as collocation or syntagmatic. Functional stimulus-response pairs are word pairs that name “two cofunctional physical referents...representing two separate entities in a functional relationship (used with, for, etc.) (e.g., table-chair, tobacco-pipe)” (ibid). Functional responses described in this way would most likely be paradigmatic. The final category, logical, consists of word pairs which Moran (ibid) identifies as “synonym”, “superordinate”, “contrast” and “coordinate”. These classifications provided by Moran have the same meaning as those previously mentioned by Aitchison (1994) and McCarthy (1990). The responses falling into the logical category would also most likely be paradigmatic.

In Moran’s study, 4 and 5-year-old native English speaking children’s responses fell primarily into the “enactive” category; however, 6 and 7-year-old responses fell primarily into the “logical” category. Japanese 5 to 7-year-olds tested in their own language tended to provide responses which fell into the enactive category. This trend also continued up to age 10. After age 10, responses changed and were primarily in the iconic category.

Yoneoka (1987), in her study, used Moran’s classifications as well as syntagmatic and paradigmatic classifications. Her findings mimicked those of Moran’s in that American and Japanese 3 to 5-year-olds tended to provide responses which were considered enactive. However, both sets of respondents showed a shift in preferred response at 8 years of age. For Americans the shift was from enactive to logical responses, whereas the Japanese shift went from enactive to iconic. With her Japanese groups taking the English form of the test, there is a noticeable shift from the iconic and enactive responses which are primarily given in both the Intermediate and Advanced groups, to primarily functional logical responses in her Expert group.

In a 1963 study, McNeill indicated that the terms paradigmatic and syntagmatic were “ambiguous since it is not clear whether they refer to all words belonging to the

same or to different parts of speech, or whether the reference is to words that substitute for one another versus ones that form speech sequences” (ibid: 251). He suggested that better terms might be “homogeneous” for responses from the same grammatical class as the stimulus, and “heterogeneous” for responses from a different grammatical class as the stimulus. He also suggested that the syntagmatic term be maintained for responses that form “clear speech sequences with the stimulus” (ibid: 251).

Sökmen (1993: 139) also identified a “nonsense” category. She felt this category was necessary for responses that do not seem to fit nicely into one obvious category or another. An example of a “nonsense” response was *long* for the stimulus *butter* (ibid). A problem with this category is that it is too judgmental. However, Sökmen does make a point as to the difficulty in placing responses into seemingly narrow defined categories.

2.6 Less frequently discussed findings - A “Noun Bias”?

While conducting research for the Lexis module for the University of Birmingham Master’s in TEFL/TESL programme (see Deignan et al 1998) in which an eight word English word association test was utilized with two Japanese classes in the same high school (Edwards 1998) an interesting finding in the data was observed. A large majority of the responses for all word classes were nouns. Of the non-noun stimuli, 70% of the responses were nouns. Of all the non-adjective stimuli only 16.3% were adjective responses, and for non-verb stimuli only 9.3% were verbs. See Table 2.5 for a full comparison of noun responses to non-noun stimuli.

In Sökmen’s (1993) study of four different L2 groups 61.5% of all adjective responses were nouns and 59.3% of all verb responses were nouns for a total of 61.3% noun responses for all non-noun stimuli. There were 22.2% adjective responses for all non-adjective stimuli, and 8.5% verb responses for all non-verb stimuli. Although she

provided the figures to arrive at the above results for her study, she did not think this seemingly “noun bias” was significant. She did say, however, “Adjective and verb stimuli were more likely to stimulate a response which formed a syntactic unit: adjective-->noun (deep-->kiss), verb-->noun (eating-->rice)” (ibid: 140).

Table 2.5 Noun Bias Figures					
EFM – (NEC)	Edw – (JE)	W – (NE)	W – (JE)	W – (JJ)	Sok – (NNE)
K - 66.9	70	26.4	57.4	66.2	61.3
1 - 47.3					
3 - 17.5					
5 - 13.8					

Percentages for only noun responses to all non-noun stimuli

(EFN – Entwisle, Forsyth & Muuss/Edw – Edwards/W-Wolter/Sok- Sökmén)

(NEC - Native English Children/JE – Japanese taking an English test/

JJ – Japanese taking a Japanese test/NNE – Non-native taking an English test)

Yoneoka (1987) conducted a study in which she tested three different English and Japanese groups – 3-5 year-olds, 8-12 year-olds and adults as well as three Japanese L2 learner groups, intermediate, advanced and expert. What is interesting about her study is that she tested the Japanese group in Japanese. A common bond she found between all groups was that nouns were preferred responses for all non-noun stimuli. In a review of her 1987 study, Yoneoka (2000) wrote:

“... Japanese adults showed a tendency ... toward noun-class responses in general, irrespective of the word class of the stimulus. This tendency to respond with nouns held true for the most part even when the participants were tested in English, except in the case of the “expert” speakers.” (ibid: p.4)

Wolter (1999) did a similar study where he conducted word association tests in both English and Japanese to native Japanese speakers of English. Although he did not specifically address a “noun bias” in responses in his study, he did provide the raw data

of his study. A review of his data reveals similar results of the “noun bias” found in Edwards (1998), Sökmen (1993) and Yoneoka (1987) for the English word association test but not as remarkable. There were only 42.7% noun responses for non-noun stimuli, 7.35% adjective responses for non-adjective stimuli and 4.9% verb responses for non-verb stimuli. The lower results might be due to a very mixed level group of students or due to his use of high frequency words for part of his test. However, the results for his Japanese word association test were more consistent with previous findings. There were 66.2% noun responses to non-noun stimuli, 8.82% adjective responses to non-adjective stimuli and 12.75% verb responses to the non-verb stimuli.

These findings would tend to indicate that at least for Japanese there seems to be a “noun bias” in responses to word association tests conducted in English and Japanese for native Japanese speakers.

2.7 Noun Bias in Native Speakers?

In 1964, Entwisle et al published a report showing the results of word association test administered to native English speaking children in kindergarten, 1st grade, 3rd grade and 5th grade. The results show as previously mentioned that the syntagmatic-paradigmatic shift occurs sometime between 1st and 3rd grade. Looking at the report’s raw data it appears that a non-bias shift also occurs. Using the figures provided by Entwisle et al’s report (1964: 23) which shows the breakdown of all responses to stimuli by each grade level, an analysis was conducted using only the data for responses to adjectives and verb stimuli. Noun stimuli were not included here because it is only logical based upon the paradigmatic research that noun stimuli would primarily beget noun responses. Deese (1962: 79) reports it this way:

“In the analysis of associative meaning (Deese, 1962) it is assumed that nouns are more likely than other classes to serve as the source of the

generation of utterances. Nouns are, therefore, largely independent of their verbal environments in association. They should yield associations which are mostly other nouns.”

The results of the analysis of the data can be seen in Table 2.6 below. It is clear that kindergartners and 1st graders predominately respond with noun responses to adjective and verb stimuli, 66.9% and 47.3% respectively. However, 3rd and 5th graders answer with noun responses to adjective and verb stimuli at a far lower rate, 17.5 % and 13.8% respectively. It would seem that this noun bias trend lends support to the syntagmatic paradigmatic shift during this period in childhood development. It can be easily observed from Entwisle et al’s data (ibid) and the data in Table 2.6 that as the number of noun responses decrease rapidly from kindergarten and 1st grade to 3rd and 5th grade, the number of adjective and verb responses increase rapidly at the same time.

Table 2.6	Entwisle, Forsyth & Muuss				Noun Bias Figures		
(Responses for all non-noun stimuli for 4 different groups. of native Eng. children)							
Stimulus Type	Grade	N	Adj	V	Adv	P	O
Adjective	K	69.7	16.3	6.3	2.8	2.2	2.8
	1	47.2	40.2	5.9	1.9	2.7	2.2
	3	16.3	76.9	3.3	0.9	1.7	0.9
	5	13.8	81.9	1.7	1.1	0.6	0.9
Verbs	K	64.1	3.1	15.0	10.9	3.1	3.8
	1	47.5	3.8	25.9	16.9	2.7	3.3
	3	18.8	4.8	62.8	11.9	0.8	0.9
	5	13.9	2.9	72.5	8.6	1.6	0.5
Total	K	66.9	9.7	10.6	6.9	2.7	3.3
	1	47.3	22.0	15.9	9.4	2.7	2.7
	3	17.5	40.9	33.0	6.4	1.3	0.9
	5	13.8	42.4	37.1	4.8	1.1	0.7

(These figures, which are in percentages, were calculated using the data provided by the authors)

(N-Noun/Adj-Adjective/V-Verb/Adv-Adverb/P-Preposition/O-Other)

In a separate study conducted by Entwisle (1966) in which she does look at differences in the form classes of the responses to stimuli in word association, her findings are very similar to the findings above (see Table 2.7 below). Noun responses again dominate for kindergarten and 1st grade with much less domination in 3rd and 5th grade. However, this trend somewhat changes with adverb stimuli. Although noun responses are quite high in the kindergarten and 1st grade level, they are almost the same as verb responses.

Table 2.7 Selected Responses Not Matching the Form Class of the Stimulus

	Responses to Adjectives			Responses to Verbs		
Grade	N	V	Adv	N	Adv	P
K	57.1	13.4	3.0	55.4	4.8	5.2
1	44.1	13.0	2.6	48.1	7.3	4.2
3	18.3	7.0	1.7	26.1	8.6	2.5
5	14.6	4.4	1.6	20.1	7.6	1.4
	Responses to Adverbs			Responses to Nouns		
Grade	N	Adj	V	Adj	V	
K	35.0	8.2	31.9	5.7	20.8	
1	28.1	12.1	27.8	8.4	19.0	
3	10.5	19.0	15.0	10.1	13.6	
5	6.6	19.2	9.7	9.9	10.5	

(These figures were obtained from Entwisle (1966: 561) and are in percentages)

(N-Noun/Adj-Adjective/V-Verb/Adv-Adverb/P-Preposition)

Finally, Fillenbaum and Jones (1965) conducted a study of college students in which responses to word association tests were separated into various form classes. Table 2.8 below shows partial figures from their study. Adults show a similar pattern as the 3rd and 5th graders in the two previous studies. This pattern is that a noun bias for responses is prevalent in young native English speaking children but not so prevalent in children in 3rd grade to adults.

Table 2.8 Fillenbaum & Jones

Noun Bias Figures

Stimulus Class	Response Class				
	N	Adj	V	Adv	P
Noun & Pronoun	91	6	6	2	2
Adjective	28	65	1	1	2
Verb	18	5	43	5	10
Adverb	7	14	2	45	2
Preposition	24	5	9	6	42

(Figures are a partial composite derived from a table from Fillenbaum & Jones (1965: 250))

(Totals do not add up to 100 because that study included other class forms not tested in the current study)

Language is indeed a human function. It develops quickly in children and certain cognitive changes occur. These changes are noticeable in the syntagmatic paradigmatic shift that occurs between children and adults. This shift has been found in Japanese L2 learners and seems to change slightly as language development occurs and even closely mirroring a native speakers pattern at the expert level. Can word association test results show language development? Do results differ due to gender or how the test was given? Also, a possible “noun bias” has also been noted in responses by Japanese to word association tests. Does this “noun bias” hold true for different groups and does it change as development occurs? The following study of three different groups of Japanese students attempts to answer these questions.

CHAPTER 3

Method, Procedure and Survey

3.1 Choosing the Stimuli

A simple word association test was devised taking into consideration Meara's opinion that researchers should abandon the Kent-Rosanoff list when testing non-native speakers and "think about their choice of words more carefully" (Meara 1983: 4). He has problems with the Kent-Rosanoff list primarily for its use of high frequency words. This problem was also discussed by Deese (1962: 79) who also found fault with the list's predominant use of adjectives and nouns as stimuli, therefore rendering the data as not being "useful in establishing general conclusions about the grammatical structure of associations in the language at large." According to Meara (1983: 3) high frequency words "tend to produce very similar responses in both the TL [target language] and NL [native language]."

Taking Meara's suggestion into consideration and considering that one of the purposes of this research is to try to show language development, words used as stimuli were obtained from the second year level of *New Horizon* (Asano et al 1999), a popular junior high school textbook utilized extensively in Japan. The second year textbook was utilized because it contains an index of vocabulary items for the second year level as well as the vocabulary items from the first year level. Therefore, third year junior high school students should have been taught the material from the first and second year textbooks and thus have some familiarity with the vocabulary items from both texts. The third year textbook was not utilized because the third year junior high school students would not be finished with the text and therefore may not have actually seen or learned some of the vocabulary items listed in the text.

Since *New Horizon* is a textbook approved by Mombusho, Japan's Ministry of

Education (all textbooks utilized in any classroom for all primary and secondary schools in Japan must have prior approval from Mombusho), it contains words from the basic word list that all junior high school students are supposed to be taught. It is quite easy to assume that the Japanese high school or university students participating in this study could have possibly used the textbook when they were junior high school students or would be familiar with the stimuli selected because they come from a basic word list for all junior high school students and thus they would have some familiarity with the vocabulary items from the texts.

In all, 50 stimuli were chosen at random, seven nouns (*age, custom dictionary, letter, question, story* and *vacation*), twelve verbs (*arrive, believe, bring, celebrate, cry, cut, enjoy, forget, hold, make, speak* and *sleep*), twelve adjectives (*black, busy, cold, dangerous, dark, happy, hungry, little, near, pretty, wise* and *wonderful*), twelve adverbs (*again, also, always, carefully, down, just, later, off, out, quickly, together* and *very*) and seven other/grammar words (*after, and, between, must, since, under* and *until*). There are high frequency words placed on the list; however, this could not be avoided. The nature of the English program in Japan as it stood at the time this data was collected is that English is first presented at the junior high school level and therefore students are provided with basic beginner level English which contains a lot of high frequency words. The stimuli were arranged in a random order with particular care being made to keep possible collocates and the same word classes apart. The same word order was used for both tests in order to facilitate easier sorting of the responses.

3.1.1 The Polysemy Problem

In any word association test polysemy is a problem. Polysemous words are words that have different meanings depending upon context (Richards et al 1992) or as McCarthy puts it “a single lexical item with multiple senses (1990: 23). The following

are some examples of polysemous words found in the New Horizon textbook (Asano et al 1999) from which the stimuli were obtained:

<i>back</i>	in the adverbial sense:	<i>Come back when you have time.</i>
<i>back</i>	in the verbal sense:	<i>Back the car down the driveway.</i>
<i>back</i>	in the noun sense:	<i>My back hurts.</i>
<i>cook</i>	in the verbal sense:	<i>They cook dinner together every night.</i>
<i>cook</i>	in the noun sense:	<i>The cook made a meatloaf.</i>
<i>rain</i>	in the verbal sense:	<i>I think it will rain tomorrow.</i>
<i>rain</i>	in the noun sense:	<i>Will the rain ever stop?</i>

Polysemy is a problem because with word association tests there is no context from which to discern the sense intended. For example, if *back* was chosen as a noun stimulus in a word association test the respondents do not know that it was intended as a noun because the word is uttered or written without any other words for contextual clues. Therefore, responses could be varied because of the other possible senses of the word (e.g. *stomach, chest, come, again* etc.). Schmitt and Meara (1997: 21) made this one of their criteria for abandoning a possible stimulus; "...the verb and its related noun did not use an identical form (i.e. *to smile* and *a smile*).” Polysemy also creates the same problem with responses but that will be discussed later.

The stimuli were therefore carefully screened to ensure that words were chosen which had only one sense or where one sense (and word class) is more known by the junior high school students than the other senses.

Also, in order to test the hypothesis of a “noun bias” in responses to word association, fewer nouns were used in this research than other word classes. As has been pointed out before, paradigmatic responses are those within the same word class as the stimulus; therefore a noun stimulus should beget a noun response. To test for an overall “noun bias” regardless of word class more stimuli from the other word classes

was desirable. Therefore, noun stimuli were minimized but not altogether left out of the sample.

3.1.2 Forms of Testing

Although most traditional word association tests are orally presented, two forms of the test were made, one written and one oral. The two different tests were designed to test the hypothesis of whether response patterns differed depending upon whether the test was orally presented or visually presented (in written form). It is noted here that most word association research is conducted orally (see Orita 2002a, 2002b; Farooq 1998; Yoneoka 1987, 2000, 2001; Wolter 1999, for example); however, there have been studies in which data was collected from a written form of a test (Moss and Older (1996) conducted both written and oral tests). Schmitt and Meara (1997: 27) also devised a written word association test in order to test “productive and receptive association knowledge change.” Also, McCarthy (1990) asks his readers to do a written association test as a task. Finally, Meara (1983: 1) describes the word association “game” as requiring “two players: one whose task is to call out or show single words, and a second whose task is to respond to these words with the first word that comes into his or her head.” Besides it is common knowledge within the Japanese ELT circle that Japanese learners tend to fare much better on written tests than in spoken tests.

3.2 Subjects

Subjects were all non-native speakers of English who are learning English as a second or foreign language in Japan. In all 294 third year students (145 males and 149 females) at three Japanese junior high schools were tested with either the oral test (76 males and 69 females) or the written test (69 males and 80 females), which was determined by their teachers. These three junior high schools were selected because

the English teachers or the AETs (Assistant English Teachers from the Japanese Exchange and Teaching (JET) program) teaching there were known.

Third year students (109 males and 196 females) at two high schools were tested with either the oral test (24 males and 97 females) or the written test (85 males and 99 females), which was again determined by the teachers. Again the high schools were selected due to their accessibility. Although these schools were accessible, I was unable to collect the data myself and had to rely upon the teachers and AETs at each of the schools.

Students from four universities (41 males and 42 males) were tested with either the oral test (5 males and 26 females) or the written test (36 males and 16 females). Since I did not have access to any universities, assistance was requested through the Centre for English Language Studies (CELS) students' e-mail network and the Hiroshima Chapter of JALT (Japan Association for Language Teaching). From these requests, data were obtained from second, third and fourth year students from the four universities. Although this research was initially designed to test development in three different groups who were essentially aged three years apart, it was necessary to utilize all the university data due to the relative small number of respondents. It should also be noted that the male university students were primarily economics majors whereas the female students were economics or English majors. The form of the test, either oral or written, given to the university students, was left to the discretion of each of the university instructors involved. They indicated that due to time constraints in their classes one form of the test would suit their classes better than the other test.

3.3 Procedure

Teachers and AETs who participated in collecting data from their students were either contacted in person or via e-mail and given instructions concerning the word

association test. Also, each teacher or AET was provided with written instructions (see Appendix I) and testing documents consisting of a sample of an oral student response sheet (Appendix II), a written student response sheet (Appendix III), stimuli word list for the oral test (Appendix IV) and a student survey (Appendix V).

For the oral test, the instructions were those of a simple one word response word association test where the teacher was told to read out the words on the list to the students with the students instructed to write down the first word that came to their minds. The students were also instructed that if they didn't know or understand the word that was spoken they were to place an "X" on the line for that word, or if they understood the word but did not know a response for the word they were to leave the space blank. These instructions were to be given orally. They were also provided in both English and Japanese at the beginning of the test response sheet for the students to read.

As for the written test, teachers and AETs were instructed to pass out the test response sheet to the students and tell the students to read each stimulus word and then write the first word that came to their minds. Again, the instructions were the same as the oral test if they did not understand the word or didn't know a response for the word. Students were told not to worry about spelling but to try and spell the responses as best they could.

3.4 Survey

All respondents were asked to fill out a nine-question survey (Appendix V) before or after taking the word association test. The survey asked for gender, where the respondent lived and the respondent's school level and year. To ensure that the survey would be understood correctly by all groups each item was translated into Japanese. The pertinent questions of the survey were questions 4 through 8 with question number

9 confirming the answer for question number 8. Therefore, question number 9 was not tabulated with the rest of the data.

Question number 4 asked for the number of hours per week the respondent studied English in school with the possible choices being 1 to 3 hours, 4 to 6 hours, 7 to 9 hours and 10 or more hours per week respectively.

Table 3.1 Survey Answer Key	
Question # and Answer	Answer Information
4a	Hrs. of Eng. in School 1 to 3
4b	Hrs. of Eng. in School 4 to 6
4c	Hrs. of Eng. in School 7 to 9
4d	Hrs. of Eng. in School 10 or more
5 Yes	Study English Outside of School
5 No	Study English Outside of School
6a	Where Study – Eng. Conver. School
6b	Where Study – Cram School
6c	Where Study – Private Instruction
6d	Where Study – At Home
6abc	Total of a, b & c responses
7a	Hrs. of Eng. out of School 1 to 3
7b	Hrs. of Eng. out of School 4 to 6
7c	Hrs. of Eng. out of School 7 to 9
7d	Hrs. of Eng. out of School 10 or more
8 Avg.	Number of Years Studied English

Question number 5 asked a simple “yes” or “no” question whether the respondent studied English outside of school. If the respondent answered “no” to this question he or she didn’t need to answer question numbers 6 and 7. If the respondent answered “yes” to question number 5, question number 6 asked him or her where he or she studied by circling all answers that applied. The choices were English Conversation School, Cram School, Private Instruction and At home. Question number 7 was similar to number 4 in that it asked how many hours a respondent studied English outside of school with the answers being the same as question 4.

Question number 8 asked for the number of years the respondent had studied English to date with question number 9 asking when the respondent started studying English. Table 3.1 above provides a key for the survey results to follow.

3.5 Survey Results

Tables 3.2, 3.3, and 3.4 show the survey results for all the junior high school, high school and university respondents. The left hand column for the Tables show the relevant question numbers (numeric number) with their respective possible answers (alphabetic letter). All values are in percentages except for the values listed for question '8 Avg.' which is the average number of years respondents have studied English. Percentages for question number 6 do not add up to 100% because respondents were allowed to choose more than one answer. The values for '6abc' is a total for the values of answers A, B and C for that question and is a value indicating percentage of respondents who study English outside of school away from home.

Table 3.2	Junior High School Survey Results				
	Boys Oral	Boys Written	Girls Oral	Girls Written	Total
4a	78.9	85.5	78.3	80.0	80.6
4b	19.7	10.1	21.7	17.5	17.3
4c	0.0	1.4	0.0	2.5	1.0
4d	1.3	2.9	0.0	0.0	1.0
5 Yes	81.6	72.5	76.8	78.8	77.6
5 No	18.4	27.5	23.2	21.2	22.5
6a	1.6	0.0	7.5	3.2	3.1
6b	64.5	70.0	60.4	55.6	62.3
6c	6.5	2.0	17.0	7.9	8.9
6d	32.3	38.0	39.6	50.8	40.4
6abc	72.6	74.0	84.9	66.7	74.1
7a	93.5	88.0	84.9	84.1	87.7
7b	4.8	10.0	13.2	14.3	10.5
7c	0.0	0.0	1.9	0.0	0.4
7d	1.6	2.0	0.0	1.6	1.3
8 Avg.	3.41	3.45	3.68	3.66	3.55

Looking at the junior high school results (Table 3.2 above) for question 4 a large majority of respondents (80.6%) in all groups indicated they only study English for 1 to 3 (4a) hours in school weekly. The next largest group (17.3%) is 4 to 6 hours (4b). However, in the high school results (Table 3.3) there is an increase in the number of hours studied in school (62.9% indicated they studied 4 to 6 hours and 28.8% studied 7 to 9 hours a week). Then there is somewhat of a reversal with the university

respondents (Table 3.4) (45.8% indicated they studied English in school 1 to 3 hours weekly and 38.6% indicated they study 4 to 6 hours weekly).

Table 3.3	High School Survey Results				
	Boys Oral	Boys Written	Girls Oral	Girls Written	Total
4a	12.5	7.1	11.3	0	6.6
4b	20.8	91.8	17.5	92.9	62.9
4c	54.2	1.2	69.1	7.1	28.9
4d	12.5	0.0	2.1	0.0	1.6
5 Yes	66.7	65.9	59.8	63.6	63.3
5 No	33.3	34.1	40.2	36.4	36.7
6a	6.3	1.8	6.9	7.9	5.7
6b	56.3	51.8	41.4	47.6	47.7
6c	6.3	7.1	0.0	12.3	6.7
6d	50	55.4	67.2	53.9	58.0
6abc	68.8	60.7	48.3	68.3	60.1
7a	81.3	71.4	81.0	85.7	79.8
7b	12.5	21.4	18.9	11.1	16.6
7c	0	5.4	0.0	3.2	2.6
7d	6.2	1.8	0.0	0.0	1.0
8 Avg.	6.5	6.27	7.11	6.58	6.66

This seems a likely trend considering the “examination hell” that Japanese students face as they try to enter universities after high school. Junior high school students must also take examinations to enter high school, but the stakes are not as high. English is one of the main areas tested on all Japanese university entrance examinations; therefore, there would be an obvious push to give students more English instruction to help them pass their entrance examinations.

Table 3.4	University Survey Results				
	Boys Oral	Boys Written	Girls Oral	Girls Written	Total
4a	0.0	66.7	38.5	25.0	45.8
4b	60.0	33.3	34.6	50.0	38.6
4c	20.0	0.0	26.9	18.8	13.3
4d	20.0	0.0	0.0	6.3	2.4
5 Yes	60.0	25.0	80.8	56.3	50.6
5 No	40.0	75.0	19.2	43.8	49.4
6a	0.0	33.3	19.1	22.2	21.4
6b	0.0	0.0	0.0	0.0	0.0
6c	33.3	0.0	0.0	0.0	2.4
6d	66.7	77.8	90.5	100.0	88.1
6abc	33.3	33.3	19.1	22.2	23.8
7a	66.7	66.7	76.2	100.0	78.6
7b	33.3	22.2	14.3	0.0	14.3
7c	0.0	11.1	9.5	0.0	7.1
7d	0.0	0.0	0.0	0.0	0.0
8 Avg.	11.8	8.36	9.88	10.38	9.43

Subsequently, after entering a university, depending upon the program, there would probably be less English classroom instruction. The relative high numbers for the university males in 4a and 4b might show the fact that they are primarily economics majors, where as the higher numbers for the university females for answers 4b and 4c might indicate they are primarily English majors. Except from what each teacher mentioned about their students in general, it is not known what the percentages of economics and English majors are.

As mentioned earlier, questions 5, 6 and 7 are related in that they indicate whether the respondents study English outside of school, where they study if they do and how many hours per week they do this. The results show that a majority of the respondents in junior high school (77.6%) and high school (63.3%) study outside of school, whereas it is almost a fifty-fifty split (50.6% and 49.4%) for those who study outside and those who do not for the university respondents. Again, this would indicate the Japanese education system where students must take an entrance examination in order to gain access into high school and university. Then once in university this would obviously decrease.

The results for question 6 also reflect the above trend in Japan. In Japan students have a few choices for extracurricular study, especially for English. There are various English conversation schools, called *eikaiwa*, throughout Japan. These schools focus primarily on English conversation. Then there are the thousands of *juku* or cram schools which teach all the subject areas that students face in their schools. The focus of the cram schools is to train the student to be a better test taker so that they can pass their entrance examination. Obviously, for English at these schools, the focus is a grammar based one. Then there are private classes where students get one-on-one instruction. The focus here depends upon the student's desire but can cover all aspects

from conversation to grammar based and test taking. Obviously, since most students are trying to pass their entrance examination, the extracurricular school of choice would be the *juku*. The results show this to be in fact accurate; 62.3% of all junior high school and 47.7% of high school respondents indicated that they attend a *juku* whereas none of the university respondents attended one. For all extracurricular study outside of home ('6abc') 74.1% of junior high school students and 60.1% of high school students partake. Only 23.8% of the university respondents who study outside of school study at an English school of some kind, either an *eikaiwa* or private instruction. These figures may be in contrast with Schmitt and Meara (1997) who in their study to determine vocabulary size for university and high school students stated, "... figures are from an EFL situation where Japanese students receive virtually no English input outside the classroom, and what gains these students made probably stemmed almost directly from their formal language study" (ibid: 24). Home is still a preferred place to study (40.4% junior high school, 58% high school and 88.1% university).

As for the number of hours spent studying English outside of school per week, 1 to 3 hours a week is the answer selected by a large majority of respondents in all three groups (87.7% junior high school, 79.8% high school and 78.6% university). A distant second was 4 to 6 hours, 10.5%, 16.6% and 14.3% respectively.

Finally, the average number of years each group has studied English is 3.55 years for the junior high school students, 6.66 years for the high school students and 9.43 years for the university students. This is important for this study because it is assumed that language development occurs over time, and the more years studied the more varied the word association test data should be between the groups. Also, the initial design of this study was to test development in three groups who were aged three years apart from each other. The self-proclaimed number of years respondents had studied English averaged out to about three years apart.

The ranges for the number of years studied were interesting for all groups, 3 to 10 years for the junior high school students, 6 to 15 years for the high school students and 8 to 17 years for the university students. Although individual differences were observed while conducting this study, the design of this study was to study possible group differences; therefore, individual differences will not be discussed. A separate study may be conducted in which individual differences are given the full attention required to fully investigate them.

The survey and its results only indicate mean values of the number of years the respondents have studied English along with some of their study habits; however, they do not provide any information into their English lexicon or development. In the next chapter the data obtained from these students will be discussed.

CHAPTER 4

The Data

4.1 Defining the Categories

Since this study was designed to test for development based upon paradigmatic and syntagmatic responses as well as for a “noun bias” in responses, the responses were separated by word class only. It is recognized that separating responses by word class only is a very liberal interpretation of paradigmatic and syntagmatic responses; however, there is some basis for this.

As discussed earlier, some scholars have used different categorizations in dealing with the placement of responses into categories. Definitions of what are considered paradigmatic and syntagmatic responses also differ between scholars. McNeill (1963: 250) said that paradigmatic responses are “words that belong to the same part of speech as the stimulus.” Söderman (1989: 114-115) indicates that paradigmatic responses are those “that belong to the same major form class as the stimulus word” and “can usually also occupy the same position within phrases or sentences.” Paradigmatic responses as defined by Wolter (2001: 3) are “from the same word class as the prompt word, and as such can presumably perform the same function as the prompt word.” To facilitate this study, the liberal definition of paradigmatic responses as being a word class phenomena was adopted.

Syntagmatic responses, as previously discussed, have been very closely linked to collocation. Deese (1962: 79) defines syntagmatic responses as “words which occupy other, generally contiguous positions in an utterance; they are members of different word classes.” Söderman (1989: 115) indicated that syntagmatic associations “are responses [that] together with the stimulus complete a phrase.” Rūķe-Draviņa (1971: 66) simply described syntagmatic responses as “what-follows-what.” Therefore, it is easy to see

that syntagmatic responses are collocational linked. Furthermore, collocation has been strongly considered a left-to-right association.

Sökmen (1993: 139) stated that collocation was only a left-to-right relationship and thus a response of *beautiful* to the stimulus *woman* was not considered collocational because it did not fit a left-to-right relationship. The problem with thinking that collocation is a left-to-right phenomena only, as in Sökmen's example, is that she is assuming that the respondent was thinking right to left or incorrectly when the respondent could have been thinking of the left-to-right sequence when the response was provided (e.g. the respondent heard *woman* and immediately thought *beautiful woman* and not *woman beautiful*). Therefore, thinking of collocational or syntagmatic responses only as a left-to-right phenomenon is not a common sense approach when analyzing responses. Meara (1983) does not specifically indicate which direction these obvious syntagmatic responses should be addressed but the examples he uses clearly show that responses of this type could go either left-to-right or right-to-left. Although Carter and McCarthy (1988: 32) initially indicate while introducing collocation that "words also play a part in the left-to-right unfolding of language..." they also indicate in discussing M.A.K. Halliday and J. McH. Sinclair's concept of co-occurrence, which is closely related to collocation, that,

"Co-occurrence...does not just mean two words occurring as an adjacent pair in a fixed grammatical configuration. Co-occurrence has two important features. Firstly there may be a gap of several or many words between the two relevant items, or they may even occur over sentence boundaries...." (ibid: 34).

Deignan et al (1998: 35) refer to collocates as not having "to appear immediately next to each other." They further discuss "upward and downward" collocation, in which collocation is considered a two-way occurrence not just one, although one

occurrence is “more significant” than the other (ibid: 42). A downward collocation is primarily a left-to-right collocation but not always. In analyzing the words “to and fro” they indicate that “‘to’ has a downward collocation with ‘fro’; ‘fro’ has an upward collocation with ‘to’.” This is clearly a common sense approach to collocation and responses to word association should also be considered as a two-way occurrence as opposed to a one-way occurrence.

As for syntagmatic responses, the definition adopted for this study is based more on collocational relationships as described by Carter (1987: 49) such that collocating items do not necessarily need to be words that follow right after each other in a left-to-right structure as previously argued and can be “a fixed number of words on either side of the specified focal word...whose patterning is being investigated” (ibid). Clang associations were deemed irrelevant to this study. These responses were observed but not included in the data.

4.2 Collection and Separation of Word Association Test Response Sheets

Students’ response sheets with individual surveys were received from the previously mentioned junior high schools (JHS), high schools (HS) and universities (UNIV). Once received these sheets were kept in their respective levels, JHS, HS and UNIV. Each level was subsequently separated into oral tests and written tests and subsequently into male and female; therefore, each level would have four separate sets of data, oral test – male (M), oral test – female (F), written test – M and written test – F. During the separation it was noted that several students failed to indicate gender. These response sheets were not included with the data. If a response sheet had a completed survey but lacked word association responses, these response sheets were used with the assumption that the student did not understand any of the stimuli or could not provide responses for the stimuli.

4.3 Compilation of Responses

Once all the response sheets were placed in their appropriate set, each response sheet was manually tabulated. Each word was written down for each response on specially prepared matrixes. A tick mark was placed after each word every time that response had been written by one of the respondents. Non-responses, which were indicated as either “X” (meaning the stimulus was not understood) or blank (indicating the stimulus was understood but an appropriate response was not) were also counted. Responses written in Japanese were noted but not counted as a valid response. Although students were told not to worry about spelling, several responses were so badly spelled that logical words could not be discerned and therefore were not counted as valid responses. After the entire set was tabulated the number of tick marks for each response for each stimulus were counted. All responses for each stimulus were then typed into an Excel spreadsheet with the total number of times each response was given.

After the above tabulation was completed, the above spreadsheets were then printed and the responses for each stimulus were separated further into six word class categories, noun, adjective, verb, adverb, preposition and other and then once again tabulated. The ‘other’ category contained such grammar function words as articles, conjunctions, interjections, etc., basically any response that did not fall into the five primary categories. Auxiliary verbs however, were counted as verbs. These numbers were then entered into additional Excel spreadsheets where statistical analyses were applied. Appendices VI through XI provide the overall results for each of the six data sets, JHS – M, JHS – F, HS – M, HS – F, UNIV – M, and UNIV – F. Much of the data were reported as percentages. The total number of responses for each word class with their percentages can be observed in Appendix XII.

A statistical tool called the Wald CI (Confidence Interval) was applied to the analysis of the paradigmatic and syntagmatic data as well as the noun bias data. The

Wald CI is fully explained in the following section.

4.4 Statistics Explanation

Although a standard Chi-square test has been used in other research for word association tests (see Orita 2002a, 2002b; Schmitt and Meara 1997; Sökmen 1993 for example), it was not used for testing the data obtained during this study because a Chi-squared test is used to compare something to an expected value. In this study none of the values were expected; therefore, the standard Wald CI (Confidence Interval) test was used since sample sizes were greater than 50 and since the tests were performed primarily to test whether differences exist between populations. The Wald CI test is useful for testing difference in and of itself. This equation determines confidence intervals for two sample binomial distributions (Brown and Li 2002). Brown and Li describe a two-sample binomial distribution in the following way:

“Suppose that X and Y are two independent random variables drawn from two different populations that both have binomial distributions. The first is of size m and has success probability p_1 . The second is of size n and has success probability p_2 . Specifically, suppose $X \sim \text{binomial}(m, p_1)$ and $Y \sim \text{binomial}(n, p_2)$ and let $\Delta = p_1 - p_2$. We want to find the confidence interval (CI) with approximate level $1 - \alpha$ for Δ .” (ibid: 1)

In this study, there are several different populations. The data has been separated into Male and Female, Oral and Written, and Junior High School, High School and University. The success probability, i.e. the p_1 and p_2 values, is the probability of a paradigmatic response. It should be noted that m and n are simply variables, and thus not attached to any particular sample.

Brown and Li (ibid) explain the formula in the following mathematical terms:

“First we introduce some notation. Let $q_i = 1 - p_i$, $i = 1, 2$, $p_1 = X/m$,

$p_2 = Y/n$, and let $q_i = 1 - p_i$, $i = 1, 2$. p_1 and p_2 are the MLEs [maximum likelihood estimate] of p_1 and p_2 respectively. Let $z_{\alpha/2}$ denote the upper $\alpha/2$ quantile of the standard normal distribution.” (ibid: 2-3)

It should also be noted that all the correct mathematical symbols used by Brown and Li (ibid) were not available and could not be used, therefore, if a letter or symbol is in bold, it should have a ‘^’ on top (e.g. $a = \hat{a}$).

Brown and Li (ibid) continue to complete the Wald CI formula:

“Let $\Delta = p_1 - p_2$, then $T = (\Delta - \Delta)/\sigma_\Delta$ asymptotically has standard normal distribution. Here σ_Δ^2 is some consistent estimate of $\text{Var}(\Delta) = p_1q_1/m + p_2q_2/n$. Substitute the MLE $p_1q_1/m + p_2q_2/n$ in T as the estimate of $\text{Var}(\Delta)$, we get the Wald CI of Δ :

$$(\Delta \pm z_{\alpha/2} \sqrt{p_1q_1/m + p_2q_2/n})” \text{ (ibid: 3)}$$

The q_i and q_2 values here would represent syntagmatic responses or in other tests, the secondary response, e.g. non-noun responses (where the p_1 and p_2 values are the noun responses).

What a Wald CI does is give a range of values, the difference between two probabilities. Since these are probabilities, the values within the interval will always be between -1 and 1 . For example, suppose the difference between JHS Male paradigmatic and syntagmatic responses and those of JHS Females are being tested. The difference in the success rates is tested, where a difference of 0 means that the two groups are essentially the same. Due to the \pm part of the above formula, an upper and lower value is obtained, such as $(-0.5, 0.5)$ or $(0.1, 0.3)$. In the former case, this means that the difference is somewhere between -0.5 and 0.5 . The conclusion is that they are not different since 0 itself lies in the potential range. In the latter example, however, 0 does not lie within the range, so the conclusion is that they are statistically different. This conclusion comes with a certainty of $\alpha\%$. In this study $\alpha\%$ was set at primarily

the 95% and 99% levels; however, in some cases $\alpha\%$ was set at 90%. Brown and Li (ibid) reported that the Wald CI does well when sample sizes are large, at least greater than or equal to 50.

All the Wald CI analyses for all the data sets (twenty-one in all) for paradigmatic and syntagmatic responses can be seen in Appendix XIII. All possible combinations of data sets, e.g. JHS Female Oral test results and JHS Female Written test results, were tested in pairs for statistical difference resulting in a total of thirty separate tests. All data pairs were initially tested at the 95% significance level. If a pair was found significant at 95%, it was further tested at the 99% level. If significance was not found at 95% the data pairs were then tested at the 90% level. This was done to show that some of the data pairs were just a little short of the 95% level. Although the 90% level was tested for some of the data and may be of some interest, the main emphasis of discussion will be for the data pairs which were found to be significant at 95% and 99%. Although the Wald CI test uses both paradigmatic and syntagmatic response totals in its mathematical formula, the results are reported as paradigmatic difference. It goes without saying that if an analysis was found to be significant in showing a paradigmatic difference between two data sets, the opposite is also true, there would be significance in the difference in syntagmatic responses. This is especially true in this study since the data was separated into only paradigmatic and syntagmatic responses.

Appendix XIV shows the Wald CI analyses for the noun bias data sets. These data sets were based upon the total numbers for individual groups (e.g. JHS Male Total, JHS Female Total and JHS Total) and not broken down further by the type of test taken (i.e. Oral Test or Written Test). A British adult data set (Moss and Older 1996) and data sets from Entwisle et al (1964) were also included with the noun bias analysis. These two extra data sets were included to compare differences and similarities.

The British data set consists of the total number of responses from twenty stimuli

(*wise, under, speak, sleep, out, off, make, little, hold, happy, forget, down, dark, cut, cry, cold, black, believe, and, and also*) which were also utilized in this study. Although Moss and Older (1996) only reported percentages of responses without total number of responses for each stimulus, they did indicate that each stimulus had between 41 and 50 respondents. Assuming that the lowest percentage given for any response was a percentage based upon a total of one response, totals in numbers were able to be calculated from the data. Responses for these twenty stimuli were then separated, counted and subjected to the same calculations as the data obtained in this study.

The numerical data from Entwisle et al (1964: 23) was calculated from the numbers provided. It is recognized that the data from Entwisle et al was obtained from twenty-four high frequency stimuli with only four stimuli matching stimuli in this study. This data was analyzed for general comparison purposes only. In all, 14 data sets were subjected to twenty-eight different tests for noun bias analysis. These data were tested at the same significance levels and in the same manner as described above for the paradigmatic analysis.

In the following chapter, the findings of all the analyses conducted are presented and discussed.

CHAPTER 5

Analysis and Discussion of the Data

5.1 General Paradigmatic Syntagmatic Data Analysis

The Wald CI test was applied to the data in two ways, a paradigmatic-syntagmatic difference analysis and a noun bias difference. The main analysis concerns the paradigmatic-syntagmatic response difference for the three levels and between data sets. Table 5.1 provides a look at the overall percentages for paradigmatic and syntagmatic responses for all the data sets and levels.

Table 5.1 Percentage of Paradigmatic and Syntagmatic Responses by Gender, Test and Level

Data Set	Par	Syn	Data Set	Par	Syn
JHS M O	34.0	66.0			
JHS M W	34.7	65.3	JHS M T	34.3	65.7
JHS F O	36.3	63.7			
JHS F W	34.8	65.2	JHS F T	35.5	64.5
			JHS M&F T	35.0	65.0
HS M O	30.1	69.9			
HS M W	35.2	64.8	HS M T	34.0	66.0
HS F O	33.99	66.01			
HS F W	34.03	65.97	HS F T	34.01	65.99
			HS M&F T	34.0	66.0
Univ M O	31.3	68.7			
Univ M W	37.5	62.5	Univ M T	36.7	63.3
Univ F O	30.0	70.0			
Univ F W	24.8	75.2	Univ F T	28.2	71.8
			Univ M&F T	31.8	68.2

JHS – Junior High School; HS – High School; Univ – University; M – Male;
F – Female; O – Oral Test; W – Written Test; T – Total

The overall results for these figures are fairly consistent with the research conducted with Japanese L2 learners mentioned in Chapter 2. For instance Wolter (1999) (see Table 2.2) reports findings of 63.9% for syntagmatic responses (although only 19.4% for paradigmatic responses) for Japanese adults in responses to low frequency stimuli. In his Japanese Novice group, Orita (2002a: 117) reports 64.5% syntagmatic responses (but only 29.0% paradigmatic responses). The results he

reported for his Japanese Novice-Low, Japanese Novice-High, Intermediate and Japanese Advanced groups (see Table 2.3) in his second study (Orita 2002b) are also within this range. Yoneoka (1987) found results (see Table 2.4) which are also very consistent to those reported in Table 5.1. Her findings for her Intermediate (31.9 % paradigmatic and 60.7% syntagmatic) and Advanced (31.1 paradigmatic and 66.7% syntagmatic) groups are very similar to those reported above.

Based upon the findings above, it would seem that what defines syntagmatic responses is fairly consistent between researchers. The definition for what defines a paradigmatic response, however, seems to be problematic. There appears to be very little consistency in the paradigmatic results from one researcher to another. To emphasize this point, although it has been shown that adult native English speakers tend to provide primarily paradigmatic responses to stimuli (Wolter (1999) observed an average response rate in his study of 77.6% paradigmatic for his native speaker group and Yoneoka (1987) cited a 60.7% paradigmatic response rate.) Orita (2002a, 2002b) observed roughly a 47% paradigmatic response rate and a 50% response rate in syntagmatic responses for his native English speaking groups. Orita's findings do not look native-like. These discrepancies could be due to what each researcher defines as paradigmatic responses.

A possible problem in the present study was noted. Although the results reported in Table 5.1 above are very similar to each other within the data sets, some of the data is not consistent. Meara (1983) indicated that in word association tests conducted with native speakers of English, large groups of respondents are unnecessary. He indicated that a group of fifty was sufficient because "using a group very much larger than this makes little difference to the range or pattern of responses" (ibid: 1). The results of this study seem to support Meara's contention that a group size of fifty or slightly greater is sufficient even for L2 learners. This study seems to indicate that a

group size of less than 50 might make a difference in word association tests involving L2 learners.

The make up and size of each of the groups and of the test taken were mentioned in Chapter 3. The size of the JHS sample was very similar and subsequently the results were seemingly very stable. However, the HS sample was not very consistent with 109 males (only 24 responding to the Oral Test) and 197 females, which were almost split evenly between the two tests. As Table 5.1 shows, the results for the HS female tests are nearly exact even though the students were from two different high schools. However, the HS male data shows that results for the oral test were a few percentage points different than the overall mean for the written male test and the two female tests as well as the overall mean for all the HS respondents.

The sample size seems to be more of a problem when the university data are considered. Responses to both tests were received from a total of 41 male (only 5 males took the oral test) and 42 female university students. The results reported in Table 5.1 show that the results from the university tests are noticeably different than those of the JHS and HS groups. These differences in the HS and university data could be due to reasons other than sample sizes, for example, motivation, personal problems, attitude or developmental. The main culprit, however, for the noticeable differences in the data is likely to be the size of the sample.

A factor that has not been widely discussed concerning the large difference between syntagmatic responses and paradigmatic responses in Japanese respondents to English word association tests is language interference. There does not seem to be a lot of research that has been conducted on the Japanese language itself to report a response pattern for Japanese. However, three studies were found which indicate that adult Japanese responding to their own language favor responses that are classified as syntagmatic. In a study conducted by Wolter (1999: 148) where he tested seventeen

Japanese adults with seven Japanese stimuli, he found that his respondents provided responses which were classified as syntagmatic 62.2% of the time and paradigmatic only 36.1% of the time.

Yoneoka (1987, 2001) discovered in both of her studies that syntagmatic responses are preferred over paradigmatic responses for Japanese children as well as Japanese and Korean adults. Yoneoka and Wolter's findings (see Table 5.2) are very consistent with the syntagmatic and paradigmatic findings in this study even though this study was conducted in English. This could indicate that although Japanese L2 learners of English are given word association tests in English, their native language might be interfering with the responses given. This could also be an indication that the Japanese respondents are actually translating stimuli and responses during word association tests instead of giving direct responses as indicated by Meara (1983: 7).

Table 5.2 Japanese and Korean Language Syntagmatic and Paradigmatic Research Results

Native Speaker Language & Group	Syntagmatic	Paradigmatic
Wolter (1999)		
Adult Japanese	62.2	36.1
Yoneoka (1987)		
3-5 year-old Japanese	70.7	6.7
8-11 year-old Japanese	81.1	17.8
Adult Japanese	77.0	22.2
Yoneoka (2001)		
Adult Japanese	77.6	22.4
Adult Korean	75.7	23.3

All figures are percentages of total responses

It is clear that there is not too much difference between word association results for Japanese who are given either an English test or a Japanese test. More testing should be done in this area to ascertain what the true Japanese response pattern is as well as whether the Japanese response pattern and the Japanese L2 English response pattern are

statistically significant in some way.

What follows are the results of the Wald CI analyses of this study's first three hypotheses regarding paradigmatic response and development, gender and type of test taken.

5.2 Paradigmatic Response – Development Analysis

The first research question asked at the beginning of this study was whether a syntagmatic-paradigmatic shift occurs as development takes place between the three Japanese groups within this study? For a comprehensive review of all the Wald CI results for paradigmatic differences see Appendix XIII. Table 5.3 below provides the results of the Wald CI test applied to fifteen different data pairs which were arranged to show possible developmental differences.

Table 5.3

Paradigmatic - Development Analysis

Data Pairs	Lower Limit	Upper Limit	Significance Level
JHS F O – HS F O	-0.0012600	0.0473816	No Sig @ 90%
JHS F W – HS F W	-0.0154397	0.0311254	No Sig @ 90%
JHS M O – HS M O	0.0015269	0.0765232	95%
JHS M W – HS M W	-0.0229786	0.0340668	No Sig @ 90%
JHS M&F T – HS M&F T	-0.0030883	0.0224410	No Sig @ 90%
JHS F O – Univ F O	0.0156525	0.1098260	99%
JHS F W – Univ F W	0.0472242	0.1527056	99%
JHS M O – Univ M O	-0.0330656	0.0878763	No Sig @ 90%
Univ M W – JHS M W	-0.0051302	0.0619446	No Sig @ 90%
JHS M&F T – Univ M&F T	0.0049104	0.0583436	99%
HS F O – Univ F O	0.0002143	0.0788425	99%
HS F W – Univ F W	0.0452258	0.01390182	99%
HS M O – Univ M O	-0.0502953	0.0878763	No Sig @ 90%
Univ M W – HS M W	-0.0051302	0.0619446	No Sig @ 90%
HS M&F T – Univ M&F T	0.0038695	0.0400318	95%

Significance in these pairs indicates that the pairs are different.

JHS – Junior High School; HS – High School; Univ – University; M – Male;

F – Female; O – Oral Test; W – Written Test; T – Total

Analysis of the data did show that a statistically significant shift occurred with one of the groups; however, this difference does not seem to indicate language

development. Although the JHS and HS groups were statistically the same (except for one data pair which will be discussed below), even at the 90% significance rate, the analysis showed significant difference when the JHS and HS data were compared with the University data. This difference was due to the JHS and HS respondents statistically providing more paradigmatic responses than the University group. In other words, the results would seem to show a reverse language development where the JHS and HS students were more developed in English language ability than the University students were.

Except for the seemingly unusual results for the university data mentioned above, the only other data pair that showed significance was that of the JHS Male Oral test data set as compared to the HS Male Oral test data set. This test pair was significantly different at 95%.

Since the significant findings between the JHS and HS data sets as compared to the University data sets are obviously not due to development the results could be due to other factors such as motivation, actual English language level or, in this case, most probably, sample sizes. The University sample sizes were far smaller than the JHS and HS samples were. The one data pair, JHS Male Oral test and HS Male Oral test, which showed significant difference, could also be the result of sample size. The HS Male Oral test sample size was only 24 students. It should be noted that no significance was found in the HS Male Oral test and Univ Male Oral test data pair even at 90%. This could also be due to sample size, since both samples were small, 24 and 5 respondents respectively.

5.3 Gender Difference Analysis

As for a gender difference in paradigmatic responses, nine separate analyses were conducted upon the data based on gender (see Table 5.4). Overall, the data does not

support a notion of a gender difference in paradigmatic responses to word association tests. The analysis of the total JHS and HS samples were insignificant, even at the 90% significance rate, that is, there was no difference noted between the JHS and HS males and females overall. However, a difference between the total University Male sample and the total University Female sample, significant at 99%, was observed.

Table 5.4 Gender - Paradigmatic Analysis Results

Data Pairs	Lower Limit	Upper Limit	Significance Level	
JHS F O – JHS M O	-0.0062676	0.0517669	No Sig @ 90%	
JHS F W – JHS M W	-0.0301860	0.0328486	No Sig @ 90%	
JHS M T – JHS F T	-0.0335032	0.0088609	No Sig @ 90%	
HS F O – HS M O	0.0063025		0.0711251	95%
HS M W – HS F W	-0.0069780	0.0310893	No Sig @ 90%	
HS M T – HS F T	-0.0157257	0.0147369	No Sig @ 90%	
Univ M O – Univ F O	-0.0485726	0.0734410	No Sig @ 90%	
Univ M W – Univ F W	0.0713196	0.1827620	99%	
Univ M T – Univ F T	0.0429928	0.1283416	99%	

Significance in these pairs indicates that the pairs are different.

JHS – Junior High School; HS – High School; Univ – University; M – Male;
F – Female; O – Oral Test; W – Written Test; T – Total

There were two individual tests that showed significance in the gender relationship. The analysis of the HS Female Oral test data set compared with the HS Male Oral test data set revealed significance at 95%. This indicates that the Female HS sample provided significantly more paradigmatic responses to stimuli than did the HS Male sample for the Oral test. Sample size could have skewed the data for this analysis. As was previously pointed out only 24 male high school students took the oral version of the word association test for this study.

The other individual data pair based on gender, which showed significant difference, was the University Male Written test data set compared with that of the University Female Written test data set. This analysis in which university males provided more paradigmatic responses to the written word association test was

significant at 99%. The significant difference noted in the University samples based on gender could be due to the individuals taking the test. It could also be due to the sample sizes discussed above or it could be due to the liberal definition for paradigmatic responses used in this study. However, since two out of three of the nine tests conducted based on gender that showed significance were from the university samples, some other factor may be at work.

Sommers (2000: 87) discusses recent research in which it has been noted that males and females are inherently different and have different abilities: "Males ... are, on average, better at spatial reasoning than females." and "Females ... have better verbal skills." This could account for the differences noted in this study. Spatial reasoning requires a certain logical way of thinking which might have allowed the University male respondents into a more logical sense of networking words. As noted in Moran's (1973) categorization of responses, he used a category called "logical" which would be paradigmatic in nature. According to Moran, this category covers stimulus-response pairs which are superordinates, coordinates, synonyms and contrasts of each other. Thinking of or networking words in this way could account for more paradigmatic responses in word association tests. This is only a possibility to explain the results and does not indicate that females do not think logically. It is just to indicate that on average males and females do think differently and could be the reason for the difference noted in the data.

Although the above is a possibility, it is probably not a possibility for this study for the simple fact that the HS female and male pair (females providing more paradigmatic responses), which showed significance, were opposite to the University male and female pair (males providing more paradigmatic responses). Therefore, some other factors may be involved and more testing would need to be conducted to better understand these mixed results.

5.4 Oral and Written Test Difference Analysis

Reported in Table 5.5 are the Wald CI test analyses conducted on six different test pairs in an effort to show whether the type of test taken has any effect on paradigmatic syntagmatic results.

Table 5.5 Oral/Written Test - Paradigmatic Analysis

Data Pairs	Lower Limit	Upper Limit	Significance Level
JHS F O – JHS F W	-0.0138400	0.0435896	No Sig @ 90%
JHS M O – JHS M W	-0.0383366	0.0252496	No Sig @ 90%
HS F O – HS F W	-0.0179227	0.0172364	No Sig @ 90%
HS M W – HS M O	0.0069406	0.6977437	99%
Univ F O – Univ F W	0.0107471	0.0937529	95%
Univ M O – Univ M W	0.0009501	0.1237621	90%

Significance in any pairs indicates that the pairs are different.

JHS – Junior High School; HS – High School; Univ – University; M – Male;

F – Female; O – Oral Test; W – Written Test

As can be seen in the figures above, the results are inconclusive that the type of test given makes any difference in word association test results. Both JHS data pairs were not significant, even at the 90% significance level. The HS Female Oral test and HS Female Written test data pair were also not significant at the 90% level. The data pair of HS Male Written test and HS Male Oral test, although significant at 99%, can probably be discounted due to problems in sample size as indicated above. Although both of the university pairs show some significance favoring the oral test over the written test, with females responding with more paradigmatic responses in the oral test at a 95% significance, the male data was only significant at the 90% level. Since there might be a problem with sampling size for this particular university sample more testing with a larger university sample would be needed before any positive link between paradigmatic responses and type of test taken could be made.

5.5 Noun Bias Data Analysis

The last proposed analysis for this study concerned the hypothesis that Japanese respondents of word association tests favor nouns as responses regardless of the word class of the stimulus. Table 5.6 provides total percentages of noun responses given for each group by word class.

Table 5.6 Percentages of Noun Responses for Each Word Class Separated by Level and Gender

	JHS M	JHS F	JHS T	HS M	HS F	HS T	Univ M	Univ F	Univ T
N	64.5	69.5	67.4	67.7	70.8	69.8	73.5	66.3	69.2
Adj	54.1	57.8	56.2	59.5	61.6	60.9	50.7	65.1	58.8
V	59.0	60.8	60.0	55.8	58.3	57.5	53.3	68.1	61.9
Adv	25.7	30.2	28.0	36.3	36.0	36.1	35.2	40.2	38.0
P	49.8	45.4	47.5	50.3	52.4	51.6	56.3	59.9	58.4
O	61.4	34.0	46.8	25.5	29.7	28.3	40.0	38.2	38.9

JHS – Junior High School; HS – High School; Univ – University; M – Male; F – Female
N – Noun; Adj – Adjective; V – Verb; Adv – Adverb; P – Preposition; O – Other

As can be observed from the results, nouns are highly favored as responses by Japanese respondents participating in word association tests. In all word classes but adverbs and the ‘other’ category, nouns dominate as the main response type from about half to two-thirds of all responses given. Comparing these results with previous data from native English speakers, the figures are obviously very different. In the Entwisle et al (1964) data, shown in Table 2.6, and the Entwisle (1966) data, shown in Table 2.7, the results above are very similar to her Kindergarten group and somewhat similar to her 1st Grade group. However, they are not similar to her 3rd and 5th grade groups. Furthermore, the figures provided by Fillenbaum and Jones (1965), shown in Table 2.8, are very different than the Japanese groups reported above. In their study the adult native speaking respondents provided answers which were predominantly within the stimuli’s word class.

When the data are analyzed using the Wald CI test (see Appendix XIV for all ‘noun bias’ data and results) there are some interesting findings. The data from the three groups of Japanese respondents were tested between each other as well as between

a British group derived from research conducted by Moss and Older (1996) and the four groups of children in the Entwisle et al (1964) study. In almost all of the twenty-eight data pairs tested there was significance found between the data pairs tested (see Table 5.7 for a comparison of some of the results). This indicates that the two data pairs tested were different. Difference between data pairs was expected to be found when Japanese data sets were compared with native English data sets (British group and children's groups).

Table 5.7 Significant Noun Bias Findings From Wald CI Analysis

Data Pairs	Lower Limit	Upper Limit	Significance Level
HS T – JHS T	0.0068466	0.0522849	99%
Univ T – HS T	0.0031094	0.0381341	90%
Univ T – JHS T	0.0195487	0.0808263	99%
HS M – Univ M	0.0029298	0.0581293	90%
HS F – Univ F	0.0260702	0.0969892	99%
JHS M – HS M	-0.0725618	-0.0015046	99%
JHS F – HS F	-0.0391001	-0.0009574	90%
JHS F – Univ F	-0.1222424	-0.0040875	99%
JHS M – JHS F	-0.0595615	-0.002522	95%
Univ M – Univ F	-0.1549181	-0.057275	99%
Brit T – JHS T	0.0745154	0.1626232	99%
Brit T – HS T	0.1062256	0.1900445	99%
Brit T – Univ T	0.1220773	0.2154363	99%
JHS T – K T	-0.220356	-0.142839	99%
JHS T – 1 st T	-0.017115	0.044540	No Sig @ 95%
JHS T – 3 rd T	0.278970	0.346335	99%
HS T – K T	-0.188335	-0.115729	99%
HS T – 1 st T	0.005038	0.081519	99%
HS T – 3 rd T	0.005038	0.081519	99%
Univ T – K T	-0.173129	-0.089691	99%
Univ T – 1 st T	0.020485	0.107315	99%
Univ T – 3 rd T	0.325744	0.398936	99%

Not all data pairs tested are shown.

JHS – Junior High School; HS – High School; Univ – University; M – Male; F – Female; T – Total Male and Female; Brit – British Sample; K – Kindergarten; 1st – 1st Grade; 3rd – 3rd Grade

In one data pair tested, however, a surprising result was observed. In the JHS Total and 1st Grade data pair, there was no significance observed at 95%. This means that the two groups were statistically the same; the Japanese JHS respondents in this study answered with noun responses at the same rate as the American 1st graders in

Entwisle et al's 1964 study. When the Japanese JHS Total data from this study were compared with the Kindergarten data they were found to be significantly different at 99%, where the Kindergarten respondents provided more noun responses than the JHS respondents. The implication one might arrive at between these two results is that the JHS respondents tested in the present study are at the same English language developmental level as the 1st graders in their study as far as noun responses to stimuli are concerned. When their data were tested between each of the grade groups they were all found to be significantly different thereby indicating that as development occurred from one grade to another, the total number of noun responses provided for non-noun stimuli decreased.

A problem with making the above assumption concerning JHS respondents from this study and the 1st graders from Entwisle et al's study is that these two groups were tested with different stimuli almost forty years apart. This makes the above finding somewhat less significant. More testing with new groups with the same stimuli would need to be conducted and analyzed in an effort to corroborate the above finding in this study.

Another problem associated with the above significant finding between the Japanese JHS group and the native 1st graders was observed. In the native English samples indicated above the noun bias was observed to decrease as development occurs in children but then slightly increase again in adults (Entwisle 1966). The increase noted in the adult sample is greater than the 3rd and 5th grade samples but still much less than the kindergarten and 1st grade samples (ibid). However, in the data obtained from this study the rate of noun responses actually increases from one level to the next instead of decreasing. This would seem to indicate that noun responses increase as development occurs in the Japanese groups.

This increase in noun response rate for Japanese respondents observed in this

study could have occurred due to the way responses were tabulated, that is, which responses were counted as nouns and which ones were not. Polysemy could also have been a factor here, where a response could be a word that falls into more than one word class. An example from the data collected from this data was the response *dream* for the stimuli *sleep* and *believe*. In this study *dream* was counted as a verb when given as a response to *sleep* but as a noun when given as a response to *believe*. There were many other responses that were difficult to place for this same reason.

Another factor could be due to the Japanese language itself. It is unknown whether there has been any definitive studies conducted on the Japanese language to determine whether or not Japanese respond with mostly nouns in their own language, and if they do, how the noun bias behaves as development takes place. A tentative answer to these questions was found in a study conducted by Wolter (1999). Utilizing the data from his study (ibid: 148), the four non-noun Japanese stimuli he used in his Japanese word association test were analyzed for noun bias. This analysis determined that 66.2% of all responses to the four non-noun stimuli were nouns. Therefore, it can be argued that Japanese prefer nouns as responses regardless of word class in their own language. The figure determined from Wolter's data is much higher than the figures obtained from the three Japanese groups tested here in English (JHS – 48.7%, HS – 51.7, University – 53.7) and this could be a result of the language being tested. Obviously much more testing would have to be conducted in order to make any concrete assumptions here, but in the limitations of this study and Wolter's data, it would appear that Japanese may in fact have a noun bias even with their own language.

As to why Japanese respond with mostly nouns to word association tests could vary. It may be that nouns, which mostly represent concrete ideas, have more links to many other words: adjectives, verbs and such, in the mind. The observation Entwistle et al (1964) made regarding the noun bias as they found it in their study with native

English speaking school children seems to support this:

“that most primitive association to any part of speech is a noun response, and this response is relatively likely, regardless of the form-class of the stimulus word. This is not surprising, because nouns are the first words learned and also the words that are conceptually the easiest to delineate. Most nouns have concrete referents that can be pointed to or otherwise identified, so that the group of sounds combined to form a noun can be unambiguously identified with the physical object for which it is the symbol.” (ibid: 23)

Furthermore, this study like studies before it found that Japanese L2 learners provide more syntagmatic responses over paradigmatic ones. The noun bias seems to mirror this in that the primary responses to adjective and verb stimuli were nouns and thus syntagmatic responses. This follows the way language is used, subject – predicate, object – modifier, where nouns are linked to verbs and adjectives in structural grammatical ways. The way these groups of words are linked by usage was probably behind Moran’s (1973) categorization of responses mentioned in Chapter 2. His “iconic” and “enactive” categories both have a relationship with nouns and seem to represent the function of words in a structural syntactic way.

Another possible cause for a noun bias is that the English language has more nouns than other word classes (Aitchison 1994). An inspection of the word list contained in the textbook the stimuli for this study were obtained from (Asano et al 1999) determined that there were, in part, 356 nouns, 103 adjectives, 135 verbs and 61 adverbs. This obvious imbalance in favor of nouns could lead to more noun responses. It should be noted here that the noun and verb totals would be higher if all polysemous words were counted as both noun and verb. As it was, a polysemous word was counted by the first or primary use given for the word in the word list from the textbook.

5.6 Unexpected Finding

During the initial separation of the tests and through all the analyses of the data it was noted that many of the JHS respondents did not provide responses to many or all of the stimuli; however, this trend seemed to change with the HS and University respondents. The total number of possible JHS responses to the tests was 14,700, but only 5,523 responses were provided, leaving 9,177 non-responses. However, at the HS level (15,250 possible responses) the figures were almost opposite, where responses (11,784) were over three times the number of non-responses (3,466). The University data continued to improve with more responses than the HS data but only a few percentage points higher (see Table 5.8 for full results).

Table 5.8 Response and Non-Response Totals for All Data Sets

	Resp	%	Non-Resp	%
JHS M O (3800)	1493	39.3	2307	60.7
JHS M W (3450)	1015	29.4	2435	70.6
JHS M T (7250)	2508	34.6	4742	65.4
JHS F O (3450)	1438	41.7	2012	58.3
JHS F W (4000)	1577	39.4	2423	60.6
JHS F T (7450)	3015	40.5	4435	59.5
JHS M&F T (14700)	5523	37.6	9177	62.4
HS M O (1200)	976	81.3	224	18.7
HS M W (4250)	2946	69.3	1304	30.7
HS M T (5450)	3922	72.0	1528	28.0
HS F O (4850)	3883	80.1	967	19.9
HS F W (4950)	3979	80.4	971	19.6
HS F T (9800)	7862	80.2	1938	19.8
HS M&F T (15250)	11784	77.3	3466	22.7
Univ M O (250)	179	71.6	71	28.4
Univ M W (1800)	1218	67.7	582	32.3
Univ M T (2050)	1397	68.1	653	31.9
Univ F O (1300)	1205	92.7	95	7.3
Univ F W (800)	681	85.1	119	14.9
Univ F T (2100)	1886	89.8	214	10.2
Univ M&F T (4150)	3283	79.1	867	20.9

(Numbers in parentheses are the number of total possible responses for each data set.)

JHS – Junior High School; HS – High School; Univ – University; M – Male; F – Female;

O – Oral Test; W – Written Test; T – Total

A cursory Wald CI test was conducted on all the data pairs, thirty separate tests, (see Appendix XV) and revealed significance at either 95% or 99% in all but four data

pairs. This indicates that, except for those four pairs, the different data pairs tested were significantly different from each other in relation to responses and non-responses. It is understood that this type of relationship, response-non-response, is a quantitative assessment (total number of responses-non-responses only) and not a qualitative one (types of responses, e.g. paradigmatic-syntagmatic, are not looked at). Still, an argument could be made that this is a better test to indicate development than the paradigmatic and syntagmatic analysis. Since this finding was not part of the original design of this study a more thorough discussion of this will not be provided. A separate study should be conducted to develop this possibility more thoroughly.

All findings that this study was initially designed to elucidate have been provided and discussed. One finding that was not in the scope of this study was also found and briefly discussed. What follows are some concluding remarks.

CHAPTER 6

Conclusion

This study investigated the possibility of observing lexical development by using word association tests. Specifically, the syntagmatic-paradigmatic shift as development takes place was investigated. Along with the development scheme, an investigation into a possible gender difference in response types was also conducted. Further, an effort was made to determine if response differences occurred depending upon whether the test was administered orally or given as a written test. In one or all of these three areas differences were expected to be found. In fact, so much has been written concerning the difference between females and males in regards to language ability (see Sommers 2000 for one example) that a gender difference was expected; however, overall there were no differences noted between the females and males in this study at the JHS and HS level. At the university level difference was found, but the males provided more paradigmatic responses than the females did, which is contrary to expectations and seems to be contrary to research in gender difference in language ability.

Besides not finding a gender difference in paradigmatic responses, this study did not find any significant link between a syntagmatic-paradigmatic shift in responses and development or type of test taken either. For the few scattered data pairs that were found to be significant, the lack of an appropriate sample size may have contributed to most of those anomalous results. Further testing with larger samples in those areas where significance was found would need to be conducted to determine if the results are valid or not.

It may be that word association tests are a bad predictor for language development where L2 learners are concerned. Wolter (2002: 4) makes a similar conclusion when

he tried to make a word association-language proficiency test: “the results of this study do not fully support the notion that a word association test can be designed to assess proficiency.” However, he suggests more thought in the area, and that is suggested here. Word association should be studied more thoroughly before it is totally disregarded as a language development indicator.

The secondary design of this study was to determine if Japanese respondents favored noun responses, a ‘noun bias,’ when responding to word association tests. A ‘noun bias’ was expected to be found and the overall findings supported this hypothesis; Japanese respondents did show a ‘noun bias’ in response to stimuli. However, instead of decreasing as development takes place, as it does in native speaking children (Entwisle et al 1964), the noun responses actually increased from the JHS sample to the HS sample and then again from the HS sample to the University sample. Therefore, further testing needs to be conducted to determine the exact nature of this phenomenon.

Although not a design for this study, another finding of possible interest was discovered. There appears to be a relationship between the number of responses and non-responses and development, gender difference and type of test taken. Total responses increase from JHS to HS and then from HS to University. Testing for a gender difference females provided more responses than males. As for test difference, all three groups seem to favor an oral test, providing more responses than in the written test. This finding of a possible preference for an oral test seems at odds with the testing reality in Japan where written tests are a norm. Since the response-non-response finding was not part of the original design of this study, further research should be conducted in this area to determine whether or not there is a definitive link between development and response and non-response.

The cultural difference and the emphasis of language expression between the Japanese and the West (especially in English) may explain some differences in the

results of word association tests. Japanese tend to omit what is understood (e.g. the subject is usually omitted in spoken discourse), and tend to use a very ambiguous way of speaking. They also do not speak in a very explicit way like the West (Hall 1994; Yum 1994). They have a strong distrust in what is being said believing that the truth lies in what is not being said. These factors could obviously affect results in word association tests. During the course of this study it was deemed that there was a lack of word association research conducted in other languages, especially Japanese, that was available for comparison and inspection. It seems only natural when looking at L2 word association data to ask what the nature of the respondents' native language is. Word association tests have been primarily designed to be given in English and compared to native English speakers. More testing in and analysis of various other languages, like Japanese, is necessary to determine response patterns for that particular language. These results then should be compared with results in the L2 and studied for similarities and differences. From these similarities and differences, language teachers and researchers might understand more about their students and the full nature of students' L1 interfering with the L2.

It was also noted that there seemingly is a need to develop better definitions for what constitute syntagmatic and paradigmatic responses. Without good definitions comparisons with other research can only be generalized. Further, it may be better to develop a new system of categorization that takes into account the functions of words in spoken and written discourse. The current dichotomy of syntagmatic and paradigmatic might be a good method in showing differences between samples but it falls short as a pedagogical tool for language teachers. It does not allow a very good understanding of what areas might be problematic in L2 learners' lexicons. A functional categorization such as the one developed by Moran (1973) would allow differences between L1 and L2 to be observed, and language teachers would be able to see how their students respond to

stimuli in a somewhat functional way. Moran's categorizations are not without problems for he does not address adverbs, prepositions and other smaller word classes that are obviously given as responses to word association tests. Much more thought would have to be given for such a functional system of classification.

What is the most important aspect of an utterance or something written? It is the words that are chosen or not chosen. For it is in the words that meaning is derived. Without some kind of association to the proper words in any given situation communication would probably fail. As Pinker points out, the human mind can make "infinite use of finite media" (1984:p. 87). Although he was referring to grammatical structures in sentence variations, that "finite media" consists of the words that are properly put together to form coherent discourse. Vocabulary then, is and continues to be a very important part of language and language development. The connection between word associations and language development is therefore worth continued investigation for it is in the use of words that we are able to effectively communicate with each other and what differentiates us from animals.

APPENDIX I

INSTRUCTION SHEET

Aim:

To further “explore the relationship between word-association and learners’ lexical development” (Deignan, et al 1998).

Resources:

1. List of test items
2. Student response sheets
3. Student survey

Procedure:

A word association test is a simple test in which students are provided with a stimulus word in English and are asked to write down the first word in English that comes to their minds as a response. For example, if the stimulus word is “Monday”, the student may write down “Tuesday” or “weekday”, etc. If a stimulus word is “snow”, the student might write down “cold”, “winter”, etc. The important thing is the students should only write one word. Spelling is not an issue.

To show possible links to lexical development, the test is only to be given to students in junior high school, high school and university. The student response sheet and the student survey should be printed on opposite sides of each other (to save paper) or stapled together.

Students should be given the instructions that they are going to hear vocabulary words one at a time in the order given on the list of test items. After they hear a word they are to write down the first word that comes to their minds (only one word). You may want to give them examples like the ones above if they need them. If a student misses a stimulus have them leave the response blank. As a rule, words should only be spoken once; however, if some students ask for a stimulus to be repeated, it may be repeated once more. As for the written test, students should be instructed to write down the first word that comes to mind after reading each word on the test sheet. This test is like a game where there are no right or wrong answers.

After the word list is finished (or before it is done), please have the students fill out the survey sheet.

All the test items were taken from the second year level of a popular Japanese junior high

APPENDIX I

school text and consists of vocabulary items from both level 1 and level 2, which are listed in the Word List section at the end of the text (Asano et al, 1999).

For CELS students this test is similar to the test mentioned in one of the Assessment Tasks at the end of the Lexis module (Deignan et al; 1998) and can be seen in McCarthy (p. 152; 1990).

I am willing to share all my data and findings with anyone in the CELS program or anyone who participates in this endeavor. I will also pay for the cost of mailing the results if needed.

Your participation in this endeavor is greatly appreciated. Thank you.

References:

- Asano, H. et al (1999) *New Horizon 2*, Tokyo: Tokyo Shoseki
Deignan, A. et al (1998) *Lexis*, Birmingham: University of Birmingham
McCarthy, M. (1990) *Vocabulary*, Oxford: Oxford University Press

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APPENDIX II

WORD SHEET ORAL

Once you hear the word spoken from the teacher, you are to write down the first word that you think of. If you don't understand the word spoken by your teacher put an X on the line for that word. If you understand the word spoken by your teacher but cannot think of any word you associate with the word then leave the line for the word blank. If you understand the word spoken and think of an associated word but do not know the correct spelling, just try to spell it the best you can (this is not a spelling test).

先生が英語の単語を読みますので、その単語から連想する単語を下の空欄に書いて下さい。もし、単語が聞き取れなかった時は、Xを書いて下さい。聞き取れたけど、連想する言葉も思いつかなかった時は、空欄にしておいて下さい。これは、綴りのテストではありませんので、聞き取れて、連想する言葉も思いついたけど、単語の綴りが良く分からない時は、綴りの間違いはあまり気にしないで書いて下さい。

- | | |
|-----------|-----------|
| 1. _____ | 26. _____ |
| 2. _____ | 27. _____ |
| 3. _____ | 28. _____ |
| 4. _____ | 29. _____ |
| 5. _____ | 30. _____ |
| 6. _____ | 31. _____ |
| 7. _____ | 32. _____ |
| 8. _____ | 33. _____ |
| 9. _____ | 34. _____ |
| 10. _____ | 35. _____ |
| 11. _____ | 36. _____ |
| 12. _____ | 37. _____ |
| 13. _____ | 38. _____ |
| 14. _____ | 39. _____ |
| 15. _____ | 40. _____ |
| 16. _____ | 41. _____ |
| 17. _____ | 42. _____ |
| 18. _____ | 43. _____ |
| 19. _____ | 44. _____ |
| 20. _____ | 45. _____ |
| 21. _____ | 46. _____ |
| 22. _____ | 47. _____ |
| 23. _____ | 48. _____ |
| 24. _____ | 49. _____ |
| 25. _____ | 50. _____ |

APPENDIX III

WORD SHEET WRITTEN

Once you read each word, you are to write down the first word that you think of. If you don't understand the word after you read it put an X on the line after the word. If you understand the word but can not think of any word you associate with the word, then leave the line blank after the word. If you understand the word and think of an associated word but do not know the correct spelling, just try to spell it the best you can (this is not a spelling test).

下記の単語を読んで、その単語から連想する単語を右側の空欄に書いて下さい。単語の意味が分からない時は、Xを書いて下さい。意味は分かるけれど、連想する単語を思いつかない時は、空欄にしておいて下さい。これは綴りのテストではありませんので、意味が分かって、連想する単語も思いついたけど、単語の綴りが良く分からない時は、綴りの間違いはあまり気にしないで書いて下さい。

- | | |
|---------------------|--------------------|
| 1. down_____ | 26. arrive_____ |
| 2. sleep_____ | 27. age_____ |
| 3. vacation_____ | 28. pretty_____ |
| 4. busy_____ | 29. later_____ |
| 5. after_____ | 30. must_____ |
| 6. dangerous_____ | 31. also_____ |
| 7. just_____ | 32. black_____ |
| 8. cut_____ | 33. cry_____ |
| 9. together_____ | 34. custom_____ |
| 10. dictionary_____ | 35. hold_____ |
| 11. off_____ | 36. hungry_____ |
| 12. wonderful_____ | 37. out_____ |
| 13. again_____ | 38. until_____ |
| 14. wise_____ | 39. believe_____ |
| 15. forget_____ | 40. little_____ |
| 16. since_____ | 41. under_____ |
| 17. quickly_____ | 42. speak_____ |
| 18. near_____ | 43. cold_____ |
| 19. enjoy_____ | 44. carefully_____ |
| 20. question_____ | 45. between_____ |
| 21. make_____ | 46. celebrate_____ |
| 22. dark_____ | 47. letter_____ |
| 23. happy_____ | 48. always_____ |
| 24. and_____ | 49. story_____ |
| 25. very_____ | 50. bring_____ |

APPENDIX IV

WORD LIST FOR TEACHERS/INSTRUCTORS

- | | |
|----------------|---------------|
| 1. down | 26. arrive |
| 2. sleep | 27. age |
| 3. vacation | 28. pretty |
| 4. busy | 29. later |
| 5. after | 30. must |
| 6. dangerous | 31. also |
| 7. just | 32. black |
| 8. cut | 33. cry |
| 9. together | 34. custom |
| 10. dictionary | 35. hold |
| 11. off | 36. hungry |
| 12. wonderful | 37. out |
| 13. again | 38. until |
| 14. wise | 39. believe |
| 15. forget | 40. little |
| 16. since | 41. under |
| 17. quickly | 42. speak |
| 18. near | 43. cold |
| 19. enjoy | 44. carefully |
| 20. question | 45. between |
| 21. make | 46. celebrate |
| 22. dark | 47. letter |
| 23. happy | 48. always |
| 24. and | 49. story |
| 25. very | 50. bring |

APPENDIX V

SURVEY

1. Gender (Circle one) Male Female
性別 男 女

2. Where are you from? _____
出身地

3. School Level (circle one) Junior High School High School University
学校 (丸で囲む) 中学校 高校 大学
Which year? 何年生? _____

4. How many hours per week do you study English in school? (circle one)
学校で週に何時間英語を勉強しますか。(丸で囲む)

A. 1 to 3 hours per week 1 時間から 3 時間	B. 4 to 6 hours per week 4 時間から 6 時間
C. 7 to 9 hours per week 7 時間から 9 時間	D. 10 or more hours per week 10 時間以上

5. Do you study English outside of your school? (circle one) Yes No
学校以外で英語を勉強しますか。 はい いいえ

6. If you answered Yes to question #5, where do you study? (circle the answers that apply)
はい、と答えられた方、どこで勉強しますか。

A. English Conversation School 英会話教室	B. Cram School 塾
C. Private Instruction 個人教授	D. At home 家

7. If you answered Yes to question #5, how many hours do you study English outside of school?
はい、と答えられた方、学校以外の場所では、週何時間勉強しますか。

A. 1 to 3 hours per week 1 時間から 3 時間	B. 4 to 6 hours per week 4 時間から 6 時間
C. 7 to 9 hours per week 7 時間から 9 時間	D. 10 or more hours per week 10 時間以上

8. Counting this year, how many years have you studied English? _____
今年も含めて何年間英語を勉強していますか。

9. When did you start studying English? _____
何歳または、何年生の時、英語を勉強し始めましたか。

ご協力ありがとうございました。

APPENDIX VI

Breakdown of Responses & Percentages for Male JHS Respondents

	JHS Male Oral					TPR	3800
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	128	26	46	0	1	4	205
Adj	205	124	44	6	2	2	383
Verbs	260	23	98	2	6	13	402
Adv	95	65	78	110	9	4	361
Prep	56	7	6	1	43	4	117
Other	15	1	3	1	0	5	25
Total	759	246	275	120	61	32	1493
%	50.8	16.5	18.4	8	4.1	2.1	39.3

Total Percentage of Non-Responses (TNR) $2307 / 3800 \approx 60.7\%$

TPR – Total Possible Responses

	JHS Male Written					TPR	3450
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	88	18	23	0	1	0	130
Adj	144	83	27	8	0	0	262
Verbs	121	14	66	14	23	6	244
Adv	67	46	62	83	9	3	270
Prep	47	2	6	2	30	3	90
Other	12	0	1	1	3	2	19
Total	479	163	185	108	66	14	1015
%	47.2	16.1	18.2	10.6	6.5	1.4	29.4

TNR $2435 / 3450 \approx 70.6\%$

	JHS Male Total					TPR	7250
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	216	44	69	0	2	4	335
Adj	349	207	71	14	2	2	645
Verbs	381	37	164	16	29	19	646
Adv	162	111	140	193	18	7	631
Prep	103	9	12	3	73	7	207
Other	27	1	4	2	3	7	44
Total	1238	409	460	228	127	46	2508
%	49.4	16.3	18.3	9.1	5.1	1.8	34.6

TNR $4742 / 7250 \approx 65.4\%$

APPENDIX VII

Breakdown of Responses & Percentages for Female JHS Respondents

	JHS Female Oral					TPR	3450
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	148	16	50	0	1	2	217
Adj	235	136	37	3	4	1	416
Verbs	216	34	110	2	3	8	373
Adv	92	62	63	82	5	6	310
Prep	43	1	10	3	42	0	99
Other	10	1	4	0	4	4	23
Total	744	250	274	90	59	21	1438
%	51.7	17.4	19.1	6.3	4.1	1.5	41.7

Total % of Non-Responses (TNR) 2012 / 3450 = 60.7%

TPR -- Total Possible Responses

	JHS Female Written					TPR	4000
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	158	28	35	1	1	0	223
Adj	270	139	39	6	4	0	458
Verbs	255	24	98	5	10	10	402
Adv	107	59	70	98	10	4	348
Prep	56	4	12	1	46	0	119
Other	7	1	0	5	4	10	27
Total	853	255	254	116	75	24	1577
%	54.1	16.2	16.1	7.4	4.7	1.5	39.4

$$\text{TNR } 2423 / 4000 = 60.6\%$$

	JHS Female Total					TPR	7450
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	306	44	85	1	2	2	440
Adj	505	275	76	9	8	1	874
Verbs	471	58	208	7	13	18	775
Adv	199	121	133	180	15	10	658
Prep	99	5	22	4	88	0	218
Other	17	2	4	5	8	14	50
Total	1597	505	528	206	134	45	3015
%	53	16.7	17.5	6.8	4.4	1.5	40.5

$$\text{TNR } 4435 / 7450 = 59.5\%$$

APPENDIX VIII

Breakdown of Responses & Percentages for Male HS Respondents

	HS Male Oral					TPR	1200
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	99	22	21	1	1	0	144
Adj	164	63	15	4	0	1	247
Verbs	150	27	60	6	5	4	252
Adv	89	36	48	42	11	2	228
Prep	50	7	5	4	26	2	94
Other	3	1	1	2	0	4	11
Total	555	156	150	59	43	13	976
%	56.9	16	15.3	6	4.4	1.3	81.3

Total Percentage of Non-Responses (TNR) $224 / 1200 = 18.7\%$

TPR – Total Possible Responses

	HS Male Written					TPR	4250
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	300	67	64	4	5	5	445
Adj	449	261	54	12	5	2	783
Verbs	417	48	214	27	38	21	765
Adv	227	119	104	150	31	12	643
Prep	131	11	19	6	96	3	266
Other	11	3	0	7	6	17	44
Total	1535	509	455	206	181	60	2946
%	52.1	17.3	15.4	7	6.1	2	69.3

TNR $1304 / 4250 = 30.7\%$

	HS Male Total					TPR	5450
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	399	89	85	5	6	5	589
Adj	613	324	69	16	5	3	1030
Verbs	567	75	274	33	43	25	1017
Adv	316	155	152	192	42	14	871
Prep	181	18	24	10	122	5	360
Other	14	4	1	9	6	21	55
Total	2090	665	605	265	224	73	3922
%	53.3	17	15.4	6.8	5.7	1.9	72

TNR $1528 / 5450 = 28\%$

APPENDIX IX

Breakdown of Responses & Percentages for Female HS Respondents

	HS Female Oral						TPR 4850
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	406	94	88	4	0	0	592
Adj	612	272	63	28	9	0	984
Verbs	595	90	263	33	8	20	1009
Adv	341	126	139	259	25	16	906
Prep	177	9	13	22	112	7	340
Other	11	5	1	21	6	8	52
Total	2142	596	567	367	160	51	3883
%	55.2	15.3	14.6	9.5	4.1	1.3	80.1

Total % of Non-Responses (TNR) $967 / 4850 = 19.9\%$

TPR – Total Possible Responses

	HS Female Written						TPR 4950
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	427	67	86	0	2	2	584
Adj	623	317	62	9	7	2	1020
Verbs	614	82	288	21	33	27	1065
Adv	316	157	196	201	39	10	919
Prep	175	12	20	9	106	10	332
Other	22	1	2	9	10	15	59
Total	2177	636	654	249	197	66	3979
%	54.7	16	16.4	6.3	5	1.6	80.4

TNR $971 / 4950 = 19.6\%$

	HS Female Total						TPR 9800
	Nouns	Adj	Verbs	Adv	Prep	Other	Total
Nouns	833	161	174	4	2	2	1176
Adj	1235	589	125	37	16	2	2004
Verbs	1209	172	551	54	41	47	2074
Adv	657	283	335	460	64	26	1825
Prep	352	21	33	31	218	17	672
Other	33	6	3	30	16	23	111
Total	4319	1232	1221	616	357	117	7862
%	54.9	15.7	15.5	7.8	4.5	1.5	80.2

TNR $1938 / 9800 = 19.8\%$

APPENDIX X

Breakdown of Responses & Percentages for Male UNIV Respondents

University Male Oral							TPR	250
	Nouns	Adj	Verbs	Adv	Prep	Other		Total
Nouns	18	5	1	0	0	0	1	25
Adj	24	17	6	0	0	0	0	47
Verbs	33	5	8	1	0	0	0	47
Adv	14	12	6	7	0	1	1	40
Prep	8	2	0	3	4	0	0	17
Other	1	0	0	0	0	2	2	3
Total	98	41	21	11	4	4	4	179
%	54.7	22.9	11.7	6.1	2.2	2.2	2.2	71.6

Total % of Non-Responses (TNR) $71 / 250 = 28.4\%$

TPR – Total Possible Responses

University Male Written							TPR	1800
	Nouns	Adj	Verbs	Adv	Prep	Other		Total
Nouns	121	26	16	0	1	0	0	164
Adj	163	116	23	15	2	3	3	322
Verbs	162	30	103	3	15	6	6	319
Adv	101	49	49	74	12	2	2	287
Prep	63	4	3	2	37	0	0	109
Other	7	0	0	1	3	6	6	17
Total	617	225	194	95	70	17	17	1218
%	50.7	18.7	15.9	7.8	5.7	1.4	1.4	67.7

TNR $582 / 1800 = 32.3\%$

University Male Total							TPR	2050
	Nouns	Adj	Verbs	Adv	Prep	Other		Total
Nouns	139	31	17	0	1	1	1	189
Adj	187	133	29	15	2	3	3	369
Verbs	195	35	111	4	15	6	6	366
Adv	115	61	55	81	12	3	3	327
Prep	71	6	3	5	41	0	0	126
Other	8	0	0	1	3	8	8	20
Total	715	266	215	106	74	21	21	1397
%	51.2	19	15.4	7.6	5.3	1.5	1.5	68.1

TNR $653 / 2050 = 31.9\%$

APPENDIX XI

Breakdown of Responses & Percentages for Female UNIV Respondents

University Female Oral							TPR	1300
	Nouns	Adj	Verbs	Adv	Prep	Other		Total
Nouns	123	27	25	2	1	0		178
Adj	183	96	12	5	2	2		300
Verbs	221	25	48	8	6	8		316
Adv	98	44	60	61	14	1		278
Prep	61	7	4	4	25	8		109
Other	10	4	0	1	0	9		24
Total	696	203	149	81	48	28		1205
%	57.8	16.8	12.4	6.7	4	2.3		92.7

Total % of Non-Responses (TNR) $95 / 1300 = 7.3\%$

TPR – Total Possible Responses

University Female Written							TPR	800
	Nouns	Adj	Verbs	Adv	Prep	Other		Total
Nouns	64	19	19	2	0	0		104
Adj	127	39	10	0	0	0		176
Verbs	119	20	35	0	3	6		183
Adv	74	22	32	16	4	2		150
Prep	39	3	1	1	14	0		58
Other	3	2	0	4	0	1		10
Total	426	105	97	23	21	9		681
%	62.6	15.4	14.2	3.4	3.1	.9		85.1

TNR $119 / 800 = 14.9\%$

University Female Total							TPR	2100
	Nouns	Adj	Verbs	Adv	Prep	Other		Total
Nouns	187	46	44	4	1	0		282
Adj	310	135	22	5	2	2		476
Verbs	340	45	83	8	9	14		499
Adv	172	66	92	77	18	3		428
Prep	100	10	5	5	39	8		167
Other	13	6	0	5	0	10		34
Total	1122	308	246	104	69	37		1886
%	59.5	16.3	13	5.5	3.7	1.9		89.8

TNR $214 / 2100 = 10.2\%$

APPENDIX XII

Total Number and Percentages of Word Class Responses, Total Responses and Total Non-responses for Junior High School Respondents

	M Oral (3800)	M Writ (3450)	Tot (7250)	F Oral (3450)	F Writ (4000)	Tot (7450)	M&F Tot
N	759 – 50.8%	479 – 47.2%	1238 – 49.4%	744 – 51.7%	853 – 54.1%	1597 – 53.0%	2835 – 51.3%
Adj	246 – 16.5%	163 – 16.1%	409 – 16.3%	250 – 17.4%	255 – 16.1%	505 – 16.7%	914 – 16.5%
V	275 – 18.4%	185 – 18.2%	460 – 18.3%	274 – 19.1%	254 – 16.1%	528 – 17.5%	988 – 17.9%
Adv	120 – 8.0%	108 – 10.6%	228 – 9.1%	90 – 6.3%	116 – 7.4%	206 – 6.8%	434 – 7.9%
P	61 – 4.1%	66 – 6.5%	127 – 5.1%	59 – 4.1%	75 – 4.7%	134 – 4.4%	261 – 4.7%
O	32 – 2.1%	14 – 1.4%	46 – 1.8%	21 – 1.5%	24 – 1.5%	45 – 1.5%	91 – 1.6%
Tot R	1493 – 39.3%	1015 – 29.4%	2508 – 34.6%	1438 – 41.7%	1577 – 39.4%	3015 – 40.5%	5523 – 37.6%
Tot NR	2307 – 60.7%	2435 – 70.6%	4742 – 65.4%	2012 – 58.3%	2423 – 60.6%	4435 – 59.5%	9177 – 62.4%

Total Number and Percentages of Word Class Responses, Total Responses and Total Non-responses for High School Respondents

	M Oral (1200)	M Writ (4250)	Tot (5450)	F Oral (4850)	F Writ (4950)	Tot (9800)	M&F Tot
N	555 – 56.9%	1539 – 52.1%	2090 – 53.3%	2142 – 55.2%	2177 – 54.7%	4319 – 54.9%	6409 – 54.4%
Adj	156 – 16.0%	509 – 17.3%	665 – 17.0%	596 – 15.3%	636 – 16.0%	1232 – 15.7%	1897 – 16.1%
V	150 – 15.3%	455 – 15.4%	605 – 15.4%	567 – 14.6%	654 – 16.4%	1221 – 15.5%	1826 – 15.5%
Adv	59 – 6.0%	206 – 7.0%	265 – 6.8%	367 – 9.5%	249 – 6.3%	616 – 7.8%	881 – 7.5%
P	43 – 4.4%	181 – 6.1%	224 – 5.7%	160 – 4.1%	197 – 5.0%	357 – 4.5%	581 – 4.9%
O	13 – 1.3%	60 – 2.0%	73 – 1.9%	51 – 1.3%	66 – 1.6%	117 – 1.5%	190 – 1.6%
Tot R	976 – 81.3%	2946 – 69.3%	3922 – 72.0%	3883 – 80.1%	3979 – 80.4%	7862 – 80.2%	11784 – 77.3%
Tot NR	224 – 18.7%	1304 – 30.7%	1528 – 28.0%	967 – 19.9%	971 – 19.6%	1938 – 19.8%	3466 – 22.7%

Total Number and Percentages of Word Class Responses, Total Responses and Total Non-responses for University Respondents

	M Oral (250)	M Writ (1800)	Tot (2050)	F Oral (1300)	F Writ (800)	Tot (2100)	M&F Tot
N	98 – 54.7%	617 – 50.7%	715 – 51.2%	696 – 57.8%	426 – 62.6%	1122 – 59.5%	1837 – 55.9%
Adj	41 – 22.9%	225 – 18.7%	266 – 19.0%	203 – 16.8%	105 – 15.4%	308 – 16.3%	574 – 17.5%
V	21 – 11.7%	194 – 15.9%	215 – 15.4%	149 – 12.4%	97 – 14.2%	246 – 13.0%	461 – 14.0%
Adv	11 – 6.1%	95 – 7.8%	106 – 7.6%	81 – 6.7%	23 – 3.4%	104 – 5.5%	210 – 6.4%
P	4 – 2.2%	70 – 5.7%	74 – 5.3%	48 – 4.0%	21 – 3.1%	69 – 3.7%	143 – 4.4%
O	4 – 2.2%	17 – 1.4%	21 – 1.5%	28 – 2.3%	9 – 0.9%	37 – 1.9%	58 – 1.8%
Tot R	179 – 71.6%	1218 – 67.7%	1397 – 68.1%	1205 – 92.7%	681 – 85.1%	1886 – 89.8%	3283 – 79.1%
Tot NR	71 – 28.4%	582 – 32.3%	653 – 31.9%	95 – 7.3%	119 – 14.9%	214 – 10.2%	867 – 20.9%

APPENDIX XII

Table Response and Non.-Response Totals for All Data Sets

	Resp	%	Non-Res	%
JHS M O (3800)	1493	39.3	2307	60.7
JHS M W (3450)	1015	29.4	2435	70.6
JHS M T (7250)	2508	34.6	4742	65.4
JHS F O (3450)	1438	41.7	2012	58.3
JHS F W (4000)	1577	39.4	2423	60.6
JHS F T (7450)	3015	40.5	4435	59.5
JHS M&F T (14700)	5523	37.6	9177	62.4
HS M O (1200)	976	81.3	224	18.7
HS M W (4250)	2946	69.3	1304	30.7
HS M T (5450)	3922	72.0	1528	28.0
HS F O (4850)	3883	80.1	967	19.9
HS F W (4950)	3979	80.4	971	19.6
HS F T (9800)	7862	80.2	1938	19.8
HS M&F T (15250)	11784	77.3	3466	22.7
Univ M O (250)	179	71.6	71	28.4
Univ M W (1800)	1218	67.7	582	32.3
Univ M T (2050)	1397	68.1	653	31.9
Univ F O (1300)	1205	92.7	95	7.3
Univ F W (800)	681	85.1	119	14.9
Univ F T (2100)	1886	89.8	214	10.2
Univ M&F T (4150)	3283	79.1	867	20.9

(Numbers in parentheses are the number of total possible responses for each data set.)

JHS – Junior High School; HS – High School; Univ – University; M – Male; F – Female;

O – Oral Test; W – Written Test; T – Total

APPENDIX XIII

WALD CI DATA AND TEST RESULTS FOR PARADIGMATIC RESPONSES						
Data Sets	m	p (paradig)	q (syn)	A		alpha 99% = 2.58
						alpha 95% = 1.96
JHS Female (F) Oral	1438	0.3630	0.6370	0.000160801		alpha 90% = 1.645
JHS F Written	1577	0.3481	0.6519	0.000143903		
JHS Male (M) Oral	1493	0.3403	0.6597	0.000150356		
JHS M Written	1015	0.3468	0.6532	0.000223181		
HS F Oral	3883	0.3399	0.6601	5.77857E-05		
HS F Written	3979	0.3403	0.6597	5.64191E-05		
HS M Oral	976	0.3012	0.6988	0.000215666		
HS M Written	2946	0.3523	0.6477	7.746E-05		
Univ F Oral	1205	0.3004	0.6996	0.000174411		
Univ F Written	681	0.2482	0.7518	0.000273978		
Univ M Oral	179	0.3128	0.6872	0.001200975		
Univ M Written	1218	0.3752	0.6248	0.000192468		
JHS Total	5523	0.3496	0.6504	4.11712E-05		
HS Total	11784	0.3400	0.6600	1.90415E-05		
Univ Total	3283	0.3180	0.6820	6.60605E-05		
JHS M Total	2508	0.3429	0.6571	8.98407E-05		
JHS F Total	3015	0.3552	0.6448	7.59668E-05		
HS M Total	3922	0.3396	0.6604	5.71849E-05		
HS F Total	7862	0.3401	0.6599	2.85471E-05		
Univ M Total	1397	0.3672	0.6328	0.000166334		
Univ F Total	1886	0.2815	0.7185	0.000107253		
Data Analysis Pairs	Lower	Upper	Signif 95%	Lower	Upper	Signif 99% / 90%
JHS F Oral - JHS F Writ	-0.0193385	0.0490881	No	-0.0138400	0.0435896	No (90%)
JHS M Oral - JHS M Writ	-0.0444247	0.0313376	No	-0.0383366	0.0252496	No (90%)
JHS F Oral - JHS M Oral	-0.0118241	0.0573234	No	-0.0062676	0.0517669	No (90%)
JHS F Writ - JHS M Writ	-0.0362212	0.0388839	No	-0.0301860	0.0328486	No (90%)
HS F Oral - HS F Writ	-0.0212890	0.0206027	No	-0.0179227	0.0172364	No (90%)
HS M Writ - HS M Oral	0.0175556	0.0846697	Yes	0.0069406	0.0977437	Yes (99%)
HS F Oral - HS M Oral	0.0063025	0.0711251	Yes	-0.0039500	0.0813777	No (99%)
HS M Writ - HS F Writ	-0.0106227	0.0347341	No	-0.0069780	0.0310893	No (90%)
Univ F Oral - Univ F Writ	0.0107471	0.0937539	Yes	-0.0023816	0.1068825	No (99%)
Univ M Oral - Univ M Writ	-0.0108085	0.1355206	No	0.0009501	0.1237621	Yes (90%)
Univ M Oral - Univ F Oral	-0.0602547	0.0851232	No	-0.0485726	0.0734410	No (90%)
Univ M Writ - Univ F Writ	0.0847100	0.1693716	Yes	0.0713196	0.1827620	Yes (99%)
JHS F Oral - HS F Oral	-0.0059172	0.0520388	No	-0.0012600	0.0473816	No (90%)
JHS F Writ - HS F Writ	-0.0198981	0.0355838	No	-0.0154397	0.0311254	No (90%)
JHS M Oral - HS M Oral	0.0015269	0.0765232	Yes	-0.0103348	0.0883848	No (99%)
JHS M Writ - HS M Writ	-0.0284403	0.0395286	No	-0.0229786	0.0340668	No (90%)
HS F Oral - Univ F Oral	0.0096619	0.0693949	Yes	0.0002143	0.0788425	Yes (99%)
HS F Writ - Univ F Writ	0.0564955	0.1277486	Yes	0.0452258	0.1390182	Yes (99%)
HS M Oral - Univ M Oral	-0.0621514	0.0853907	No	-0.0502953	0.0735347	No (90%)
Univ M Writ - HS M Writ	-0.0093387	0.0550649	No	-0.0041634	0.0498896	No (90%)
JHS F Oral - Univ F Oral	0.0267040	0.0984745	Yes	0.0153525	0.1098260	Yes (99%)
JHS F Writ - Univ F Writ	0.0598983	0.1400315	Yes	0.0472242	0.1527056	Yes (99%)
JHS M Oral - Univ M Oral	-0.0446451	0.0994559	No	-0.0330656	0.0878763	No (90%)
Univ M Writ - JHS M Writ	-0.0115523	0.0683667	No	-0.0051302	0.0619446	No (90%)
JHS Total - HS Total	-0.0055326	0.0248853	No	-0.0030883	0.0224410	No (90%)
HS Total - Univ Total	0.0038695	0.0400318	Yes	-0.0018500	0.0457513	No (99%)
JHS Total - Univ Total	0.0113307	0.0519233	Yes	0.0049104	0.0583436	Yes (99%)
JHS M T - JHS F T	-0.0375594	0.0129170	No	-0.0335032	0.0088609	No (90%)
HS M T - HS F T	-0.0186423	0.0176536	No	-0.0157257	0.0147369	No (90%)

APPENDIX XIV

WALD CI DATA AND TEST RESULTS FOR 'NOUN BIAS'						
Data Sets	m	p(noun)	q(no noun)	A		alpha 99% = 2.58
						alpha 95% = 1.96
						alpha 90% = 1.645
JHS Male (M) Total	2173	0.47031753	0.529682	0.0001146		
JHS Female (F) Total	2575	0.50135922	0.498641	9.709E-05		
HS M Total	3333	0.50735074	0.492649	7.499E-05		
HS F Total	6686	0.52138797	0.478612	3.732E-05		
Univ M Total	1208	0.47682119	0.523179	0.0002065		
Univ F Total	1604	0.58291771	0.417082	0.0001516		
JHS Total	4748	0.487152	0.512848	5.262E-05		
HS Total	10019	0.516718	0.483282	2.492E-05		
Univ Total	2812	0.537340	0.462660	8.841E-05		
British Total	974	0.368583	0.631417	0.0002389		
Kindergartners*	1280	0.668750	0.331250	0.0001731		
1st Graders*	1280	0.473440	0.526560	0.0001948		
3rd Graders*	1280	0.175000	0.825000	0.0001128		
5th Graders*	1280	0.138280	0.861720	9.309E-05		
Noun Rates Test	Lower	Upper	Signif 95%	Lower	Upper	Signif 99% / 90%
HS vs. JHS	0.0123062	0.0468253	Yes	0.0068466	0.0522849	Yes (99%)
*Univ vs. HS	-0.0002441	0.0414876	No	0.0031094	0.0381341	Yes (90%)
Univ vs. JHS	0.0269115	0.0734635	Yes	0.0195487	0.0808263	Yes (99%)
*HS M vs. Univ M	-0.0023553	0.0634144	No	0.0029298	0.0581293	Yes (90%)
HS F vs. Univ F	0.0345915	0.0884679	Yes	0.0260702	0.0969892	Yes (99%)
JHS M vs. HS M	-0.0640239	-0.0100425	Yes	-0.0725618	-0.0015046	Yes (99%)
*JHS F vs. HS F	-0.0427521	0.0026946	No	-0.0391001	-0.0009574	Yes (90%)
JHS F vs. Univ F	-0.112465677	-0.0506513	Yes	-0.1222424	-0.040875	Yes (99%)
**JHS M vs. Univ M	-0.041628246	0.02862093	No	-0.0359832	0.0229759	No (90%)
JHS M vs. JHS F	-0.05956151	-0.0025219	Yes	-0.0685831	0.0064997	No (99%)
**HS M vs. HS F	-0.034809027	0.00673455	No	-0.0314707	0.0033962	No (90%)
Univ M vs. Univ F	-0.143185746	-0.0690073	Yes	-0.1549181	-0.057275	Yes (99%)
British vs. JHS Total	0.085102	0.152037	Yes	0.0745154	0.1626232	Yes (99%)
British vs. HS Total	0.116297	0.179973	Yes	0.1062256	0.1900445	Yes (99%)
British vs. Univ Total	0.133295	0.204219	Yes	0.1220773	0.2154363	Yes (99%)
JHS Total vs. K	-0.211042	-0.152153	Yes	-0.220356	-0.142839	Yes (99%)
JHS Total vs. 1st	-0.017115	0.044540	No	-0.012161	0.039586	Yes (90%)
JHS Total vs. 3rd	0.286944	0.337361	Yes	0.278970	0.345335	Yes (99%)
JHS Total vs. 5th	0.325213	0.372532	Yes	0.317729	0.380016	Yes (99%)
HS Total vs. K	-0.179611	-0.124453	Yes	-0.188335	-0.115729	Yes (99%)
HS Total vs. 1st	0.014227	0.072329	Yes	0.005038	0.081519	Yes (99%)
HS Total vs. 3rd	0.318717	0.364719	Yes	0.311441	0.371995	Yes (99%)
HS Total vs. 5th	0.357146	0.399731	Yes	0.350410	0.406466	Yes (99%)
Univ Total vs K	-0.163104	-0.099717	Yes	-0.173129	-0.089691	Yes (99%)
Univ Total vs 1st	0.030918	0.096882	Yes	0.020485	0.107315	Yes (99%)
Univ Total vs. 3rd	0.334538	0.390142	Yes	0.325744	0.398936	Yes (99%)
Univ Total vs. 5th	0.372654	0.425466	Yes	0.364302	0.433818	Yes (99%)
K vs. 1st	0.157720	0.232900	Yes	0.145829	0.244791	Yes (99%)
1st vs. 3rd	0.264067	0.332813	Yes	0.253194	0.343686	Yes (99%)
3rd vs 5th	0.008597	0.064843	Yes	-0.000300	0.073740	No (99%)
* - Figures from Entwisle et al (1964)		Sig 99%	Sig 95%	Sig 90%		

APPENDIX XV

WALD CI DATA AND TEST RESULTS FOR RESPONSE NON-RESPONSE						
Data Sets	m	p (responses)	q (no responses)	A		alpha 99% = 2.58 alpha 95% = 1.96 alpha 90% = 1.645
JHS Female (F) Oral	3450	0.4168	0.5832	7.04579E-05		
JHS F Written	4000	0.3943	0.6058	5.97042E-05		
JHS Male (M) Oral	3800	0.3929	0.6071	6.27706E-05		
JHS M Written	3450	0.2942	0.7058	6.01877E-05		
HS F Oral	4850	0.8006	0.1994	3.29131E-05		
HS F Written	4950	0.8038	0.1962	3.1855E-05		
HS M Oral	1200	0.8133	0.1867	0.000126519		
HS M Written	4250	0.6932	0.3068	5.0043E-05		
Univ F Oral	1300	0.9269	0.0731	5.21051E-05		
Univ F Written	800	0.8513	0.1488	0.000158279		
Univ M Oral	250	0.7160	0.2840	0.000813376		
Univ M Written	1800	0.6767	0.3233	0.000121549		
JHS Total	14700	0.3757	0.6243	1.5956E-05		
HS Total	15250	0.7727	0.2273	1.15163E-05		
Univ Total	4150	0.7911	0.2089	3.98241E-05		
JHS M Total	7250	0.3459	0.6541	3.12087E-05		
JHS F Total	7450	0.4047	0.5953	3.23379E-05		
HS M Total	5450	0.7196	0.2804	3.70204E-05		
HS F Total	9800	0.8022	0.1978	1.61886E-05		
Univ M Total	2050	0.6815	0.3185	0.000105888		
Univ F Total	2100	0.8981	0.1019	4.3581E-05		
Data Analysis Pairs	Lower	Upper	Signif 95%	Lower	Upper	Signif 99% / 90%
JHS F Oral - JHS F Writ	0.0002002	0.0449230	Yes	-0.0068733	0.0519965	No (99%)
JHS M Oral - JHS M Writ	0.0769581	0.1204256	Yes	0.0700831	0.1273006	Yes (99%)
JHS F Oral - JHS M Oral	0.0012936	0.0465401	Yes	-0.0058627	0.0536964	No (99%)
JHS F Writ - JHS M Writ	0.0785860	0.1215082	Yes	0.0717973	0.1282969	Yes (99%)
HS F Oral - HS F Writ	-0.0189936	0.0125540	No	-0.0164586	0.0100189	No (90%)
HS M Oral - HS M Writ	0.0941131	0.1462006	Yes	0.0858747	0.1544390	No (99%)
HS F Oral - HS M Oral	-0.0374630	0.0120334	No	-0.0334856	0.0080560	No (90%)
HS F Writ - HS M Writ	0.0929244	0.1283994	Yes	0.0873136	0.1340103	Yes (99%)
Univ F Oral - Univ F Writ	0.0472440	0.1041022	Yes	0.0382511	0.1130950	Yes (99%)
Univ M Oral - Univ M Writ	-0.0205967	0.0992634	No	-0.0109651	0.0896318	No (90%)
Univ F Oral - Univ M Oral	0.1532617	0.2685844	Yes	0.1350219	0.2868243	Yes (99%)
Univ F Writ - Univ M Writ	0.1417963	0.2073704	Yes	0.1314249	0.2177418	Yes (99%)
JHS F Oral - HS F Oral	-0.4037346	-0.3638793	Yes	-0.4100382	-0.3575757	Yes (99%)
JHS F Writ - HS F Writ	-0.4283430	-0.3908338	Yes	-0.4342755	-0.3849012	Yes (99%)
JHS M Oral - HS M Oral	-0.4474047	-0.3934724	Yes	-0.4559349	-0.3849423	Yes (99%)
JHS M Writ - HS M Writ	-0.4195518	-0.3783954	Yes	-0.4260612	-0.3718859	Yes (99%)
HS F Oral - Univ F Oral	-0.1443768	-0.1082323	Yes	-0.1500935	-0.1025155	Yes (99%)
HS F Writ - Univ F Writ	-0.0744379	-0.0203853	Yes	-0.0829870	-0.0118362	Yes (99%)
HS M Oral - Univ M Oral	0.0372442	0.1574224	Yes	0.0182365	0.1764302	Yes (99%)
HS M Writ - Univ M Writ	-0.0091649	0.0421845	No	-0.0050386	0.0380582	No (90%)
JHS F Oral - Univ F Oral	-0.5318103	-0.4884127	Yes	-0.5386742	-0.4815488	Yes (99%)
JHS F Writ - Univ F Writ	-0.4859380	-0.4280620	Yes	-0.4950918	-0.4189082	Yes (99%)
JHS M Oral - Univ M Oral	-0.3811208	-0.2650897	Yes	-0.3994727	-0.2467378	Yes (99%)
JHS M Writ - Univ M Writ	-0.4088865	-0.3560410	Yes	-0.4172447	-0.3476828	Yes (99%)
JHS Total - HS Total	-0.4072802	-0.3867339	Yes	-0.4105298	-0.3834842	Yes (99%)
HS Total - Univ Total	-0.0324069	-0.0043192	Yes	-0.0368493	0.0001232	No (99%)
JHS Total - Univ Total	-0.4300085	-0.4007316	Yes	-0.4346391	-0.3961010	Yes (99%)
JHS M T - JHS F T	-0.0743913	-0.0431426	Yes	-0.0793337	-0.0382002	Yes (99%)
HS M T - HS F T	-0.0969090	-0.0683147	Yes	-0.1014316	-0.0637922	Yes (99%)
Univ M T - Univ F T	-0.2405943	-0.1926693	Yes	-0.2481743	-0.1850893	Yes (99%)

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