

## **Acquisition of English cue strengths by Cantonese learners of English**

Chi Wui Ng

*The Chinese University of Hong Kong, Hong Kong, China*

The competition model, first developed by Bates and MacWhinney (1982), suggests that language users interpret sentences by reference to distinct cues which vary across languages. Second language learners who adopt the target language's sentence interpretation strategies are more likely to be successful. The present study investigates the acquisition of English cue strengths (i.e. the strengths of cues naturally occurring within the language) by Cantonese learners of English at distinct levels of English proficiency. A test requiring participants to select agents of actions in 27 monotransitive sentences were distributed to 30 elementary learners, 20 intermediate learners, 21 advanced learners of English in Hong Kong (all native speakers of Cantonese), and 15 native speakers. The results suggest that the extent to which Cantonese learners of English acquire English cue strengths increases with their level of English proficiency. Although advanced learners fail to fully acquire the cue strengths of native-speakers, they achieve a native-like level. The findings are consistent with those of earlier studies associating the competition model with second language acquisition which find that second language learners tend to transfer sentence interpretation strategies from their native language when at the beginners level, exhibit a combination of native and target language interpretation strategies at an intermediate level and become more native-like in their use of sentence interpretation strategies when they reach an advanced level.

**Key words:** competition model; cue strength; language processing; EFL; Hong Kong

### **Introduction**

Cantonese learners of English as a foreign language have considerable difficulty processing English texts. This appears to be predominantly attributed to their lack of phonological awareness (Gottardo, Chiappe, Yan, Siegel, & Gu, 2006; Gottardo, Yan, Siegel, & Wade-Woolley, 2001). The present qualitative study uses the competition model (Bates & MacWhinney, 1982) to investigate the processing of English sentences by L1 Cantonese learners of English at distinct levels of English proficiency. It identifies processing difficulties confronted by those learners and compares their sentence processing with that of native English speakers.

The competition model assumes direct mappings between language form and language meaning signified by cues. There are distinct cues in natural human languages, which possess varying degrees of strength across languages. In the context of the competition model, processing of a language necessitates application of appropriate cues for processing, so acquisition of a target language entails acquisition of cue strengths of the language.

### **Literature Review**

This literature review starts with a brief introduction of the competition model. It then delineates the cue strengths of English and Cantonese and accounts for second language

learners' acquisition of cue strengths from the perspective of the competition model. It ends by identifying the research questions of the present study.

### ***The competition model***

The competition model (Bates & MacWhinney, 1982) assumes both a direct mapping between surface language forms and functions expressed as well as a strength-based conflict resolution in sentence processing. The former situates it within linguistic functionalism while the latter complies with an input-based emergentist perspective of second language acquisition.

While processing incoming language input, parsers are required to process the input at two levels: the formal level, which is concerned with surface linguistic forms, and the functional level, which involves meanings conveyed by language forms (MacWhinney, Bates, & Kliegl, 1984). A direct mapping between form and meaning in language processing implies that formal processing and functional processing are of equal importance and carried out simultaneously. In the competition model, form-meaning mappings are signified by cues, each of which maps a certain constituent of a sentence onto a particular thematic role. Four prominent cues across natural human languages are word order, animacy, subject-verb agreement, and case markings (MacWhinney et al., 1984). By enabling parsers to interpret meanings conveyed by particular constituents in a sentence, form-meaning mappings are vital to the course of sentence processing.

Despite direct mappings between form and meaning, one particular language form may not necessarily map onto a single function; on the contrary, one language form can map onto many functions, and a single function can map onto many forms. For instance, there are three cues in the sentence *The boys push the ball*. The word-order cue maps the grammatical subject onto the agent. The animacy cue maps the animate entity onto the agent. The agreement cue maps the noun agreeing with the verb onto the agent. All three cues suggest that *the boy* is the agent of the sentence; in such a case, the three cues are said to converge, and one form is mapped onto one meaning. In contrast, in another sentence, *The balls push the boy*, the word-order cue suggests that *the balls* is the agent whereas the animacy and agreement cues suggest that *the boy* is the agent; the cues are thereby said to compete with one another, and several forms are mapped onto the same function.

If distinct cues compete with one another in sentence processing, disparate interpretations of the sentence occur, at which point one particular interpretation ought to take precedence over the other(s) so that the parser can interpret the sentence. Determination of an appropriate interpretation of a sentence is contingent upon the strength of each cue in a particular language, which is highly correlated with cue validity (MacWhinney et al., 1984). The validity of each cue is determined by its availability and reliability, a cue is said to be highly available if it is always present when required and said to be reliable if it is never misleading or ambiguous (MacWhinney et al., 1984). Cues that are highly available and reliable are deemed to be valid cues or stronger cues, which take precedence over their weaker counterparts in sentence processing.

The competition model contends that acquisition of both first and second languages is essentially acquisition of cue strengths of the target language (MacWhinney, 1987; MacWhinney et al., 1984). Thus, if learners master cue strengths of a language, they will find ways to identify the meaning of each lexical item in the sentence and interpret the sentence appropriately (MacWhinney, 1987). Cue strengths can only be acquired via exposure to sufficient language data from the target language as this enables discovery of availability and reliability of each cue. This view is consistent with the input-based

emergentist approach to language acquisition, which considers language learning as the abstraction of regularities from language input. Language learning situations experienced by first and second language learners are largely similar except for second language learners' prior knowledge of the cue strengths and sentence processing strategies of their mother tongue. As a result, acquisition of cue strengths and sentence processing strategies of the target language may pose a challenge to second language learners.

### ***Cue strengths of English and Cantonese***

This section presents distinctions in cue strength between English and Cantonese. The strongest cues in English and Cantonese are word order and animacy respectively whilst agreement is the weakest cue in both languages (Li, Bates, & MacWhinney, 1993; MacWhinney et al., 1984).

#### ***Word order***

Subject-verb-object (SVO) is the canonical word order in both English and Cantonese although other word orders are permitted in both languages. The object-subject-verb (OSV) word order is also permissible in both English and Cantonese. English permits the OSV word order in several ways: wh-questions (e.g. *What do you like?*), relative clauses with heads being objects of matrix clauses (e.g. *He is the man everyone hates*), and left dislocations (e.g. *This book, I have finished it*) (MacWhinney et al., 1984). In spite of permission of the OSV word order in English, rarely can it be observed. In contrast, such a word order is not uncommon in Cantonese, where OSV sentences are evident in topicalization, as in *ne1 bun2 syu1, ngo5 tai2 zo2*, which is literally translated as “This book, I have read” (Li et al., 1993).

The verb-object-subject (VOS) word order is rarer than the OSV word order in both English and Cantonese. English only permits it in imperatives (e.g. *Shut the door, Amy*) and right dislocations (e.g. *You are polite, Tom*) (MacWhinney et al., 1984). In Cantonese, the VOS word order only appears when the subject of a sentence exists as an afterthought, as in *sik6 zo2 faan6 laa1, keoi5 dei6*, which is literally translated as “Eaten already rice, they” (Li et al., 1993).

The subject-object-verb (SOV) word order is present in Cantonese yet absent in modern English. It only appears in Cantonese when the object is preceded by an object marker such as *zeong1*, as in *nei5 zeong1 keoi5 daa2 sei2*, which is literally translated as “You, (object marker) him beat die” (MacWhinney et al., 1984).

In summary, the strict word order of English is the language's strongest cue because of its high availability and reliability. Contrastingly, the more flexible word order of Cantonese makes it a weaker cue for that language.

#### ***Agreement***

Because of its strict word order English does not possess salient subject-verb agreement, but in certain circumstances agreement marking is observed on English verbs. A grammatical morpheme is marked on the verb when it is in the present simple third person singular form (MacWhinney et al., 1984). Subject-verb agreement is marked more saliently on the verb “be”, which is represented in two distinct forms to indicate singular and plural subjects in the past tense and also as three distinct forms to indicate first-person, second-person, and third-person subjects in the present tense (MacWhinney et al., 1984). Subject-verb agreement is a weaker cue than word order cue in English because it

is less often observed. Subject-verb agreement is absent in Cantonese, thus is not relevant in the processing of Cantonese sentences (Lin, 2003).

### *Animacy*

Animacy is a semantic cue present across natural human languages. The animate noun is usually the agent of actions when it appears in the same sentence as an inanimate noun (Gass, 1987). Psycholinguistic experiments demonstrate that native English speakers tend to regard animate nouns in lieu of inanimate nouns as agents of actions as well as subjects of sentences; the cue strength of animacy is thereby perceived to be relatively high in English (Bates & MacWhinney, 1982; MacWhinney, 1977). The cue strength of animacy in Cantonese has not been previously examined, although extensive studies reveal that in Mandarin animacy is a stronger cue than word order because of the latter's flexibility (Li et al., 1993; Miao, 1981; Su, 2001). Given the similarity of syntactic structures between Cantonese and Mandarin, it is likely that such findings are applicable to Cantonese.

To sum up, the strongest cues in English and Cantonese are word order and animacy respectively. Agreement is the weakest cue in both languages given that subject-verb agreement is not salient in English and not applicable in Cantonese.

### *Acquisition of cue strengths by second language learners*

Multiple studies associating the competition model with second language acquisition have been conducted. The most influential one, conducted by Gass (1987), targeted English learners of Italian and Italian learners of English. Drawing on the competition model to investigate the sentence processing strategies of these second language learners, it discovered that beginner learners tended to transfer sentence interpretation strategies from their native language to their interpretation of the target language whereas those at higher levels of language proficiency used a combination of sentence interpretation strategies of the native language and target language (Gass, 1987).

Gass (1987) also found that a semantics-based processing strategy, which is easier to acquire and more difficult to drop, was more preferable to learners than a syntax-based processing strategy (Gass, 1987). This was corroborated by disparities in the ease of acquisition of sentence processing strategies of the target language by second language learners of distinct language pairs. English and Italian use a syntax-based processing strategy and a semantics-based processing strategy respectively on account of the fixed word order in English and the relatively flexible word order in Italian (Gass, 1987). Switching from the semantics-based processing strategy associated with their mother tongue to the syntax-based processing strategy associated with the target language caused Italian learners of English difficulty processing (Gass, 1987). In contrast, switching from a syntax-based processing strategy of their mother tongue to a semantics-based processing strategy of the target language was relatively easy for English learners of Italian. A semantics-based processing strategy can more easily replace a syntax-based processing strategy in sentence processing than vice versa.

Liu, Bates, and Li (1992), Su (2001), and Lin (2003) all used the competition model to probe into the sentence processing of Chinese learners of English; their results validated the findings of Gass (1987). As animacy is its strongest cue, Chinese employs a semantics-based processing strategy. This makes it difficult for Chinese learners of English to drop the processing strategy of their native language (semantic-based) and pick up the processing strategy of the target language (syntax-based). Li, Bates, and Li (1992) and Lin (2003) found a striking difference in sentence processing strategies adopted by

intermediate Chinese learners of English and those utilized by native English speakers; this suggested that those intermediate learners had not successfully acquired cue strengths or the syntax-based processing strategy of English. Su (2001) compared sentence processing strategies amongst Chinese learners of English at three different levels of language proficiency and discovered that the proportion of learners applying word order as the strongest cue in processing of English sentences increased with proficiency level. In other words, notwithstanding difficulty in switching from a semantics-based processing strategy to a syntax-based one, there was conclusive evidence that more proficient Chinese learners of English gradually managed to acquire the sentence processing strategy of English.

### **The present study**

The motivation for the present research is the gap in the literature on application of the competition model to the acquisition phenomenon of Cantonese learners of English. Although there is a body of research looking at sentence processing by Chinese learners of English, it all focuses on Mandarin learners of English. The current study addresses three research questions:

1. To what extent can Cantonese learners of English at an elementary level acquire English cue strengths?
2. To what extent can Cantonese learners of English at an intermediate level acquire English cue strengths?
3. Can Cantonese learners of English at an advanced level fully acquire English cue strengths?

Even though it is difficult for second language learners to switch from a semantics-based sentence processing strategy to a syntax-based one (Gass, 1987), Su (2001) found that learners were able to acquire the processing strategy of the target language as they proceeded to a higher level of language proficiency. Thus, it is predicted that the Cantonese learners of elementary English in this study will be largely dependent upon the sentence processing strategies of Cantonese when processing English sentences whilst the intermediate learners will rely more on the sentence processing strategies of English. The advanced learners of English are expected to be capable of fully acquiring English cue strengths.

### **Methodology**

Four groups of participants were recruited by means of convenience sampling for the study: a group of 30 elementary learners, all of whom were primary students in Hong Kong who had been learning English for less than 10 years, a group of 20 intermediate learners, all of whom were secondary students studying in a school with English as the medium of instruction in Hong Kong who had been learning English for about 10 years, a group of 21 advanced learners, all of whom were university students in Hong Kong who had been learning English for over fifteen years, and a group of 15 adult native English speakers serving as a control group.

Having provided their informed consent, participants were provided with a list of 27 simple monotransitive sentences (Appendix 1), each of which contained two nouns and one verb, and required respondents to circle the “doer” of the action in each sentence.

The structure of the test sentences (inspired by the work of Lin, 2003) focused on word order, agreement, and animacy as three important cues, each of which was

comprised of three conditions. The three conditions for word order were: (1) noun-verb-noun (NVN), (2) noun-noun-verb (NNV) and (3) verb-noun-noun (VNN). The three conditions for agreement were: (1) that both nouns in the sentence agreed with the verb (AG0), (2) that the first noun agreed with the verb (AG1) and (3) that the second noun agreed with the verb (AG2). In all of these conditions all nouns agreeing with the verb were in singular forms. The conditions for animacy were: (1) an animate noun followed by an inanimate noun (AI), (2) an inanimate noun followed by an animate noun (IA) and (3) two animate nouns (AA). One condition for each cue was assigned to each sentence, so there were twenty-seven test sentences in total. The structure of the test sentences was the same as those used by Lin (2003) but with modifications to the nouns and verbs with the use of more commonly used nouns and verbs to cater for the level of proficiency of elementary learners in the study.

Participants' responses to each test sentence were converted into numerical values by scoring 1 if the first noun of the sentence was circled and 2 if the second noun was circled. These scores were subsequently analysed both descriptively and inferentially.

### **Results and discussion**

Planned comparisons of a one-way analysis of variance (ANOVA) were made by means of two-tailed independent-samples *t* tests as well as calculation of Cohen's *d* effect sizes to investigate differences in mean scores amongst the three groups in each test sentence. Descriptive statistics and inferential statistics are presented in Appendices 2 and 3 respectively. In determining the extent to which Cantonese learners of English at an elementary level acquire English cue strengths (research question 1), the data show that that Cantonese learners of elementary English acquired English cue strengths to a small extent. Differences in mean scores between elementary learners and native speakers in the 27 test sentences all have *p* values lower than a statistically significant level of .05, and effect sizes (*d*) which exceed 0.80 and were large for all test questions. These differences in language processing strategies between the elementary learners of English and the native English speakers concur with Su's (2001) study on the English processing of Mandarin speakers.

More specifically, in the current study, elementary learners were discovered to capitalize upon a semantics-based processing strategy and rely on the animacy cue in processing English sentences. When the word order cue competed with the animacy cue, as in test sentences 4, 6, and 9, learners tended to conceive the animate noun, being the direct object in lieu of a grammatical subject, as the agent of the action. These elementary learners had probably transferred semantics-based sentence processing strategies from Chinese to processing the English sentences which is consistent with the role of animacy as the strongest cue in Chinese, including Cantonese, but not in English. A similar phenomenon was noted by Su (2001) with Mandarin learners of English. It is clear from the data, and most likely for this reason, that the elementary learners' processing of English sentences deviated substantially from that of the native English speakers.

In examining the extent to which Cantonese learners of English at an intermediate level can acquire English cue strengths (research question 2), the data shows that the intermediate learners had difficulty resolving conflicts between the word order cue and the animacy cue, which are the strongest cues in English and Cantonese respectively. They also had difficulty strengthening the word order cue. Regarding differences in mean scores between intermediate learners and native speakers in 27 test sentences, *p* values were lower than .05 in 14 test sentences, and effect sizes (*d*) were larger than 0.80 in six test sentences. These differences comply with the findings of Su's (2001) study on

Mandarin speakers' English processing. More specifically, sentence processing strategies exploited by the intermediate learners were found to be more native-like when compared to those employed by the elementary learners despite the presence of some traits of transfer of a semantic-based processing strategy from Chinese to English under some conditions. When the word order cue competed with the animacy cue, as in test sentences 4-9, the intermediate learners tended to adopt the animacy cue in lieu of the word order cue for processing. Interestingly, in test sentences 22, 24, and 25, where the animacy cue was insignificant owing to the presence of two animate nouns, some intermediate learners still failed to capitalize upon the word order cue for sentence interpretation. This contrasts markedly with the performance of the native English speakers, as reflected in the statistical differences in mean scores in those test sentences. This implies that the word order cue was still not strong enough for intermediate learners even under conditions where transfer of L1 sentence processing strategies was inapplicable.

With regard to whether Cantonese learners of English at an advanced level can fully acquire English cue strengths (research question 3), the data suggest that the advanced learners failed to fully acquire English cue strengths but were capable of acquiring those cue strengths to a large extent. For the differences in mean scores between advanced learners and native speakers in the 27 test sentences, most *p* values were higher than .05, and effect sizes (*d*) were smaller than 0.80 in all test sentences.

A statistical difference in language processing strategies between the advanced learners of English and native English speakers was observed in one of the 27 test sentences whilst marginally significant differences between the language processing strategies of the two groups of speakers was identified in one other test sentence. The native English speakers hinged their sentence processing on the word order cue processing in all 27 test sentences. This is not surprising as it is the strongest cue in English. The advanced learners perform similarly to native English speakers except for in a few specific conditions. When the word order cue competed with the other two cues, as in test sentence 8, learners sometimes exploited cues other than word order for processing; this accounted for the statistically significant *p* value of .04 in test sentence 8. When the agreement cue competed with the other two cues, as in test sentence 23, some learners employed the agreement cue for processing, so a marginally significant *p* value of .08 was yielded for this test sentence. Learners' reliance on the agreement cue, which is the weakest of the three cues in both Cantonese and English, might be attributable to form-based instruction in Hong Kong schools, where explicit grammatical instruction is provided and learners' errors are corrected explicitly (Curriculum Development Council, 2002; Ng, in press). Subject-verb agreement is absent in Cantonese making it prone to errors by Cantonese learners of English. As a result, it is often explicitly introduced to learners in English language classrooms in Hong Kong. The repetitive reminding about subject-verb agreement in English, might develop a tendency among Cantonese learners of English to pay extra attention to the agreement cue in their comprehension and production of English.

Despite disparities in language processing strategies between Cantonese learners of English and native English speakers, the advanced learners in the present study performed more native-like in processing of English sentences than those in the study of Su (2001). This is probably related to contextual disparities in the two studies, particularly language histories and educational backgrounds. In particular, learners' exposure to English is more frequent in Hong Kong than in mainland China due to differences in the education system and linguistic repertoire. Additionally, the advanced learners in the current study rarely relied on the animacy cue in processing the English sentences even though it is the strongest cue in Chinese (Li et al., 1993; Miao, 1981; Su, 2001). This implies that the

direct transfer of processing strategies from L1 to L2 rarely take place with learners at a more advanced level of English proficiency.

## **Conclusion**

The study reported here shows that, in general, the processing of English sentences by Cantonese learners of English becomes increasingly native-like as their English proficiency level increases. The elementary learners acquired English cue strengths to only a small extent. The intermediate learners showed signs of conflict between the word order and animacy cues which suggests an intermediary stage of moving from using semantic-based cues (as in Chinese) to syntax-based cues (as in English). The advanced learners failed to fully acquire English cue strengths despite developing native-like language processing strategies. Although this is the first such study of Cantonese learners of English, the findings are consistent with those conducted on other learners of English and learners of other foreign languages. The findings of this, and other, studies suggest that sentence processing strategies are likely to be transferred from the native language to the target language in the beginning stages of second language learning but cue strengths can be acquired at later stages of second language learning.

In accordance with the emergentist approach to second language acquisition, cues, which are form-meaning mappings, can be acquired naturalistically given exposure to sufficient language input. As reflected in the findings of the study, advanced learners can eventually acquire native-like language processing strategies. Nevertheless, it is worth devoting pedagogical efforts to sentence processing techniques, in particular those dealing with complex sentences, for the sake of enabling second language learners, especially those with limited exposure to primary language data outside the classroom, to interpret sentences in the target language successfully.

The current small-scale and preliminary study is somewhat limited in three ways. The sample is rather small, the contrived nature of the test sentences makes it difficult to generalize findings to authentic language contexts and the assumption that primary, secondary and university level students will equate to beginner, intermediate and advanced learners. These compromises were necessary for this small study but it is hoped that a larger-scale study with a wider range of test sentence types and more detailed monitoring of individual participants' proficiency levels will serve to refine the findings.

## **About the author**

Chi Wui Ng is a graduate master in an aided secondary school in Hong Kong as well as a masters student in applied English linguistics in the Department of English at the Chinese University of Hong Kong. His research interests are in English grammar, second language development, second language instruction, and pedagogical grammar.

Email: [ngchiwui@link.cuhk.edu.hk](mailto:ngchiwui@link.cuhk.edu.hk)

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### Appendix 1: Test Sentences

Number	Word order	Agreement	Animacy	Sentence
1	NVN	AG0	AI	The girl destroys the machine.
2	NVN	AG1	AI	The girl destroys the machines.
3	NVN	AG2	AI	The girls destroys the machine.
4	NNV	AG0	AI	The girl the machine destroys.
5	NNV	AG1	AI	The girl the machines destroys.
6	NNV	AG2	AI	The girls the machine destroys.
7	VNN	AG0	AI	Destroys the girl the machine.
8	VNN	AG1	AI	Destroys the girl the machines.
9	VNN	AG2	AI	Destroys the girls the machine.
10	NVN	AG0	IA	The cave protects the boy.
11	NVN	AG1	IA	The cave protects the boys.
12	NVN	AG2	IA	The caves protects the boy.
13	NNV	AG0	IA	The cave the boy protects.
14	NNV	AG1	IA	The cave the boys protects.
15	NNV	AG2	IA	The caves the boy protects.
16	VNN	AG0	IA	Protects the cave the boy.
17	VNN	AG1	IA	Protects the cave the boys.
18	VNN	AG2	IA	Protects the caves the boy.
19	NVN	AG0	AA	The cat follows the dog.
20	NVN	AG1	AA	The cat follows the dogs.
21	NVN	AG2	AA	The cats follows the dog.
22	NNV	AG0	AA	The cat the dog follows.
23	NNV	AG1	AA	The cat the dogs follows
24	NNV	AG2	AA	The cats the dog follows.
25	VNN	AG0	AA	Follows the cat the dog.
26	VNN	AG1	AA	Follows the cat the dogs.
27	VNN	AG2	AA	Follows the cats the dog

**Appendix 2: Descriptive Statistics**

Sentence	Elementary (N=30)		Intermediate (N=20)		Advanced (N=21)		Native (N=15)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	1.35	0.35	1.08	0.25	1.00	0.00	1.00	0.00
2	1.35	0.35	1.10	0.31	1.00	0.00	1.00	0.00
3	1.28	0.31	1.00	0.00	1.10	0.30	1.00	0.00
4	1.48	0.33	1.55	0.51	1.86	0.36	2.00	0.00
5	1.52	0.36	1.60	0.50	1.81	0.40	1.93	0.26
6	1.47	0.35	1.50	0.51	1.90	0.30	2.00	0.00
7	1.52	0.28	1.70	0.44	1.90	0.30	2.00	0.00
8	1.55	0.30	1.70	0.44	1.76	0.44	2.00	0.00
9	1.48	0.31	1.70	0.44	1.95	0.22	2.00	0.00
10	1.35	0.33	1.20	0.41	1.00	0.00	1.00	0.00
11	1.37	0.35	1.30	0.47	1.00	0.00	1.00	0.00
12	1.35	0.35	1.20	0.41	1.19	0.40	1.07	0.26
13	1.57	0.34	1.73	0.44	1.95	0.22	1.93	0.26
14	1.62	0.34	1.78	0.41	1.76	0.44	1.93	0.26
15	1.62	0.36	1.68	0.47	1.95	0.22	2.00	0.00
16	1.53	0.29	1.80	0.41	2.00	0.00	1.93	0.26
17	1.60	0.28	1.85	0.37	1.81	0.40	1.93	0.26
18	1.55	0.30	1.75	0.44	2.00	0.00	2.00	0.00
19	1.37	0.29	1.10	0.31	1.00	0.00	1.00	0.00
20	1.40	0.33	1.20	0.41	1.00	0.00	1.00	0.00
21	1.33	0.30	1.10	0.31	1.14	0.36	1.00	0.00
22	1.50	0.32	1.63	0.46	1.86	0.36	2.00	0.00
23	1.50	0.35	1.68	0.46	1.81	0.40	2.00	0.00
24	1.47	0.32	1.60	0.45	1.95	0.22	1.93	0.26
25	1.53	0.22	1.58	0.49	1.95	0.22	2.00	0.00
26	1.55	0.24	1.78	0.41	1.81	0.40	1.93	0.26
27	1.48	0.25	1.68	0.47	1.95	0.22	2.00	0.00

**Appendix 3: Inferential Statistics from ANOVA**

Sentence	Elementary – Native			Intermediate – Native			Advanced – Native		
	Mean difference	<i>p</i> value	Cohen's <i>d</i>	Mean difference	<i>p</i> value	Cohen's <i>d</i>	Mean difference	<i>p</i> value	Cohen's <i>d</i>
1	0.35	.00	1.00	0.08	.25	0.32	0.00	1.00	0.00
2	0.35	.00	1.00	0.10	.22	0.32	0.00	1.00	0.00
3	0.28	.00	0.90	0.00	1.00	0.00	0.10	.23	0.33
4	0.52	.00	1.58	0.45	.00	0.88	0.14	.13	0.39
5	0.42	.00	1.58	0.33	.03	1.27	0.12	.30	0.46
6	0.53	.00	1.51	0.50	.00	0.98	0.10	.23	0.33
7	0.48	.00	1.71	0.30	.01	0.68	0.10	.23	0.33
8	0.45	.00	1.50	0.30	.01	0.68	0.24	.04	0.55
9	0.52	.00	1.68	0.30	.01	0.68	0.05	.41	0.23
10	0.35	.00	1.06	0.20	.07	0.49	0.00	1.00	0.00
11	0.37	.00	1.06	0.30	.02	0.64	0.00	1.00	0.00
12	0.28	.01	1.08	0.13	.28	0.50	0.12	.27	0.46
13	0.37	.00	1.38	0.21	.11	0.77	0.02	.82	0.08
14	0.32	.00	1.19	0.16	.20	0.58	0.17	.18	0.65
15	0.38	.00	1.06	0.33	.01	0.68	0.05	.41	0.23
16	0.40	.00	1.54	0.13	.28	0.50	0.07	.33	0.27
17	0.33	.00	1.27	0.08	.46	0.31	0.12	.30	0.46
18	0.45	.00	1.50	0.25	.04	0.57	0.00	1.00	0.00
19	0.37	.00	1.28	0.10	.22	0.32	0.00	1.00	0.00
20	0.40	.00	1.21	0.20	.07	0.49	0.00	1.00	0.00
21	0.33	.00	1.10	0.10	.22	0.32	0.14	.13	0.39
22	0.50	.00	1.56	0.38	.00	0.80	0.14	.13	0.39
23	0.50	.00	1.43	0.33	.01	0.70	0.19	.08	0.48
24	0.47	.00	1.77	0.33	.02	1.27	0.02	.81	0.08
25	0.47	.00	2.14	0.43	.00	0.86	0.05	.41	0.23
26	0.38	.00	1.46	0.16	.20	0.58	0.12	.30	0.46
27	0.52	.00	2.08	0.33	.01	0.68	0.05	.41	0.23