

A STUDY OF CONJUNCTIVE ADVERBIALS IN ACADEMIC JOURNAL ARTICLES

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ABSTRACT

This study investigated the usage of conjunctive adverbials (CAs) in the introduction section of linguistics/TESOL-related and IEEE journal articles written by English native and Taiwanese graduate students. The four corpora compiled by the author were used for analysis. Each of the Taiwanese learner corpora consists of 100 academic articles and per native English-speaking student corpus contains 50 journal papers. On a large-scale, corpus-based study, quantitative results have presented that both Taiwanese EFL learners and English native writers were inclined to use a fixed and limited set of CAs; however, non-native students relied heavily on some of the most commonly used CAs in particular. In addition, the qualitative analysis demonstrated that some of the Taiwanese students used certain CAs such as *besides*, *therefore* inappropriately and had problems with the use of some CAs which were less familiar to them. The disciplinary variation in the use of CAs was also revealed under the cross examination of the four sets of writings. Pragmatically, the results of our research may have some direct impacts on scientific or academic English teaching and may also assist learners to employ CAs efficiently in academic writing.

Keywords : conjunctive adverbials, corpus-based study, academic writing, disciplinary variation

I. INTRODUCTION

1.1 Background and motivation

Previous research on EFL/ESL learners' writing has indicated that advanced language learners tend to have great difficulties in creating a coherent text (e.g., Crewe, 1990; Lorenz, 1999). Conjunctive adverbials (CAs) are a type of cohesive devices that help create coherence. Non-native speakers of English who want to function in the academic world must be able to know how to use CAs appropriately in the preparation of their own research work. A full understanding of such devices is thus critical to academic success. Mastery of CAs is particularly important to L2 graduate students because they need the ability to write academic papers, to participate in seminar discussion, and so on. EFL/ESL

learners have been found to have difficulty applying CAs appropriately (e.g., Crewe, 1990; Tankó, 2004), and they tend to overuse a wide range of connectors and misuse some types of CAs (e.g., Crewe, 1990; Field and Yip, 1992; Granger and Tyson, 1996). In addition, some students are insensitive to register differences in different styles of writing (Crewe, 1990; Granger and Tyson, 1996; Altenberg and Tapper, 1998). CAs have been suggested to be an important problem for non-native speakers of English which is worthy of consideration and instructional attention. This stimulates our interest in the study of CAs exploited by learners of English in Taiwan.

Previous corpus-based studies have shed light on the general patterns of connector usage by EFL/ESL learn-

ers. However, it is questionable in suitability and comparability of the learner corpus and the control corpus in many of the studies. Many of the writing samples referred to as “academic writing” in those studies are exam papers or written assignments. In fact, the best target model for academic writing would be those which were already published. Bolton et al. (2002) has pointed out that “a better set of control data would be provided by a corpus of published academic writing in English” (2002:173). Specifically, learners in the current study are graduate students, and the articles published in professional journals are the goal graduate students, Ph.D. students in particular, need to accomplish. In order to ensure comparability and reliability, both the learner and control corpora in the present study consist of academic papers already published in well-known English-language, international journals. Because no such ready-made corpus is currently available, the author had to compile learner and control corpora to be used in this study to compare the use of CAs between advanced EFL learners in Taiwan and native English-speaking students.

To the best of the author’s knowledge, no literature focuses on CA usage in English academic journal articles by advanced Taiwanese EFL learners. The writing samples in previous studies examining conjunctions used by advanced Taiwanese EFL learners have mostly concentrated on students’ term papers, master’s theses or proceeding articles rather than academic journal articles. Moreover, the subjects in those studies were Taiwanese EFL graduate students majoring in applied linguistics or TESOL (Wu, 2005; Shen, 2005; Chen, 2006). We do not know of any study which has investigated how CAs are used by Taiwanese graduate electrical/electronics engineering (EE) students in their English academic journal papers. In fact, ESL/EFL student writers with different majors may display different tendencies toward their use of CAs and encounter different difficulties. By analyzing how the groups of students with different majors employ CAs differently in their writing, the current research can provide English teachers the valuable insights for pedagogical design. Consequently, this study attempts to compare the usage of CAs in the

four sets of linguistics/TESOL-related and electrical/electronics engineering academic journal articles to explore disciplinary variation. Research questions of the present study are outlined as below.

1. Do Taiwanese writers use CAs as frequently as English native writers?
2. Do Taiwanese writers use CAs to express the same semantic relations as English native writers?
3. Do Taiwanese writers choose CAs in appropriate register?
4. How do writers of different disciplines vary in their use of CAs in academic writing?

1.2 Definition of conjunctions

Conjunction is one of the linguistic resources that create cohesion in a text. According to Celce-Murcia and Larsen-Freeman (1999), they are “lexical expressions that may add little or no propositional content by themselves but they serve to specify the relationships among sentences in oral or written discourse, thereby leading the listener/reader to the feeling that the sentences ‘hang together’ or make sense” (ibid.: 519). Therefore, the primary function conjunctions serve is to mark the relationship between two units of discourse and help the listener/reader to accurately infer the writer/speaker’s intentions. These conjunctive devices include coordinating conjunctions (e.g., *but*, *and*, *or*), subordinating conjunctions (e.g., *because*, *though* and *if*), and conjunctive adverbials (e.g., *therefore*, *however* and *furthermore*). In this study, the author focused on conjunctive adverbials.¹

1.3 Contributions

The significance of this study is at least two-fold. Academically, the results of our research can extend the scope of research in the related field such as corpus-based linguistic research, Research Article study (RAs), and English for Academic Purpose (EAP) research and supplement the findings of previous work. The most impressive feature of its research is its results yield representativeness. First of all, the corpora under investigation are large in size (100 journal articles in each of Taiwanese learner corpora and 50 per native



English-speaking student corpus). Secondly, the four sets of data are homogeneous and thus comparable in terms of their genre, register and subject field. Pragmatically, the insights gained from the results can provide EAP instructors with a better idea on how to help learners, ESL/EFL students in particular, make better use of CAs and improve their academic writing.

II. PREVIOUS CORPUS-BASED CONNECTOR STUDIES

A brief review of some corpus-based studies regarding connector usage by ESL/EFL university students will be presented—Granger and Tyson (1996), Altenberg and Tapper (1998), and Bolton et al. (2002). With regard to the learner corpus, Granger and Tyson (1996) extracted L2 samples from the French sub-corpus of the *International Corpus of Learner English* (ICLE), Altenberg and Tapper (1998) from the Swedish component of ICLE, and Bolton et al. (2002) from the Hong Kong component of *International Corpus of English* (ICE-HK). In the first two studies, the native English control corpus is derived from the *Louvain Corpus of Native Essay Writing* (LOCNESS). Bolton et al. (2002), constructed a control corpus, a subset of published academic writing taken from the British Component of ICE (ICE-GB). They insisted the best target model for academic writing would be those which were already published in international English-language academic journals and generated a list of common academically-used connectors from their control corpus.

The quantitative analysis in Granger and Tyson (1996) did not reveal overuse of connectors in general by French students in their English essay writing. Similarly, Swedish learners in Altenberg and Tapper (1998) used fewer conjuncts than native English students. However, a more detailed qualitative investigation manifested overuse and underuse of individual connectors. Both Granger and Tyson (1996) and Altenberg and Tapper (1998) pointed out learners of English tended to underuse contrastive and resultive types of connectors. On the other hand, French learners overused some corroborative and appositive connectors. Bolton et al. (2002) found Hong Kong students overused a wide range of connectors, as they used more than twice more connec-

tors than professional writers, and non-native students used a considerably smaller number of connector types in their writing than professional writers.

Learners' misuse in semantic and stylistic aspect was also identified. For example, French learners very often misunderstood the meanings of connectors (e.g., *moreover*, *on the contrary*), leading to semantic misuse. Furthermore, both French and Swedish learners are often insensitive to register distinctions of certain connectors. In Granger and Tyson's (1996) study, the misuse of informal connectors (e.g., *anyway*) was found in the French learner writing. Altenberg and Tapper (1998) also indicated Swedish learners preferred less formal connectors (e.g., *but*) to the formal alternatives (e.g., *yet*, *however*) in formal writing.

Since the present study attempts to investigate the usage of CAs by advanced Taiwanese EFL learners, the relevant research, Wu (2005), Shen (2005) and Chen (2006), are referred to. In these studies, the learner corpora are composed of master theses, proceeding articles or final papers written by Taiwanese graduate students. They all indicated that Taiwanese EFL students tended to overuse conjunctions and used a smaller set, compared with professional writers. In addition to the overuse and underuse of conjunctions, Shen (2005) further found out Taiwanese EFL learners' deviant use, including misuse and redundant use. Chen (2006) pointed out that certain CAs were employed inappropriately by Taiwanese EFL students even at a rather advanced level of proficiency in English.

III. METHODOLOGY

3.1 The corpora

Four corpora were constructed for this investigation: Taiwanese Linguistics/TESOL Learner Corpus (TL), Taiwanese Electrical/Electronics Engineering Learner Corpus (TE), English Native Linguistics/TESOL Writer Corpus (NL), and English Native Electrical/Electronics Engineering Writer Corpus (NE). The two native English-speaking writer corpora are served as reference corpora and the other two Taiwanese EFL/ESL learner corpora are the target of this study.

Taiwanese Linguistics/TESOL Learner Corpus (TL)



consists of 100 introduction sections of linguistics- and TESOL-related research articles from well-established international journals, *Journal of Phonetics*, *Journal of Pragmatics*, *Oceanic Linguistics*, *Asian EFL Journal* and *Language Sciences*, for example (published between 2002 and 2011). All the writers were graduate students majoring in linguistics and TESOL from national universities in Taiwan. They are non-native speakers of English, either MA students or doctorate students.

Taiwanese Electrical/Electronics Engineering Learner Corpus (TE) contains 100 introduction sections of English academic journal articles written by non-native speaker graduate students from Electrical Engineering Department of National Tsing Hua University, a prestige university in Taiwan, and published in IEEE journals such as *IEEE Sensors Journal*, *IEEE Transactions on Speech and Audio Processing*, *IEEE Trans. on Multimedia*, *IEEE Trans. on Fuzzy Systems* (published between 2002 and 2011).

English Native Linguistics/TESOL Writer Corpus (NL) comprises 50 introduction sections of journal articles on applied linguistics written by native English-speaking students and published in prestigious journals *Journal of Pragmatics*, *TESOL Journal*, *Reading in a Foreign Language*, and *TESOL Quarterly* (published between 2002 and 2011).

English Native Electrical/Electronics Engineering Writer Corpus (NE) composes of 50 introduction sections of IEEE journal articles from *IEEE Trans. on Multimedia*, *IEEE Trans. on Fuzzy Systems*, *IEEE Sensors Journal*, and *IEEE Trans. on Image Processing*, for example (published between 2007 and 2012). All the writers are English native students.

We select the introduction section as our data. Most academic articles are too professional for us to understand their general meaning. IEEE journals, for example, are targeted at electrical and electronics engineers. Generally speaking, the content of the introduction section is easier than that of other sections so we choose the introduction section.

The total word count for TL Corpus is 72,601 words,

86,501 for TE, 35,177 for NL, and NE contains 36,277 words. The articles were selected in our corpora on condition that the first author or the second author (if the first author is the professor) was the graduate students.²

3.2 Method of analysis

The statistical analysis in this study consisted of a frequency count, a ratio of occurrence analysis and a discrepancy analysis. To identify occurrences of the CAs, the software *AntConc* 3.2.1w was used. Although the concordancing function of *AntConc* was capable of generating concordance lines of our target CAs from the corpora, manual efforts were still employed to discard instances that did not satisfy the pre-determined criteria. As the four corpora under investigation differed in size, the ratio of occurrence of CAs in each corpus was presented in frequency per 10,000 words for comparison. A discrepancy analysis of the ratio of each CA among the four corpora was also conducted to examine whether any CA is favored more or less by Taiwanese writers and by the discipline of Linguistics/TESOL. Chi-square tests were further used to evaluate if the discrepancy was statistically significant. The level of significance for the study was set at 0.01 for the P value. In addition to the statistical analysis, a qualitative analysis was carried out to discuss the efficiency of CAs used by Taiwanese graduate students in writing the introduction section of their English academic articles.

3.3 Selection of CAs

In order to ensure the comprehensiveness and reliability of the selection of CAs, the author of this paper derives a list of 94 CAs based on various sources in the literature, including Bolton et al. (2002), and the reference books by Biber et al. (1999), Celce-Murcia and Larsen-Freeman (1999), Ball (1986), and Quirk et al. (1985). Bolton et al.'s 54 commonly used academic connectives are our major resource. CAs identified during data processing in the writing samples are also added. Some CAs used in informal settings are incorporated in our study to examine if learners employ stylistically appropriate CAs in their academic writing.

As for the semantic types of CAs, the author adopts



Biber et al.'s (1999) classification scheme whose corpus-based approaches to language investigation were similar to our study. The Corroboration category is later added since the corroborative CAs such as *of course* and *in fact* are used frequently in academic writing for emphasizing a new point or giving a new turn to the argument (Granger and Tyson, 1996, Altenberg and Tapper, 1998). Ultimately, a list of 94 CAs which are classified into 8 semantic types is generated for investigation. The complete list is as follows.

1. Addition: *similarly, moreover, further, furthermore, also, in addition, additionally, above all, besides, and, by the same token, likewise*
2. Contrast/Concession: *rather, however, instead, on the contrary, alternatively, conversely, in/by contrast, yet, by/in comparison, nevertheless, nonetheless, anyhow, anyway, after all, still, in any case/event, in spite of that, at any rate, despite this, at least, but, on the other hand, otherwise*
3. Result/Inference: *accordingly, therefore, thus, consequently, so, hence, as a result/ consequence, then, in consequence, thereby, for this reason, for that reason*
4. Enumeration: *first/firstly, second/secondly, finally, first of all, in the first place, in the second place, last/lastly, for one thing, for another (thing), to begin with, next, for a start, then, on the one hand*
5. Apposition: *namely, in other words, for example/instance, that is (to say)*
6. Summation: *in short, in sum, to conclude, all in all, in conclusion, to summarize, to sum up, on the whole, overall, in general, in total, in brief, in summary*
7. Transition: *incidentally, at the same time, now, meantime, meanwhile, in the meantime, subsequently, eventually, by the way*
8. Corroboration: *indeed, in fact, in effect, actually, of*

course, as a matter of fact, in the event

IV. RESULTS

In this study, the overall frequencies of CAs used by English native writers and Taiwanese writers were presented. The writers' use of CAs in semantic types was also addressed. We discussed CAs more frequently used and less used by Taiwanese writers and explored disciplinary differences with respect to the use of CAs. Table 1 presents a comparison in terms of the total number and forms of CAs used in Taiwanese Learner Corpora TE and TL, and Native Writer Corpora NE and NL respectively. The overall frequencies of CA usage in terms of 10,000 words are calculated to make a comparison.

As can be seen from Table 1, Taiwanese writers used more numbers of CAs in the introduction sections of their research articles than native writers, based on the number of tokens per 10,000 words (136.30 vs. 127.35; 146.00 vs. 120.25). The results are consistent with previous findings that non-native writers employ CAs more frequently than native writers (e.g., Crewe, 1990; Field and Yip, 1992 and Bolton, et al., 2002). In addition, Taiwanese writers apply more forms of CAs in their writing, 59 and 64 CAs versus 49 and 55 CAs by native writers. The results also reveal disciplinary differences in the use of CAs. For both English native and Taiwanese EFL graduate students, linguistics/TESOL students particularly tend to use a larger set of CAs than electrical/electronics engineering students do (59 vs. 64; 49 vs. 55). This finding suggests that students in a MA or doctorate linguistics/TESOL program seem to have a better control over CAs in their academic writing.

4.1 Use of individual CAs

The similarities and differences of the use of CAs among the four corpora can be found in terms of the top most frequently used CAs.

Table 1 Forms and number of CAs in Native Writer Corpus and Taiwanese Learner Corpus

	Taiwanese Learner Corpus TE	Taiwanese Learner Corpus TL	Native Writer Corpus NE	Native Writer Corpus NL
Corpus size in words	86,501	72,601	36,277	35,177
Total number of CAs	1179	1060	462	423
CAs/10,000 words	136.30	146.00	127.35	120.25
Forms of CAs	59	64	49	55



The following tables display the raw frequency of the most common occurring CAs in each corpus and the percentage of the overall CAs used, in order of frequency. The cumulative percentage is also provided.

Table 2 Most frequently used CAs by English native writers in the discipline of electrical/electronics engineering (NE)

Rank	CA	Raw	RF(%)	cumulative%
1	however	76	16.45	16.45
2	also	54	11.69	28.14
3	for example/instance	38	8.23	36.36
4	then(E)	34	7.36	43.72
5	thus	30	6.49	50.22
6	finally	22	4.76	54.98
7	therefore	20	4.33	59.31
8	hence	17	3.68	62.99
9	first/firstly	15	3.25	66.23
10	moreover	14	3.03	69.26
11	Furthermore	11	2.38	71.65

NOTE: then(E): Enumerative *then*; RF: raw frequency

Table 2 shows that the most frequently used CA is *however*, which alone hits a fairly high percentage in the overall frequency in NE (i.e. 16.45%). The top ten CAs account for 69.26% of the total occurrences. The CAs accounting for 2% or more amount to 71.65% of the occurrences. This indicates that English native writers in the discipline of electrical/electronics engineering used a limited number of types of CAs in the introduction section of their academic writing.

Table 3 Most frequently used CAs by English native writers in the discipline of Linguistics/TESOL (NL)

Rank	CA	Raw	RF(%)	cumulative%
1	also	76	17.97	17.97
2	however	47	11.11	29.08
3	for example/instance	36	8.51	37.59
4	then(E)	30	7.09	44.68
5	thus	27	6.38	51.06
6	first/firstly	21	4.96	56.03
7	finally	13	3.07	59.10
8	rather	12	2.84	61.94
9	in general	10	2.36	64.30
10	therefore	9	2.13	66.43
11	that is (to say)	9	2.13	68.56

Results from Table 3 show that the most frequently occurring CA in NL is *also*, which represents 17.97 % of all the CAs in the corpus, and *however* is the second favored one. The top ten account for over 60% (i.e. 66.43%), and the CAs accounting for more than 2% amount to 68.56% of the occurrences. As the same case of NE, English native writers in the discipline of Linguistics/TESOL also used a narrow range of CAs.

NE and NL tend to use a similar set of high-frequency CAs. 8 of 10 most frequently used CAs employed by NE are also among the first ten high-frequency ones used by NL, that is, *however*, *also*, *for example/instance*, *then(E)*, *thus*, *therefore*, *finally*, *first/firstly*. Moreover, the ranking for the top five frequently used CAs from both groups is the same — *however*, *also*, *for example/instance*, *then(E)*, and *thus*.

Table 4 Most frequently used CAs by Taiwanese writers in the discipline of electrical/electronics engineering (TE)

Rank	CA	Raw	RF(%)	cumulative%
1	also	209	17.73	17.73
2	however	165	13.99	31.72
3	therefore	106	8.99	40.71
4	then(E)	84	7.12	47.84
5	finally	64	5.43	53.27
6	for example/instance	62	5.26	58.52
7	still	49	4.16	62.68
8	thus	46	3.90	66.58
9	furthermore	36	3.05	69.64
10	hence	31	2.63	72.26
11	further	31	2.63	74.89
12	first/firstly	30	2.54	77.44
13	moreover	25	2.12	79.56

Table 4 also shows that certain CAs are used obviously more often than others. The most frequent one in TE is still *also*, which represents 17.73% of the occurrences. In addition, the second commonly used CA, *however*, also represents a high percentage in the overall frequency (13.99%). The first ten most frequently used CAs account for 72.26% of the total, and the CAs accounting for 2% or more amount to 79.56% of the occurrences. Compared to the case of English native writers, Taiwanese writers used a narrower set of CAs and were only limited to certain words in their academic articles on electrical/electronics engineering.

TE and NE are also similar in the most frequently used CAs they employed, as can be seen in the fact that 8 of the 10 high-frequency ones are used by both groups, despite slight variation in ranking. The eight CAs are *however*, *also*, *for example/instance*, *then(E)*, *thus*, *therefore*, *finally*, and *hence*.

The analysis shows that a large number of connective occurrences are accounted for by only a few CAs. Table 5 reveals that *also* and *however* are the two most preferred CAs by Taiwanese writers in the discipline of Linguistics/TESOL (16.42% and 11.04%), just the same



as TE and NL. The ten most frequently used CAs account for 63.49% of occurrences. The top 16 accounting for more than 2% amount to 78.02% of the occurrences. Like TE, Taiwanese writers in TL used a very limited range of CAs in their linguistics/TESOL-related journal articles as well.

Table 5 Most frequently used CAs by Taiwanese writers in the discipline of Linguistics/TESOL (TL)

Rank	CA	Raw	RF(%)	cumulative%
1	also	174	16.42	16.42
2	however	117	11.04	27.45
3	thus	79	7.45	34.91
4	for example/instance	69	6.51	41.42
5	therefore	54	5.09	46.51
6	in addition	45	4.25	50.75
7	first/firstly	38	3.58	54.34
8	further	36	3.40	57.74
9	that is (to say)	31	2.92	60.66
10	then(E)	30	2.83	63.49
11	still	30	2.83	66.32
12	moreover	27	2.55	68.87
13	finally	25	2.36	71.23
14	on the other hand	25	2.36	73.58
15	namely(viz)	25	2.36	75.94
16	second/secondly	22	2.08	78.02

TL and TE used a similar pool of high-frequency CAs, as proved by the fact that both groups share six CAs among the ten most commonly used ones, i.e. *however*, *also*, *for example/instance*, *then(E)*, *thus*, and *therefore*. Likewise, there are similarities between TL and NL, as 7 of the 10 most frequent CAs used by TL are also among the top 10 high-frequency ones employed by NL, namely, *however*, *also*, *for example/instance*, *then(E)*, *thus*, *therefore*, and *first/firstly*.

The similarities between English native writers and Taiwanese EFL/ESL students can be found in terms of the most frequently used CAs in the four corpora. First, the top 10 most commonly used CAs account for more than 63% of all the CAs used in the four sets of writing.

Moreover, the CAs accounting for 2% or more amount to more than 68% of the occurrences, much higher in TE (79.56%) and in TL (78.02%) in particular. These findings show that the four groups of writers depend heavily on a rather small range of CAs in their academic journal articles, especially written by Taiwanese graduate students. In other words, Taiwanese writers use a more limited set of CAs in their journal articles than native writers. Second, *also* and *however* are the two most commonly used CAs in the four corpora, which closely conforms to the previous research (e.g., Wu, 2005; Shen, 2005; Chen, 2006). Third, the high-frequency CAs used by the four groups are fairly similar, as can be seen from the fact that 6 of the 10 most frequently used CAs in the four groups are the same, namely, *however*, *also*, *for example/instance*, *then*, *thus*, and *therefore*. These results indicate that Taiwanese graduate students' performance in the use of high-frequency CAs is quite similar to English native students' in writing academic papers.

4.2 Semantic types of CAs

The Taiwanese writers' and English native writers' use of CAs in semantic categories are examined in the current study, and the comparison of the semantic types of CAs among the four groups of writers are made for study. The frequency of semantic types of CAs by English native writers and Taiwanese writers are presented in the following tables which contain the raw frequencies and the per 10,000 word frequencies of each semantic category. The discrepancies per 10,000 words suggest that some semantic relations are more favored by Taiwanese writers while other semantic relations are less preferred. The discrepancies further tested by chi-square indicates no significant differences ($p < .01$).

Table 6 Types of CAs used by writers in the discipline of electrical/electronics engineering (NE vs. TE)

Category	Native writers (NE)		Taiwanese writers (TE)		Discrepancy TERF-NERF	Per 10,000 words discrepancy RF/10,000 (TE-NE)
	RF	RF/10,000	RF	RF/10,000		
<i>Contrast</i>	115	31.71	271	31.34	156	-0.37
<i>Addition</i>	107	29.51	334	38.60	227	9.09
<i>Result/Inference</i>	93	25.64	236	27.27	143	1.63
<i>Enumeration</i>	80	22.04	196	22.77	116	0.73
<i>Apposition</i>	42	11.58	86	9.95	44	-1.63
<i>Transition</i>	11	3.04	11	1.27	0	-1.77
<i>Summation</i>	9	2.48	27	2.72	18	0.24
<i>Corroboration</i>	5	1.38	18	2.07	13	0.69
Total	462	127.35	1179	136.30	717	8.95

NOTE: $\chi^2=1.99747$, $df=7$, $p<.01$

Table 7 Types of CAs used by writers in the discipline of Linguistics/TESOL (NL vs. TL)

Category	Native writers (NL)		Taiwanese writers (TL)		Discrepancy	Per 10,000 words discrepancy
	RF	RF/10,000	RF	RF/10,000	TLRF-NLRF	RF/10,000 (TL-NL)
<i>Addition</i>	108	30.7	322	44.36	214	13.66
<i>Contrast</i>	94	26.73	239	32.93	145	6.2
<i>Enumeration</i>	75	21.32	130	17.9	55	-3.42
<i>Apposition</i>	52	14.78	136	18.73	84	3.95
<i>Result/Inference</i>	52	14.79	162	22.31	110	7.52
<i>Corroboration</i>	19	5.39	39	5.38	20	-0.01
<i>Summation</i>	17	4.81	15	2.08	-2	-2.73
<i>Transition</i>	6	1.7	17	2.34	11	0.64
Total	423	120.22	1060	146.00	637	25.75

NOTE: $\chi^2=4.13836$, $df=7$, $p<.01$

By analyzing the IEEE journal articles in the two corpora NE and TE, this study demonstrated that both groups of writers used additives and contrastives most frequently in academic writing (see Table 6). The discrepancies per 10,000 words indicate that the semantic relations more strongly favored by Taiwanese electrical/electronics engineering writers, from the most frequent to the least, are *Addition*, *Result/Inference*, *Enumeration*, *Corroboration*, and *Summation*. The not-so-favored semantic relations include: *Transition*, *Apposition*, and *Contrast*.

Similar to the use of CAs by graduate electrical/electronics engineering students, additives and contrastives are also used most frequently in both English native and Taiwanese linguistics/TESOL students' academic journal articles, as illustrated in Table 7. The discrepancies per 10,000 words indicate that compared to the usage of CAs by NL, the semantic relations much preferred by TL, from the most frequent to the least, are *Addition*, *Result/Inference*, *Contrast/Concession*, *Apposition*, and *Transition*. The less favored semantic relations include: *Enumeration*, *Summation*, and *Corroboration*.

From the per 10,000 word discrepancies in Table 6 and 7, we found that *Addition* and *Result/Inference* are the two most favored semantic types of CAs in English journal papers written by Taiwanese graduate students either in electrical/electronics engineering or linguistics/TESOL discipline (9.09/13.66; 1.63/7.52).

Disciplinary variation can further be observed by comparing NE with NL, TE with TL according to per 10,000 words discrepancy. Results from Table 8 and 9 show that *Result/Inference* type of CAs is strongly favored by both English native and Taiwanese graduate

students in their IEEE journal papers, but, on the contrary, used least frequently in linguistics/TESOL-related journal articles (-10.85 and -4.96). *Appositive* CAs are, by contrast, much preferred by native English-speaking and Taiwanese writers in the discipline of Linguistics/TESOL (3.2 and 8.78).

The similarities in the types of CAs between TE and TL can be seen from Table 9. For example, the ranking of the top three semantic types used by both groups of writers is the same, i.e. *Addition*, *Contrast/Concession*, and *Result/Inference*. With the further investigation in detail, the results present that four most frequent CAs in the *Contrast/Concession* category in both corpora are *however*, *still*, *on the other hand*, and *nevertheless/nonetheless* in order, and the top five additive CAs are the same, that is, *also*, *furthermore*, *further*, *moreover*, and *in addition*. These findings indicate that advanced Taiwanese EFL learners have a similar preference for certain CAs in English academic writing.

4.3 The top 10 CAs more favored by Taiwanese writers

The top ten CAs more favored by TE and TL were also examined in the current study, with their raw frequencies and their occurrences per 10,000 words, arranged in order of discrepancy. The chi-square test shows the per 10,000 word discrepancies between the two groups of writers are not significant ($p<.01$).

By comparing TE with NE and TL with NL, the current study manifested that Taiwanese writers, either with linguistics/TESOL or with electrical/electronics engineering major, were both more inclined to use certain CAs in academic writing than native writers did (e.g., *therefore*, *further*, *still* and *also*), as shown in Table 10



and 11. The extent to which *also* and *therefore* were overused ones.
overused by TE are far more noticeable than other

Table 8 Types of CAs used by English native writers (NE vs. NL)

Category	Native EE writers (NE)		Native linguistics/ TESOL writers (NL)		Discrepancy	Per 10,000 words discrepancy
	RF	RF/10,000	RF	RF/10,000		
<i>Contrast</i>	115	31.71	94	26.73	-21	-4.98
<i>Addition</i>	107	29.51	108	30.7	1	1.19
<i>Result/Inference</i>	93	25.64	52	14.79	-41	-10.85
<i>Enumeration</i>	80	22.04	75	21.32	-5	-0.72
<i>Apposition</i>	42	11.58	52	14.78	10	3.2
<i>Transition</i>	11	3.04	6	1.7	-5	-1.34
<i>Summation</i>	9	2.48	17	4.81	8	2.33
<i>Corroboration</i>	5	1.38	19	5.39	14	4.01
Total	462	127.35	423	120.25	-39	-7.1

NOTE: $\chi^2=7.05765$, $df=7$, $p<.01$

Table 9 Types of CAs used by Taiwanese writers (TE vs. TL)

Category	Taiwanese EE writers (TE)		Taiwanese linguistics/ TESOL writers (TL)		Discrepancy	Per 10,000 words discrepancy
	RF	RF/10,000	RF	RF/10,000		
<i>Contrast</i>	271	31.34	239	32.93	-32	1.59
<i>Addition</i>	334	38.60	322	44.36	-12	5.76
<i>Result/Inference</i>	236	27.27	162	22.31	-74	-4.96
<i>Enumeration</i>	196	22.77	130	17.9	-66	-4.87
<i>Apposition</i>	86	9.95	136	18.73	50	8.78
<i>Transition</i>	11	1.27	17	2.34	6	1.07
<i>Summation</i>	27	2.72	15	2.08	-12	-0.64
<i>Corroboration</i>	18	2.07	39	5.38	21	3.31
Total	1179	136.30	1060	146.00	-119	9.7

NOTE: $\chi^2=5.72943$, $df=7$, $p<.01$

Table 10 Top ten CAs more favored by Taiwanese writers in the discipline of electrical/electronics engineering

CA	Taiwanese Writers(TE)		Native Writers(NE)		TE-NE(10,000 words)
	Raw	RF/10,000	Raw	RF/10,000	
<i>also</i>	209	24.16	54	14.89	9.27
<i>therefore</i>	106	12.25	20	5.51	6.74
<i>still</i>	49	5.66	8	2.21	3.45
<i>further</i>	31	3.58	7	1.93	1.65
<i>that is (to say)</i>	14	1.62	0	0	1.62
<i>finally</i>	64	7.40	22	6.06	1.34
<i>in general</i>	23	2.66	5	1.38	1.28
<i>on the other hand</i>	17	1.97	3	0.83	1.14
<i>furthermore</i>	36	4.16	11	3.03	1.13
<i>besides</i>	6	0.69	0	0	0.69

NOTE: $\chi^2=2.43549$, $df=9$, $p<.01$

Table 11 Top ten CAs more favored by Taiwanese writers in the discipline of linguistics/TESOL

CA	Taiwanese Writers(TL)		Native Writers(NL)		TL-NL(10,000 words)
	Raw	RF/10,000	Raw	RF/10,000	
<i>in addition</i>	45	6.20	4	1.14	5.06
<i>therefore</i>	54	7.44	9	2.56	4.88
<i>further</i>	36	4.96	3	0.85	4.11
<i>thus</i>	79	10.88	27	7.68	3.20
<i>however</i>	117	16.12	47	13.36	2.76
<i>still</i>	30	4.13	6	1.71	2.42
<i>also</i>	174	23.97	76	21.61	2.36
<i>namely(viz)</i>	25	3.44	4	1.14	2.30
<i>second/secondly</i>	22	3.03	3	0.85	2.18
<i>nevertheless/nonetheless</i>	19	2.62	2	0.57	2.05

NOTE: $\chi^2=7.51198$, $df=9$, $p<.01$



These findings are similar to previous studies, as *therefore*, *besides*, *in addition*, *nevertheless/nonetheless*, *also*, *that is (to say)*, and *second/secondly* were on Wu's (2005) and Shen's (2005) top 10 list of the most favored CAs by Taiwanese writers.

4.4 The top 10 CAs less favored by Taiwanese writers

As for the less applied CAs, the top ten CAs less favored by TE and TL were presented in the following tables.

The per 10,000 word discrepancies in Table 12 and 13 present *for example/instance* is less favored by Taiwanese writers than native writers in the introduction sections of their academic journal papers, especially on electrical/electronics engineering (-3.30). In addition, the enumerative CA *then* is least frequently used in linguistics/TESOL-related international journal articles written by Taiwanese graduate students (-4.40). Those less favored CAs also on the top 10 less preferred ones in Wu's (2005) and Shen's (2005) studies were *for example/instance*, *rather*, *however*, and *in/by contrast*.

Although these CAs were not significantly underused ($p < .01$), results from Table 12 and 13 demonstrate some differences between the native and non-native uses.

Additionally has only one instance in TE and TF but 7 occurrences in NE. In English writing, *additionally* as a CA is often treated as an alternative expression of *in addition*. We found Taiwanese students are inclined to employ *in addition* rather than *additionally* to add another fact to what has been stated, as proved by the fact that *in addition* is the most favored CA by Taiwanese graduate students in linguistics/TESOL program. Taiwanese linguistics/TESOL writers use *in addition* more often than native writers by 5.06 tokens per 10,000 words (see Table 11). This finding suggests Taiwanese writers employ fewer alternative expressions and resort to those high-frequency CAs in academic writing, however. Lorenz (1999) claimed EFL writers, due to their exposure to high-frequency connectors, may amplify the high-frequency connectors while underusing less frequent ones. This might be due to their unfamiliarity with the use of some CAs.

Table 12 Top ten CAs less favored by Taiwanese writers in the discipline of electrical/electronics engineering

CA	Taiwanese Writers(TE)		Native Writers(NE)		TE-NE(10,000 words) discrepancy
	Raw	RF/10,000	Raw	RF/10,000	
for example/instance	62	7.17	38	10.47	-3.30
thus	46	5.32	30	8.27	-2.95
however	165	19.07	76	20.95	-1.88
additionally	1	0.12	7	1.93	-1.81
otherwise	1	0.12	5	1.38	-1.26
instead	4	0.46	6	1.65	-1.19
hence	31	3.58	17	4.69	-1.11
in contrast/by contrast	1	0.12	4	1.10	-0.98
moreover	25	2.89	14	3.86	-0.97
now	0	0	3	0.83	-0.83

NOTE: $\chi^2=3.87538$, $df=9$, $p<.01$

Table 13 Top ten CAs less favored by Taiwanese writers in the discipline of linguistics/TESOL students

CA	Taiwanese Writers(TL)		Native Writers(NL)		TL-NL(10,000 words) discrepancy
	Raw	RF/10,000	Raw	RF/10,000	
then(E)	30	4.13	30	8.53	-4.40
rather	4	0.55	12	3.41	-2.86
in general	8	1.10	10	2.84	-1.74
at least	2	0.28	5	1.42	-1.14
indeed	10	1.38	8	2.27	-0.89
conversely	0	0.00	3	0.85	-0.85
first/firstly	38	5.23	21	5.97	-0.74
consequently	3	0.41	4	1.14	-0.73
for example/instance	69	9.50	36	10.23	-0.73
at the same time	3	0.41	4	1.14	-0.73

NOTE: $\chi^2=3.5615$, $df=9$, $p<.01$



Similarly, Taiwanese electrical/electronics engineering students use *otherwise* and *in/by contrast* less frequently than native writers by 1.26 tokens per 10,000 words and 0.98, respectively, and these two CAs occur only once in TE. *Conversely* is never used by Taiwanese linguistics/TESOL writers but rather applied more commonly by native writers by 0.85 items per 10,000 words. The relatively lower frequency of these CAs shows non-native students do not have a good control over the vocabulary necessary for their academic writing and rely heavily on a rather limited set of CAs.

Rather is the second least used CA by Taiwanese linguistics/TESOL writers by 2.86 tokens per 10,000 words. The highest discrepancy demonstrates Taiwanese EFL learners are unfamiliar with the usage of *rather* as a contrastive CA and are thus less confident in using *rather* to mark contrasts between ideas. In order not to run the risk of making mistakes, they do not use *rather* in their writing instead.

4.5 The top 10 CAs more/less favored by linguistics/TESOL writers

As we made a comparison of CA usage between TL and

TE and then NL and NE, some disciplinary variation can be observed in terms of the discrepancies per 10,000 words. Results from Table 14 and 15 indicate *that is (to say)*, *first/firstly*, and *in fact* are much more favored by both English native and Taiwanese linguistics/TESOL graduate students than electrical/electronics engineering students. *However*, *hence*, *therefore*, *thereby* and *finally* are, in contrast, more favored by both native and non-native electrical/electronics engineers, as shown in Table 16 and 17.

As presented in Table 8 and 9, the disciplinary difference is confirmed by Table 16 and 17, suggesting that both native and non-native speaker graduate students in electrical/electronics engineering discipline have a great preference for the CAs in Result/Inference type such as *hence*, *therefore*, *thereby* in their academic writing. Of the top ten strongly favored CAs by either TE or NE, 4 are resultives. On the other hand, *however* and *finally* are the other two CAs which are less preferred by both native and nonnative linguistics/TESOL writers when writing the introduction of their journal articles.

Table 14 Top ten CAs more favored by Taiwanese linguistics/TESOL writers

CA	Taiwanese Writers (TL)		Taiwanese Writers (TE)		TL-TE (10,000 words)
	Raw	RF/10,000	Raw	RF/10,000	
thus	79	10.88	46	5.32	5.56
in addition	45	6.20	20	2.31	3.89
namely(viz)	25	3.44	3	0.35	3.09
that is (to say)	31	4.27	14	1.62	2.65
for example/instance	69	9.50	62	7.17	2.33
first/firstly	38	5.23	30	3.47	1.76
second/secondly	22	3.03	11	1.27	1.76
in fact	15	2.07	4	0.46	1.61
nevertheless/nonetheless	19	2.62	9	1.04	1.58
yet	15	2.07	5	0.58	1.49

NOTE: $\chi^2=2.59287$, $df=9$, $p<.01$

Table 15 Top ten CAs more favored by English native linguistics/TESOL writers

CA	Native Writers (NL)		Native Writers (NE)		NL-NE (10,000 words)
	Raw	RF/10,000	Raw	RF/10,000	
also	76	21.61	54	14.89	6.72
rather	12	3.41	2	0.55	2.86
that is (to say)	9	2.56	0	0	2.56
first/firstly	21	5.97	15	4.13	1.84
indeed	8	2.27	2	0.55	1.72
in general	10	2.84	5	1.38	1.46
in fact	5	1.42	0	0	1.42
at least	5	1.42	1	0.28	1.14
similarly	6	1.71	3	0.83	0.88
on the other hand	6	1.71	3	0.83	0.88

NOTE: $\chi^2=4.21295$, $df=9$, $p<.01$

Table 16 Top ten CAs less favored by Taiwanese linguistics/TESOL writers

CA	Taiwanese Writers (TL)		Taiwanese Writers (TE)		TL-TE (10,000 words) discrepancy
	Raw	RF/10,000	Raw	RF/10,000	
then(E)	30	4.13	84	9.71	-5.58
therefore	54	7.44	106	12.25	-4.81
finally	25	3.44	64	7.40	-3.96
however	117	16.12	165	19.07	-2.95
hence	7	0.96	31	3.58	-2.62
furthermore	16	2.20	36	4.16	-1.96
in general	8	1.10	23	2.66	-1.56
still	30	4.13	49	5.66	-1.53
thereby	2	0.28	11	1.27	-0.99
as a result/consequence	3	0.41	9	1.04	-0.63

NOTE: $\chi^2=2.57923$, $df=9$, $p<.01$

Table 17 Top ten CAs less favored by English native linguistics/TESOL writers

CA	Native Writers (NL)		Native Writers (NE)		NL-NE (10,000 words) discrepancy
	Raw	RF/10,000	Raw	RF/10,000	
however	47	13.36	76	20.95	-7.59
hence	2	0.57	17	4.69	-4.12
therefore	9	2.56	20	5.51	-2.95
finally	13	3.70	22	6.06	-2.36
additionally	1	0.28	7	1.93	-1.65
moreover	8	2.27	14	3.86	-1.59
otherwise	0	0.00	5	1.38	-1.38
then(R)	1	0.28	6	1.65	-1.37
thereby	2	0.57	7	1.93	-1.36
in addition	4	1.14	9	2.48	-1.34

NOTE: then(R): Resultive *then*; $\chi^2=3.39105$, $df=9$, $p<.01$

V. DISCUSSION

Although the chi-square test indicated that the discrepancies of each CA between the four groups of writers did not reach significant differences, our qualitative analysis did demonstrate that Taiwanese writers to some extent deviated from English native writers in the use of some CAs. Our analysis also yields disciplinary variation between electrical/electronics engineering writers and linguistics/TESOL writers concerning the use of CAs.

5.1 Insensitivity to registers

In this research, we found that Taiwanese writers were less sensitive to the register use of certain CAs, for example, the inappropriate choice of register of *besides* in academic writing.

5.1.1 Besides

It is noteworthy that the additive CA *besides* is used by Taiwanese EFL learners while not used at all by English native writers in this study, the same result as Chen's (2006). It occurs 6 times in TE and 4 times in TL. In fact, *besides* is among the top 10 most overused CAs by

Taiwanese graduate electrical/electronics engineering students. Field and Yip (1992) investigated the use of *besides* in Hong Kong students' writing. They regarded *besides* as an informal connector which is used more often in speech but not in writing (ibid.:26). Shen (2005) and Chen (2006) also found that advanced Taiwanese EFL learners used *besides* in their academic writing, which gives an unintended colloquial tone to the academic paper (Chen, 2006, p.124). Since the register of academic journal articles is formal, the use of *besides* is not register-appropriate and should be avoided. In this study, the use of *besides* in Taiwanese students' academic journal papers suggests that some of the students seem to be unaware of the inappropriateness of using *besides* in their formal academic writing and even do not know *besides* occurs commonly in informal register.

Field and Yip (1992) further indicated that *besides* is sometimes misused to "weld together points which do not fit together coherently" (ibid.:27), which is another reason to avoid using *besides* in formal writing. Such misuse of *besides* is also identified in our data.



1. TL038

The topic of teaching grammatical rules with either an inductive, or with a deductive approach has drawn much attention and generated much controversy over the past few decades. Some researchers point out that the deductive approach, rules first and then examples, is more logical than the inductive one and it helps learners obtain more complete grammatical knowledge. In addition, through the deductive approach, learners are able to acquire concepts lacking in their native language that cannot be made readily apparent with only a few examples. However, Shaffer (1989) indicated that one problem arising from deduction is that many students may not accurately apply what they have learned in their language use because of not having fully understood the target concept. Furthermore, the approach focuses too much on rules rather than on meanings. Thus, learners tend to become passive rather than active participants in the learning process. Besides, learners benefit from an inductive approach in which they discover and formulate the underlying grammatical rules by themselves. This cognitive depth leads to longer and better retention of the knowledge. The process of discovering could also be more interesting.

The use of *besides* is incorrect in the above passage, as it connects two sentences with different and contrastive topics, i.e. the first one focuses on the disadvantages of deductive approach while the second one shifts the focus to the advantages of inductive approach. The use of *besides* should be replaced with *on the other hand*. Such misuse impedes the coherence of the passage.

In the current study, it is found that the use of *besides* by advanced Taiwanese EFL learners in academic writing is attributable to students' insensitivity to registers and then misuse. As stated earlier, the results of the present research show that native writers do not employ *besides* in their writing, further discouraging the use of *besides* in academic writing. This is supported by Shen's (2005) and Chen's (2006) findings. Therefore, "on two accounts, its informality and its misuse, it would be best to discourage the use of *besides* in essay writing" (Field and Yip, 1992, p.27).

5.1.2 Actually

In addition to *besides*, Chen (2006:126) indicated that *actually* is another informal CA which is not appropriate in formal essay writing; however, it is found to be used in academic articles by both Taiwanese writers and English native writers in the current study. It occurs 6 times in TE (RF/10,000: 0.69), 11 times in TL (RF/10,000: 1.52), and also 2 times in NE (RF/10,000: 0.55) and 3 times in NL (RF/10,000: 0.85). This presents the register distinction of certain CAs seem to be not so clear-cut and rigid for both non-native and native student writers.

5.2 Misuse of *therefore*

Another problem identified in Taiwanese EFL learner corpora involves the use of *therefore*. The results of our analysis demonstrate that *therefore* is the second CA much more favored by Taiwanese writers than native writers by 6.74 and 4.88 instances per 10,000 words, in line with Wu's (2005) and Shen's (2005) findings. However, a careful examination of Taiwanese students' academic articles reveals that some students do not use *therefore* appropriately and use it to signal causal relationship in discourse where no such logical link exists at all. This finding is confirmed by Shen's (2005) and Chen's (2006) studies, which showed that some Taiwanese EFL learners used *therefore* merely as "surface-level filler" (Crewe, 1990, p. 321). In Crewe's (1990) research on Hong Kong students' writing, he observed that the writers seem to be trying to "impose surface logicity on a piece of writing where no deep logicity exists" (ibid.:320). Garton (1996) also pointed out that when second language learners attempt to employ CAs to draw conclusions, they tend to overgeneralize and overuse the cause-effect relationship inappropriately in situations, "where there may be no logical conclusion being drawn at all" (ibid.:8). Such misuse of *therefore* by Taiwanese writers can be found in the following example:

2. TL024

Lexical use is an area where L2 learners frequently demonstrate a number of errors. Many L2 learners rely on dictionaries and thesauri to provide denota-



tional meaning of a lexical item without being aware of the subtle implications embedded in contexts. Implicit knowledge of lexical items is not easily taught. Semantic infelicities due to inappropriate lexical use leads to miscommunication and unfavorable social consequences. Therefore, misuse of lexical items, particularly among near synonyms, calls for more attention and treatment in L2 lexical learning.

The writer attempts to explain that the implications embedded in contexts and implicit knowledge of lexical items are essential to the appropriate lexical use. However, this can not lead readers to the conclusion that the misuse of lexical items, especially for near synonyms, arouses more attention in L2 learning. The use of *therefore* is ineffective and also confusing to readers since the ideas are overtly linked by the use of *therefore*, but no cause-effect relationship actually exists.

5.3 Overuse of CAs

Similar to Shen (2005) and Chen (2006), some Taiwanese EFL learners in this study are also found to mark overtly the connectedness between sentences and unnecessarily clutter up the text with too many connectors, as shown in Example (1). Six CAs are used in a total of eight sentences. Such excessive use of connectors will hinder the flow of the argument and make the text sound rather fragmented and awkward.

5.4 Unfamiliarity with certain CAs

Some advanced Taiwanese EFL learners resort to a limited set of CAs when writing their academic journal articles, and are more inclined to employ those which are familiar to them. In this study, certain formal CAs such as *rather* and *thereby* are found to be used less frequently by Taiwanese EFL learners. *Rather* is the second less commonly occurring CA by Taiwanese graduate linguistics/TESOL students (see Table 13), and *thereby* is underused by both groups of Taiwanese writers. The possible reasons may be that the students are not familiar with those CAs which occur less frequently in our data and cannot be very sure of their meanings and uses. Such sporadic use confirms that Taiwanese graduate students do not use a wide range of relevant vocabulary and the ability of the students to use CAs is

not good enough to help create coherence by means of varied lexical items in their academic writing.

5.5 Disciplinary variation

On closer examination, the semantic types of CAs displayed the intra-disciplinary variability. Results from Table 8 and 9 demonstrate that English native and Taiwanese graduate electrical/electronics engineering students tend to use more resultive CAs to mark cause-effect relationship while linguistics/TESOL students prefer appositive CAs to signal reformulation relations in the introduction section of their English academic articles, as shown in the following excerpts.

3. TE016

While the use of raw RF data is attractive and has numerous advantages, it also has a few drawbacks. First, the sampling rate of the RF data must be very high. The amount of data stored and processed is, thus, much larger than that of image data. Furthermore, nonstandard equipment configuration may be required. Hence, if the distortions caused by B-scanned video image can be rectified, the gray-level distribution of a B-scan image characterizes liver tissues adequately.

The use of resultive CA *thus* and *hence* in the above passage help writers to establish a causal relationship. Since academic articles on electrical/electronics engineering focus on inferential process and causal connections, resultive CAs are thus strongly favored in IEEE journal articles.

4. TL043

In addition to being disruptive or collaborative, interruptions can sometimes be neutral, not being particularly associated with rapport nor constituting violations of the rights of others. For example, one might interrupt because of a problem with the communicative process, that is, one's failure in understanding what the speaker is saying.

In Example (4), the writer use *for example* to provide evidence to support her arguments. It is crucial for writers to give sufficient examples in their academic writing to make their arguments explicit and convincing and consequently readers are more likely to comprehend the



work. *That is* is regarded as a reformulation marker, which is used to restate what has been mentioned in the preceding clause/sentence. Linguistics/TESOL-related academic articles are typically “more interpretative and less abstract” (Hyland, 1999, p.115), emphasizing the discussion of reformulation relations, because they involve a lot of clarifications, and “the context often has to be elaborated anew” (ibid.:110). In order to explain an abstract concept or make the idea clarified, the writer will use reformulation strategies.

VI. CONCLUSION

On a large-scale, corpus-based study, both English native and Taiwanese graduate students in the current study were found to have a similar performance in the use of most frequently used CAs when writing their academic journal articles. Some differences are, however, observed from the quantitative and qualitative analysis. Non-native student writers slightly overuse CAs and are apt to depend on a narrower range of CAs than native writers. With respect to the disciplinary variation, students majoring in linguistics or TESOL seem to have a better command of CAs than electrical/electronics engineering students do. Additionally, appositive CAs are used more frequently to mark reformulation relations in the introduction section of linguistics/TESOL-related journal articles while resultive CAs are applied more often in IEEE journal papers to establish a causal relationship. A few problems were uncovered under investigation. Many CAs such as *additionally*, *on the contrary*, *conversely*, *alternatively*, *otherwise* do not occur frequently or merely occur once or twice in the Taiwanese students' writing. This demonstrates that Taiwanese graduate students use these forms sporadically. It seems that Taiwanese EFL learners do not have a good command of vocabulary necessary for their academic studies, and the CA usage is limited only to certain words. More precisely, the non-native students appear to be not good at using different and varied lexical items as connectors to signal sentential/causal relations. This also implies that the EFL writers even at an advanced level do not have enough confidence in using CAs in their academic articles. The possible reasons may be that the students are not familiar with the

meanings and uses of those CAs which occur less frequently in our data, and thus cannot know how to use them appropriately.

CAs are an important problem area for non-native speakers of English which is worthy of further investigation and instructional attention. The results of our research have some direct impacts on scientific or academic English teaching in the classroom, and they can help teachers in their course design, textbook selection, teaching assessment as well. In this paper, I have discussed the efficiency of CAs used by Taiwanese graduate students in writing their English academic articles. Information of this sort would provide textbook writers and teachers with a more principled basis on which to select the forms to be included in their ESL/EFL materials. The results also suggest that non-native writers need more help with their use of CAs. The teacher should emphasize the use of those CAs with which Taiwanese graduate students are less familiar.

Another problem is that *besides* is used as an additive CA by Taiwanese student writers. *Besides* should be used in speech/colloquial contexts and thus inappropriate in formal essay writing. Such misuse of *besides* in academic writing may be due to the fact that some of the EFL learners are insensitive to register differences. Teachers need to assist learners to develop an awareness of register restriction of certain CAs.

Taiwanese graduate students in the current study were also found to have problems with causal CAs. Students do not always use *therefore* appropriately. They often misuse it to connect sentences which lack causal relationship, resulting in incoherence and confusion to readers. Teachers need to train students to “think through their argument before deciding on how it might be reinforced with logical connectives” (Crewe, 1990, p. 324). The use of CAs in academic world is a necessary and vitally important skill which should be seen as a tool for making ideas coherent, and be taught to the students in order to assist them in their studies and professional careers.

In this study, I examine CAs only in the introduction section of academic articles, owing to the time limita-

tion. For future research, the full journal papers can be used as the writing samples in the corpora to explore whether the frequency and category of CAs used are different from the current study. In addition, there is certainly space for more research concerning the use of CAs in different fields. Our study focuses on the usage of CAs in linguistics/TESOL and electrical/electronics engineering disciplines. Comparisons of disciplines in terms of the use of CAs would be most welcome in order to know more about the differences of CAs in different disciplines.

NOTE

1. It is noted that *and*, *but* and *so* were treated as CAs only when they are placed in sentence-initial position, which function as adjunct to a sentence.
2. Most of the writers of academic journal articles we compiled for our corpora were PhD students, who were asked to publish their research papers in academic journals. Taiwanese student writers, electrical engineering students in particular, tend to treat their advisors as the first author of their journal articles for respect and academic morality.

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學術期刊論文中連接副詞之探討

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摘 要

本研究旨在探討英語為外國語的台灣研究生在撰寫語言學與英語教學和電機電子學術期刊論文的緒論時，使用英語連接副詞和英語為母語的研究生有何差異。研究分析的語料是由作者收集編輯而成的四個語料庫。台灣學生語料庫各收集 100 篇學術論文，而英語為母語的學生語料庫則各包含 50 篇的期刊論文。本研究運用語料庫大量語料的特色採取量化研究，研究結果顯示台灣研究生與母語研究生一般，傾向於使用固定種類的連接副詞，而台灣研究生尤其侷限於較常使用的連接副詞。從質性分析所得的結果，研究發現台灣研究生誤用 *besides* 和 *therefore* 等連接副詞，而且在一些較不熟悉的連接副詞使用上也有問題。在四組語料的交叉對比分析之下顯示出連接副詞在不同學科領域的使用差異。本研究結果對於科技英文與學術英文的教學上有實質的助益並可幫助學生在學術寫作上更能正確使用連接副詞。

關鍵詞：連接副詞、以語料庫為本的研究、學術寫作、領域差異

