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Variation of Sentence Connectors as Logical Devices in Abstracts

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Abstract- This study was an attempt to examine the category and frequency of sentence connectors in research articles' abstracts of two disciplines of Applied Linguistics and Electrical Engineering written by native English speakers (NES) and non-native English speakers (NNES). The corpus of eighty research articles that all taken from well-known refereed journals, are selected by scholars within two disciplines. Sentence connectors were identified and classified following the taxonomies of Quirk et al. model. In this model, taxonomies included connectors occurring both within and beyond the sentential level. The words were counted by Ant-Conc-3.4.1 software. The results indicated the sentence connectors in the two disciplines were differently used. The frequency of sentence connectors in Electrical Engineering articles was higher than that in the Applied Linguistics. As for the NES and NNES, the results demonstrated stylistic differences as well. So, writing style is not only a function of disciplinary distinctions but also a reflection of the writers' linguistic backgrounds.

Keyword- Discipline; Sentence connectors; Native speakers; Non-Native speakers.

1. INTRODUCTION

Writing has proven to be the most difficult language skill even for native speakers (Norrish, 1983)[27]. Apparently, it is more difficult than speaking since in written communication there is no additional means of help in terms of nonverbal cues (e.g. facial expression, gesture) to ensure that the message is accurately understood. Hence, it is very important for novice writers to write in a way that makes the message clear, succinct, and easily interpretable for the readers.

Nowadays, corpus-studies are superabundant in the field of Academic Writing, especially in those pedagogical approaches aimed at improving non-native English speakers (NNES) writing. For NNES, mastering academic genres is essential in order to be able to access the academic community. As most scholars point out such as (Swales, 1990)[40], the majority of the research done in Academic Writing has addressed the analysis and description of Academic English in order to set up pedagogical tools that would enable native and non-native speakers to improve their writing performance.

Genre Analysis as defined by Swales (1990)[40] provides, through both qualitative and quantitative methodology, a comprehensive description of a specific genre taking into account both detailed macrostructure and microstructure description of discourse features. Also, one of the main developments proposed by the field is to relate language description with a comprehensive insight of the communicative situations in which the genre is used (Hyland, 2007[20]; Swales & Leeder, 2012[42]; Swales & Feak, 1994[43]; Swales, 2004[41]; Swales, 1990[40]; Eggins & Martin, 1998[12]). In that line, linguistic analysis proceeds from a mere descriptive approach to evaluate language use and variation in context. knowledge of discursive and genre practices is essential in order to design appropriate pedagogical materials for students that are acquiring proficiency in Academic English and are trying to become future academics; in the case of NNES, who have, on the one hand, to acquire competence in L2 and, on the other, to be initiated as academic professionals, this demand is paramount.

A research article can be defined as a piece of writing described logically as certain phenomena of a field through a scientific research method. Generally, it can be divided into several parts, with an important part being abstract.

An abstract is a research tool (Porush, 1995)[31] that serves a "gate-keeping function" in helping readers decide if they want to invest more time in the rest of the paper. Abstracts are a briefing or summary about the whole articles, giving readers the first impression of the basic document and offering an important base to decide whether to continue reading or not. A poor abstract sometimes undermines the achievement of the main research. Writing good abstracts helps writers practice cognitively to shape up their own writing, to eliminate superfluous expression and to define the essence (Porush, 1995)[31]. Although abstracts take up the major part of professional and scientific papers, their study or methodology are not sufficient.

Academic writing and research article in particular has been the subject of considerable body of applied research aimed at underpinning the needs of non-native users of English wishing to study and publish in English (Swales 1990, 2004[40][41]; Hyland 1996, 2001, 2002[17][18][19]). Indeed academic writing requires conscious effort and practice in composing, developing, and analyzing ideas. In structuring information, the writer uses various types of knowledge, including discourse knowledge, understanding of audience, and sociolinguistic rules (O'Malley & Chamot, 1990)[30]. Organization at both the sentence and the text level is also important for effective communication of meaning, and ultimately, for the quality of the writing product (Scardamalia & Bereiter, 1987[38]; Jalilifar & Hayati & Mashhadi, 2012).

A written academic text in particular requires more than just the ability of the writers to construct sentences accurately in the standard language. It also needs an ability to use devices to create cohesion and coherence of a text. These cohesive devices have been referred to in the literature by such terms as cohesive elements (Halliday & Hasan, 1976)[15], logical connectors (Quirk et al., 1985)[33], linking adverbials (Biber et al., 1999)[6], conjunctive adverbials (Celce-Murcia & Larsen-Freeman, 1999)[9], connectives (Huddleston & Pullum, 2002)[16], and discourse connectors (Cowan, 2008)[10]. Discourse connectors (such as *therefore*, *however*, *instead*) have been shown to facilitate comprehension, especially when used appropriately.

Cohesion and coherence are two factors in the English text. In order to successfully communicate in academic writing, it is necessary for students to learn about cohesive and coherent devices. Halliday and Hassan (1976)[15] discuss how reference, substitution, ellipsis, conjunction and lexical cohesion create cohesion in the text. They indicate that reference, substitution and ellipsis are clearly grammatical; lexical cohesion is, as the name implies, lexical; and conjunction is on the borderline of the grammatical and lexical. The conjunction they mentioned refers to not only conjunctions but also adverbs and propositional phrases with conjunctive function.

The focus on cohesion has been part of the new direction in communicative and functional language teaching, and there has been much emphasis in both language textbooks and in the classroom on the importance of logical connectors. The choice of textual devices in writing research articles can affect the quality of writing. Writers not only produce texts, they, but also, try to persuade and convince readers to accept their claims. However, we need to increase our knowledge of the use of sentence connectors in different genres, disciplines, text types and skills among native and non-native writers or speakers in order to provide a pedagogical theory of sentence connectors.

One of the first studies on "logical connectors" in EFL Writing is the work of Crismore (1980)[11]. He examined EFL students' mastery of meaning and use in reading and composing of five formal logical connectors in English *(moreover, accordingly, hence, even so,* and *still)* across school level and class type. The participants were 100 remedial and non-remedial students from a high school, a vocational college, and a university who had been asked to give a synonym for each connector and to generate a compound sentence using the connector. The results showed that the proportion of synonym and sentence errors according to connector type and student class level was not significant (Crismore, 1980)[11].

Bolton et al. (2003)[7] conducted a corpus-based study of logical connectors in student writing. Their research focused on usage of logical connectors in the English essay writing of university students in Hong Kong and in Great Britain, and presented results based on the comparison of data from the Hong Kong component and the British component of the International Corpus of English (ICE). As Bolton et al. (2003)[7] pointed out; the study confined itself to the analysis of underuse and overuse of logical connectors and was especially concerned with methodological issues relating to the accurate measurement of these concepts. The results have been claimed to show that "both groups of students – native speakers and non-native speakers alike – overuse a wide range of connectors", and no evidence of significant underuse had been observed (Bolton, Nelson, & Hung, 2003)[7]. The results of their study also indicated that the overuse of connectors is not limited to non-native speakers, but is a significant feature of students' writing, in general.

Many researchers believe that cohesion poses a serious problem to EFL learners. for example, Ahmad (2012)[3], who conducted a perception study with the Egyptian university students, agrees with Leki (1991)[25], Nunan (1999)[28] and Qaddumi (1995)[32] that students have problems in all aspects of cohesion. Similarly, Tangkieng (2010)[44] concluded that Thai students have problems with cohesion even at an advanced level of proficiency in EFL. Adas (2012)[2] reviewed a number of cohesion studies (Khalil, 1989[23]; Olateju, 2006[29]) to support his view that EFL students are incompetent in cohesion. Al-Jarf (2001) and Sadighi (2012)[35] studied the use of cohesion by Arab and Iranian EFL students, respectively. Al-Jarf and Sadighi rank ordered the different aspects of cohesion according to their difficulty levels. According to Al-Jarf, substitution was the most difficult whereas Sadighi found reference to be the most difficult. Both of them agreed that conjunctions were the easiest. Al-Jarf used a recognition test for data collection whereas Sadighi asked her students to write about one of two topics she had given them.

Gorjian et.al. (2013)[13] conducted a study of conjunctive adverbials in experimental articles. Their research focused on the use of conjunctive adverbials between Iranian non-native and native researchers of English. They found that non-native researchers underuse conjunctive adverbials in their articles. Inattention to conjunctive adverbials as subcategories of sentence connectors among Iranian

learners of English has made problems in writing English text in a cohesive way.

Sentence connectors have been shown to help maintain text coherence in academic discourse by researchers such as Halliday and Hasan (1976)[15], Celce-Murcia and Freeman (1999)[9], Quirk et al. (1985)[33] and Achugar and Schleppegrell (2005)[1]. More precisely, Swales (1990)[40] studied the use of connectors in academic writing to maintain coherence and, more recently, Lockman and Swales (2010)[26] have compared the different connectors found in the Michigan Corpus of Upper-level Student Papers (MICUSP), highlighting that 'however' was the most frequent connector used in research paper introductions. The occurrences reported by Lockman and Swales (2010)[26] are similar to those of Hyland and Tse (2004)[21] and Shaw (2009)[40]. These studies consider sentence connectors as potentially coherent semantic units that construct knowledge mediated by distinctive patterns of language. Connectors are the parts of discourse which signpost how the text is to be appropriately interpreted and facilitating understanding.

Use of sentence connectors is varied in different texts. Texts especially academic texts are more involved in appropriately using sentence connectors. Research articles are one of the academic genres that have been studied for this strategy. Connectors play an important role in discourse, for example conjunction is used as coordination to conjoin different grammatical units: clauses, clause elements, words (Leech & Svartvik, 2013)[24]. Connectors or conjunctives (Halliday and Hasan, 1976)[15] are a type of cohesion device that make explicit the logical relations among sentences. Some of the connectors are more common than others, *for example, and, but* and *because*. The reader can understand how connectors function in the text and the logical relationship in each part when the reader has little knowledge about the domain. The presence of signals that cue logical relationship among sentences would seem to be important. This aspect of language is very important to students who acquire English as a second or foreign language (ESL) and are attempting to learn from English language texts. These students can be successful if they learn from text.

Prompted by the potential deviations and differences between disciplines and NES and NNES, this study seeks to investigate the use of connectors in two different disciplines in research articles' abstracts between NES and NNES. It should be mentioned that every academic discipline has its own technical terms and putting forward the arguments for presenting the ideas, but what is important for this study is using sentence connectors in an appropriate way.

1.1. Research Questions

Based on what was mentioned above, the following research questions can be posed:

1. Are sentence connectors used differently across disciplines of Applied Linguistic and Electrical Engineering (based on Quirk et al.'s taxonomy)?
2. Do NES and NNES make use of different sentence connectors in the two disciplines of Applied Linguistic and Electrical Engineering (based on Quirk et al.'s taxonomy)?

1.2. Research Hypotheses

Two hypotheses can be formulated in this study:

1. There is no difference between the two disciplines, Applied linguistics and Electrical Engineering in using sentence connectors in research articles analyzed based on Quirk et al.'s taxonomy?
2. There is no difference between native and non-native English speakers in using sentence connectors in research articles analyzed based on Quirk et al.'s taxonomy?

2. METHODOLOGY

2.1. Data for the Study

The data for this study consisted of 80 research articles written on a variety of topics, forty research articles belonging to Applied Linguistics (AL henceforth) for NES & NNES and forty research articles belonging to Electrical Engineering (EE henceforth) for NES & NNES, too . These two disciplines were selected as representatives of two broad disciplines of Engineering and Social Sciences. Research articles were drawn from the leading journals of Applied Linguistics and Electrical Engineering published during 2010-2014. This study explored 'Abstract' section of research articles. The articles of NES and NNES were selected based on the universities and countries of publication.

2.2. Procedure of Data Analysis

The main aim of this study was to examine the occurrence of sentence connectors in two disciplines of Applied Linguistics and Electrical Engineering in rhetorical sections of Abstract of research articles. In order to carry out the analysis, rhetorical sections of 80 research articles with a total of 13847 words were included in the analysis. To determine the frequency of sentence connectors, Quirk et al.'s (1985) model of sentence connectors was used (Table 1). Forty research articles' abstracts in AL consisted of 6363 words and forty research articles' abstracts in EE consisted of 7484 words. In other words, these sections (abstracts) and words are divided in two groups; the first one was forty research articles' abstracts for NES consisting of 7130 words and the second one was forty research articles' abstracts for NNES consisting of 6717 words. Therefore, the total number of words in this study was 13847 words.

The research articles were selected based on all of the above-mentioned parameters and the words were counted to know the number of the analyzed words. The information related to the size, journal, article outline, authors' names, acknowledgement, and reference part were deleted. Then sentence connectors were identified and classified following the taxonomies of Quirk et al. (1985).

Quirk et al.'s (1985)[33] taxonomies included connectors occurring both within and beyond the sentential level. The words were counted by Ant Conc- 3.4.1. It is a freeware, multiplatform tool for carrying out corpus linguistics research and data-driven learning. This software contains some toolboxes that one of them is "Word List" tool. This tool counts all the words in the corpus and presents them in an ordered list. This allows you to quickly find which words are the most frequent in a corpus.

The next step involved identifying the occurrences found in the corpus, analyzing the most frequent connectors and placing them into the different categories shown in **Table 1**. Afterward, comparisons were made between the disciplines and NNES and NES in the corpus.

Table 1. Categories of connectors (Quirk et al., 1985)

Categories of Connectors	Connectors
Listing	First, second, firstly, secondly, finally, further, furthermore, in addition, moreover, lastly, last but not least, to begin with, in the first place, in the second place, similarly, for one thing, for another, above all, for a start, in the same way, likewise.
Summative	To sum up, to conclude, in summary, in sum, in short, in brief, in conclusion, overall, all in all, altogether, then.
Appositional	That is, that is to say, in other words, for instance, for example, namely, e.g., i.e.
Resultive	Consequently, hence, therefore, thus, as a result, as a consequence, in consequence, so.
Inferential	Therefore, in that case, otherwise, in other words, if so.
Contrastive	However, although, (even) though, on the other hand, instead, after all, on the contrary, in contrast, besides, nevertheless, anyway, still, nonetheless, alternatively, rather, more precisely, in any case, by contrast, again.
Transitional	Meanwhile, eventually, subsequently, originally, in the meantime, by the way, incidentally.

The categories and also the frequencies of sentence connectors in each category was obtained in each discipline in order to find out similarities or differences in the distribution of sentence connectors as designated by Quirk et al. in AL and EE research articles.

3. RESULTS OF THE USE OF SENTENCE CONNECTORS

To answer the research questions we should use the contingency table. A contingency table is a type of table that displays the frequency distribution of the variables. It is often used to analyze the relation between two or more categories. The categories, the connectors, the number of occurrences and the percentages are shown in this table. In this study, in addition to comparing disciplines, the usage of connectors between NES & NNES is considered too. Although the most frequent connectors were the chief focus of this study, the results of all the sentence connectors analyzed are included in Table 2 illustrating the total variation present in the corpora.

Table 2. Contingency table of connectors for NES and NNES in two disciplines

	Connectors	**NES**		**NNES**	
		LING.	ENGIN.	LING.	ENGIN.
Listing	Finally	3(11.1%)	3(8.8%)	3(7.3%)	1(2.6%)
	Furthermore	0	0	3(7.3%)	3(7.8%)
	in addition	1(3.7%)	1(2.9%)	1(2.4%)	4(10.5%)
	in the first place	0	0	0	0
	in the second place	0	0	0	0
	Similarly	0	0	0	0
	for a start	0	0	0	0
	in the same way	0	0	0	0
	Likewise	0	0	0	0
	Moreover	0	3(8.8%)	4(9.7%)	0
	Further	1(3.7%)	0	2(4.8%)	1(2.6%)

	Lastly	0	0	0	0
	last but not least	0	0	0	0
	to begin with	0	0	0	0
	for another	0	0	0	0
	for one thing	0	0	0	0
	above all	0	0	0	0
	First	0	1(2.9%)	6(14.6%)	1(2.6%)
	Second	1(3.7%)	0	2(4.8%)	0
	Firstly	1(3.7%)	0	0	0
	Secondly	1(3.7%)	0	0	0
Summative	to sum up	0	0	0	0
	to conclude	0	0	0	0
	in summary	0	0	0	0
	in conclusion	0	0	0	0
	Altogether	0	0	0	0
	Then	1(3.7%)	3(8.8%)	7(17%)	3(7.8%)
	in sum	0	0	0	0
	in short	0	0	0	0
	in brief	0	0	0	0
	all in all(after all)	0	0	0	0
Appositional	For example	0	0	0	0
	Namely	0	1(2.9%)	1(2.4%)	2(5.2%)
	that is	0	0	0	2(5.2%)
	that is to say	0	0	0	0
	in other words	0	1(2.9%)	0	0
	for instance	0	1(2.9%)	0	0
	e.g.	4(14.8%)	1(2.9%)	0	2(5.2%)
	i.e.	4(14.8%)	1(2.9%)	2(4.8%)	4(10.5%)
Resultive	Consequently	0	0	0	0
	Therefore	1(3.7%)	2(5.9%)	0	1(2.6%)
	So	0	2(5.9%)	3(7.3%)	2(5.2%)
	Hence	0	0	0	1(2.6%)
	Thus	0	0	0	0
	as a consequence	0	0	0	0
	in consequence	0	0	0	0

Inferential	Therefore	0	1(2.9%)	0	0
	in that case	0	0	3(7.3%)	0
	Otherwise	0	0	0	0
	in other words	0	1(2.9%)	0	0
	if so	0	0	0	0
Contrastive	However	2(7.4%)	6(17.6%)	3(7.3%)	5(13.1%)
	Although	2(7.4%)	1(2.9%)	0	0
	on the other hand	0	1(2.9%)	0	0
	Instead	0	0	0	1(2.6%)
	on the contrary	0	0	0	0
	Nevertheless	0	0	0	0
	in contrast	0	0	0	1(2.6%)
	Rather	1(3.7%)	1(2.9%)	0	0
	more precisely	0	0	0	0
	in any case	0	0	0	0
	Again	0	0	0	0
	(even) though	2(7.4%)	1(2.9%)	0	2(5.2%)
	after all	0	0	0	0
	by contrast	0	0	0	0
	Besides	0	0	1(2.4%)	1(2.6%)
	Anyway	0	0	0	0
	Still	1(3.7%)	0	0	0
	Nonetheless	0	0	0	0
	Alternatively	0	0	0	0
Transitional	Meanwhile	0	1(2.9%)	0	0
	in the meantime	0	0	0	0
	Originally	0	1(2.9%)	0	1(2.6%)
	Incidentally	0	0	0	0
	Eventually	0	0	0	0
	Subsequently	1(3.7%)	0	0	0
	by the way	0	0	0	0

According to Table 2, some of connectors were used in EE but not in AL such as *first* in Listing connectors, *namely* and *that is* in Appositional connectors, *so* and *hence* in Resultive connectors, *Instead*, *in contrast* and *besides* in Contrastive connectors and *Originally* in Transitional connectors. Listing and Contrastive connectors were most used by NES. It should be noted that NES used fewer connectors than NNES.

The usage of connectors in EE was more than AL by NNES. Listing connectors are the most frequent occurrence and Transitional connectors are at the least frequently used for NNES. Therefore, sentence connectors

used differently in two disciplines, in EE abstracts, sentence connectors used more than AL.

The taxonomies of connectors and the frequency of them are shown in Table 3. The highest frequency collectively belongs to 'Listing connectors' (f= 47), which may indicate that both disciplines and natives/nonnatives function similarly and come close to each other in this special parameter. The inter-linguistic or inter disciplinary scholarship may account for such resemblance, which can be further investigated in different research designs.

Table 3. The frequency of Connectors using in two disciplines

Connector	LINGUISTICS		ENGINEERING	
	NES	NNES	NES	NNES
Listing	8	8	10	21
Summative	1	3	3	7
Appositional	8	5	10	3
Resultive	1	4	4	3
Inferential	0	2	0	3
Contrastive	8	10	10	4
Transitional	1	2	1	0
Total	27	34	38	41

In order to validate the results obtained after the analysis, a contingency table was drawn up and a chi-squared test was carried out. In statistics, a contingency table is a type of table that displays the frequency distribution of the variables. It is often used to analyze the relation between two or more categories. The chi-square distribution is used to establish the goodness of fit of an observed distribution with a theoretical one and in confidence interval (p) estimation. If the value of the latter is lower than 0.05, it means that the results obtained are statistically significant and the study is validated.

Table 4 shows the calculated chi-square at $p \leq 0.05$ level. It shows the comparison of abstract in two disciplines by NES & NNES. We cannot see the meaningful relations between them. In this comparison almost, overall results were not similar in two disciplines. Therefore, NES and NNES used sentence connectors in different manner in their abstracts.

Table 4. Comparison between NES & NNES

	Value	P
Pearson Chi-square	14.18	0.0276
log-likelihood	16.25	0.0124

Table 5 shows the calculated chi-square at $p \leq 5\%$ level. The comparisons between EE and AL in abstract were considered according to Table 3. Sentence connectors used in the same way in two disciplines; hence, there is meaningful relation in this comparison.

Table 5. The comparison between EE and AL

		value	P
Pearson	Chi-square	7.20	0.3030
log-likelihood		7.29	0.2946

Table 6 shows the comparison between AL and EE by NES. The usage of connectors by NES in this comparison was similar in two disciplines. The background knowledge and mother tongue can be an important factor in this similarity.

Table 6. The comparison between NES in EE and AL

		value	P
Pearson	Chi-square	1.71	0.9446
log-likelihood		1.83	0.9348

Table 7 shows the comparison between AL and EE by NNES. The results of chi-square in this comparison was very close to cut-off (0.5) so, to evaluate results confidentially, we can look at the other significance test, log-likelihood. According to this test, NNES in two disciplines used sentence connectors in different manner. Acquiring linguistics could be effect on results by NNES in AL, because in this comparison the mother tongue of writers was unique.

Table 7. The comparison between NNES in EE and AL

		value	P
Pearson	Chi-square	12.3	0.0556
log-likelihood		13.3	0.0383

The relationships among sentences and, therefore, the underuse of connectors were not considered risky. This fact has also been noted by researchers such as Altenberg and Tapper (1998)[5], who observed the underuse of some categories of connectors in corpora from Swedish and Hungarian writers. However, Granger and Tyson (1996)[14] did not observe overall overuse or underuse of connectors in the English writing of NNES, but they did find strong evidence of variation in the use of individual connectors. In this way, with regard to the results shown in Table 2, it can be said that NNES do not underuse certain categories of connectors, but just some of the connectors included in the categories. The role of the writers and their interpersonal styles are at play in their choice for certain connectors as employed by NNES and NES.

An example of a text that would benefit from additional connectors in the corpus of NNES can be observed in [1] below:

[Example 1]

"ISDF protocol was considered as a new relaying protocol that has better performance than the fixed DF relaying

protocol. SER was chosen as the performance criteria. The main objective of this work was to derive an SER expression for the incremental selective relaying over slow flat Nakagami-m fading channels.
With different fading figure parameter in the Nakagami-m fading model, the results in slow flat fading channels such as Rayleigh and Rician fading channels were derived. The performance of the protocol at different fading figures for the relay channel was examined."
This is an example of a text whose rhetorical style is different from another one written by a NES. If connectors had been added before the second sentence in the first and second paragraph, the writer would have guided the reader through the text. The readers are familiar with this discipline but discourse may be more fluent if the writer adds connectors to guide the reader. The underuse of connectors may be due to the nature of the paper, i.e. bed voltages, or the decision of the writer to present information in a straightforward style. This possibility receives some support from the studies carried out by Hyland and Tse (2004)[21], which maintain that writers create individual authorial identity when choosing or rejecting certain rhetorical devices.
In contrast, NES prefer to use sentence connectors in order to guide the reader through discourse, as can be seen in [2], an example from the NES corpus:
[Example 2]
"The main takeaway of this paper is that very large throughput gains can be achieved in ad hoc networks using only receive antennas in conjunction with linear processing. In a point-to-point link receive antennas only provide array gain, which translates into a linear SNR and thus logarithmic rate increase (in the number of receive antennas). In an ad hoc network, however, receive antennas can also be used to cancel interference and this possibility turns out to yield much more significant benefits. "
In this example, the writer used different sentence connectors to maintain text coherence. The sentences in the paragraph were linked in order to join ideas. Therefore, variation may exist in academic English, as the interpersonal style of writers could be different when their linguistic background is different.

4. DISCUSSION

This study investigated categories and frequencies of sentence connectors in two disciplines (AL&EE) in research article abstracts by NES and NNES. It should be mentioned that every academic discipline has its own technical terms to put forward the arguments for presenting the ideas, but what is important for this study is the extent of using sentence connectors in research articles. Disciplines in this study refer to different branches of science, AL as the representative of humanities and EE as the representative of non-humanities.
The results of our study showed some similarities between two disciplines in using sentence connectors by NES and NNES. Both disciplines demonstrated a preference for 'listing' connectors more than other connectors. However, the EE writers used more connectors than AL writers. As with this study, other researchers such as Tseng and Liou (2006)[45], Rahimi and Qannadzadeh (2010)[34] and Yang and Sun (2012)[47] have conducted comparative studies on the use of connectors in texts written by native English speakers and non-native English speakers. In these studies, the importance of connectors for the understanding of inter-sentence relations and to the construction of cohesive devices for text coherence has been highlighted.
Sentence connectors have been shown to help maintain text coherence in the academic discourse by researchers such as Swales (1990)[40] who studied the use of connectors in academic writing. Lockman and Swales (2010)[26] compared the different connectors found in the (MICUSP), highlighting that *however* was the most frequent connectors used in research paper introductions. These studies consider sentence connectors as potentially coherent semantic units that construct knowledge mediated by distinctive patterns of language. Our findings also agree with another research by Carrio'-Pastor (2013)[8] which focused on sentence connectors in academic English. The occurrences of the categories and of individual connectors were compared in order to determine whether Spanish writers of English and native English writers employed the same categories of sentence connectors to join ideas. The results showed much similarity.

5. CONCLUSION

In this study, sentence connectors were considered as rhetorical devices in two disciplines (AL & EE) in academic articles written by NES & NNES. The usage of connectors in EE was more than AL and the most frequent categories of sentence connectors were listing connectors. Concerning other categories, NES made less use of sentence connectors than NNES, and yet NES used more listing, appositional and contrastive connectors. NNES employed more sentence connectors than NES in all these categories except for appositional connectors. In some categories, NNES and NES used the same number of connectors: for example, *however*, *then*, *in addition*, *finally* and etc. The cause of these results could be the imitation of this academic style by NNES, leading to the frequent use of these connectors. Connectors such as *in brief*, *in short*, *all in all*, *similarly*, *eventually* and *in sum* are seldom used in the corpora analyzed. The reason for this lower number of occurrences in both groups of writers could be that semantically equivalent sentence connectors are preferred. For example, NNES and NES preferred the use of *then* instead of *in sum.* The former connectors may be viewed as formal by the writers, while the latter seems not to be considered appropriate for academic English, with the other more standard connectors being employed. Moreover, the less frequent sentence connectors were those expressing a more informal or colloquial style. In conclusion, the use of connectors in research articles'

abstracts shows that language can be used in different ways depending on the linguistic background of the writers and the academic style of the text.

Sentence connectors offer teachers a useful way of assisting students towards control over disciplinary sensitive writing practices because it shows how writers connect their ideas and intentions to readers. In this study we investigated connectors based on taxonomies by Quirk et al, there are other classifications of sentence connectors as well. Further studies can also be carried out in order to shed light on other aspects of rhetorical choices that have a tendency to produce variation in texts written by NES and NNES with different linguistic backgrounds. By analyzing surface linguistic features of research articles and by comparative studies across different disciplines we can get familiar with these features of academic discourse, making students aware of these rhetorical strategies and helping them observe and apply these features in their writing. As such, they can appear as a member of a specific discourse community.

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