Native vs. Novice Nonnative Writers' Use of Conjunctions in Conference Abstracts of Soft vs. Hard Sciences

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Abstract

The aim of the current study was to examine conjunctions in academic texts. The corpus included 200 conference abstracts, of which 100 were written by Iranian novice writers and 100 by English native speakers. Each group of texts consisted of 50 abstracts from soft sciences and 50 from hard sciences. Following Liu's (2008) taxonomy, the frequency and type of conjunctions were examined. The results revealed that non-native writers use more conjunctions in their conference abstracts. Furthermore, it was found that compared to hard sciences, more conjunctions are employed in soft sciences. Regarding the role of L1, the results showed that non-native writers in soft sciences are more likely to use conjunctions. Moreover, the findings indicated that the most frequent conjunction type used by both native and nonnative writers are adversatives and additives in soft sciences, and additives and adversatives in hard sciences, respectively. The findings of the study have implications for teaching academic writing and material development for writing courses.

Keywords: Conference Abstract, Conjunction, Hard Sciences, Non-Native Writers, Soft Sciences

1. Introduction

The members of a speech community know how to communicate with each other via language (Swales, 1990, p. 58). The knowledge of social context and reader as part of the context, create a discourse by which all the members of a speech community transmit their ideas and findings, a discourse that is easily recognizable by discourse community members and does not make sense for non-specialists (Myer, 1991). On the other hand, the sentences and clauses in a text could be connected by cohesive devices which bind a text together and signal the reader that there is some degree of continuity. A very important point is that cohesive relations do not create semantic relations, but 'construct' semantic relations (Carrel, 1982). In other words, a text could be cohesive without the occurrence of any cohesive device. There are two broad divisions of cohesion identified by Halliday and Hasan (1976): grammatical and lexical cohesion. Grammatical cohesion includes reference, substitution, ellipsis, and conjunction. Lexical cohesions are realized through repetition of lexical items, synonyms, superordinate, and general words. The focus of the present study is on conjunctions.

Conjunctions are connectors that join sentences. They can tell us whether the coming sentence is in coordination or contrast with the present sentence. They can create a sequence in sentences that must be followed or constitute a cause-effect structure. Conjunctions have an optional nature and their appropriate use depends on the semantic and syntactic context in which they occur (Biber, Johansson, Conard, Leech, Conrad & Finegan, 1999). Inappropriate use of conjunctions is pointed out by researchers who compared writings of non-native novice writers with their English native counterparts. Moreover, many research works have focused on the similarities and differences among different text types in terms of the textual elements employed by the writers in each field of study. In the following section, a review of these two groups of studies will be provided.

2. Literature Review

2.1. Native vs. Non-native Writers

Some researchers believe that novice non-native writers are not competent enough in English language. For example, Field and Oi (1992) observed an overuse of conjunctions in Cantonese students' writings. Field and Oi (1992) sought this weakness in their grammar instruction. The Cantonese students were presented with a long list of conjunctions to choose from, without enough instruction about their real syntactic and semantic features.

Similar results are reported by Milton and Tsang (1993) who examined assignments of students. Overuse of conjunctions was highly significant in

additives. Chen (2006) also explored the use of conjunctions in final papers contributed by MA students. The findings indicated again the overuse of conjunctions. Chen (2006) in his qualitative analysis found out that the students used additive conjunctions to connect the sentences without establishing any logicality between sentences. Additionally, they used causal conjunction to express a conclusion without really providing convincing evidence or enough information for the reader to follow the argument.

But language proficiency is not always the only rationale for inappropriate use of conjunctions. Ishikawa (2010) investigated conjunctions in argumentative. The results revealed that Asian writers tend to overuse additive conjunctions. The Japanese students' essays, categorized based on their levels, showed that language proficiency is not related to the appropriate use of conjunctions.

Meanwhile, some researchers focused on the effect of mother language on conjunction use. Hinkel (2003), investigated the concessive adverbs in 569 essays written by speakers of five languages of American English, Chinese, Japanese, Korean and Indonesian. The non-native speakers were advanced English speakers. The results revealed that English native speakers use more concessive adverbs rather than other non-native speakers. Hinkel attributed the underuse to language culture of these groups. In Chinese language, concessive subordinate clauses are so rare, and coordinate or temporal conjunctions are much more common.

Mur Dueñas (2007) compared the logical markers in research articles written by English and Spanish writers. She found that despite additive markers that are used to the same extent in both sub corpora, contrastive and consecutive markers are far more frequent in the RAs in English than in the RAs in Spanish. Mur Dueñas pointed out that the higher frequency of logical markers in the English RAs could be considered an indicator of the tendency towards a writer-responsible style of writing texts in the English language/culture versus the tendency towards a reader-responsible style in Spanish language.

Ahangar, Taki, and Rahimi (2012) studied grammatical cohesion in 200 different sport live and TV recorded programs. Four groups of conjunctions were explored in this study: associative conjunctions, additives, adversatives and developmental conjunctions. The results showed that associatives have the greatest frequency while adversatives have the least frequency. Ahangar et al. concluded that in Iranians' talks adversatives have the least importance in creating cohesion. Shirazi and Mousavi (2017) compared adversatives use between English and Persian native speakers in 200 research articles. The results revealed that adversative conjunctions were used twice by English native rather than L1-Persian writers. Shirazi and Mousavi believe that the effect of Persian language writing culture is the reason for the observed discrepancy.

Kuzborska and Soden (2018) in their study tried to understand the rationale behind the difference between native and non-native in employing opposition relations. For this purpose, they compared the argumentative assignments of Chines in low, middle, high score writing. It was revealed more appropriate use of concessive and contrast relations in high scores. Kuzborska and Soden concluded that exposing the students to authentic texts written with expertise help them to become familiar with the most common construction of opposition. But to speed up this process the explicit instruction of forms and function of conjunctions would be necessary. In other words, they believed in both roles of writing experience and clear instruction.

2.2. Discipline-specific Writing

Academic genres have been the focus of many research works. One of the most significant dimensions of these studies is the investigation of the way discipline-specific patterns are employed by experienced vs. less experienced writers to crystalize the generic features of a text in a particular field of study.

For example, Gea-Valor, Rey-Rochab, and Moreno (2014), surveyed 111 doctoral students in the fields of Education, Psychology, and Sociology to identify their needs in English publishing. According to the results of the survey, grammar, vocabulary, paragraph and sentence structure mostly challenged the researchers. The researchers pointed out that instruction should be accompanied by the acquisition of cultural differences and similarities.

Gnutzmann and Rabe (2014), surveyed 24 German doctoral students, post-doctorate-researchers and professors in four discipline of biology, mechanical engineering, German linguistic and history. According to their results, the language demand of researchers varies across the disciplines. The language in biology and engineering mostly follow 'rigid' and 'formulaic' rules. Though the history researchers expressed that the genre structure in their field depends on various factors such as audience and personal preferences, the biology writers mostly rely on a limited number of vocabulary and fixed rules. The researchers concluded that some disciplines are easier to write for non-native writers.

Bardi (2015), interviewed 16 Spanish researchers in economics and business. While the novice researchers were mainly worried about their poor grammar and their inability to express the ideas, the expert writers were concerned about 'certain lack of accuracy and limited ability to handle the academic register'. The point is that all the participants regardless of their competence in English, acknowledged that the best way to acquire proficiency in academic writing is to study the academic literature in their own disciplines and to practice writing.

Kuteeva and Negretti (2016), carried out a comparative study to explore how genre knowledge assists the researcher to create their research papers. For this purpose, they asked ten students to analyses the introduction part in a model text, to reflect on their own writing strategy and to write an introduction. According to the results, in natural science, even a student with low L2 proficiency level can meet the necessities of academic writing in this genre. On the other hand, humanities language has a crucial role in knowledge making. In the end, they pointed out that L2 genre knowledge is more challenging for humanities and social science.

Zhao (2017) analyzed conjunction realization over four groups of writers: L1/L2 graduate students and L1/L2 scholars in applied linguistics. Fifteen essays from each group were selected. She reported that L2 graduate students use explicit conjunction the most followed by L1 graduate students. On the other hand, L1 and L2 scholars use conjunctions in the same way. Zhao concluded that in academic writing, disciplinary knowledge and experience overweight insufficient syntactic and lexical knowledge in academic writing. Everyone, whether L1 or L2 writer needs to learn the academic language.

3. Impetus to the Present Study

Academic writing is not the first language of anybody and this is the experience which helps scholars in academic writing. Both L1 and L2 writers must be exposed to authentic texts and engage in academic writing in their genres. But language need for expert writers could vary across science type, too. Soft science is less abstractive and linear (Hyland, 2015). The writers are more conscious about their claims and employ more hedges and boosters to mitigate their effect and persuade the audience (Hyland, 1997). Thus, it is believed that inherent features of soft science lead to employing more conjunctions (Hyland & TSE, 2004; Peacock, 2010). While hard science scholars have access to the main body of language and reference to quantitative proofs could be sufficient to convenience the audiences (Becher, 1994, p. 15).

Some non-native students do not use conjunctions appropriately. Some researchers blame the language: the insufficient language proficiency, mother language interference or culture influence. Meanwhile, some have a completely different perspective. They argue that the problem is not a result of poor English but stem from their unfamiliarity with conventions of academic writing and genre-structure. Regarding that conjunctions vary across soft and hard, the question is which factor is worth of attention: the influence of L1 writing culture or science type. There are few research works on the impact of L1 writing culture and field of study, thus, the present study is aimed to know what the inappropriate use of conjunctions originates from, L1 writing culture interference or unfamiliarity with language demands of the discipline. The results of this study

could be used as criterion for predicting the potential failures of Iranian nonnative writers in creating cohesive structures in their writings. The present study aimed to address the following research questions.

1. What are the frequency and types of conjunctions used in conference abstracts of English native and Iranian nonnative writers?

2. What are the frequency and types of conjunctions across soft and hard sciences?

3. What are the types and frequency of conjunctions used by native and Iranian nonnative writers in soft science?

4. What are the types and frequency of conjunctions used by native and Iranian nonnative writers in hard science?

4. Corpus

The study made use of 200 conference abstracts of which 100 were written by English native writers (ENWs) and 100 were written by Iranian nonnative writers (PNWs). The texts were selected from the proceedings of national as well as international conferences on English language teaching and psychology as representatives of soft sciences and physics and geology as examples of hard sciences. Each group of texts consisted of 50 abstracts from soft sciences (25 English language teaching and 25 psychology) and 50 abstracts from hard sciences (25 physics and 25 geology). To enhance the accuracy of the research, every abstract was examined to be written by only one writer and have 150-250 words.

The total number of conferences from which the abstracts were taken was 33. The issue of whether a person is a native English speaker or not is a very complex one in this globalized flex world. For example, an Iranian may actually be classified as a native writer of English if he/she went to study in an English-speaking country at a very young age. On the other hand, a professor teaching at a university in an English-speaking country may actually be a nonnative English writer originally hailing from a non-English speaking country. As the study concentrates on the impact of writers' L1 background, in order to determine who native English writers were, the author's name, institution, and/or location were considered.

5. Procedure

A taxonomy of cohesive devices was first introduced by Halliday and Hassan (1976). In the present study, however, Liu's (2008) taxonomy was used because it

is more detailed (Table 1).

Table 1
Liu Taxonomy (Liu, 2008, pp. 491-501)

Additives	
Emphatic	*above all, additionally, again, also, as they/you say, as well, as a matter of fact, besides, in addition, further, furthermore, moreover, not to mention, of course, to crown it all, to cap it all, too, what's more*
Reformulation	*i.e., that is, that is to say, in other words, for example, for instance, for one thing, namely, to put it another way, to put it mildly, what I'm saying is, what I mean, which is to say*
Similarity Comparative	*Alternatively, by the same token, correspondingly, likewise, similarly*

Adversatives	
Concessive	*At the same time, however, nevertheless, nonetheless, of course, then again, though, yet*
Contrastive	*Actually, as a matter of fact, conversely, in/by comparison, in/by contrast, in fact, in reality, on the other hand*
Correction	*Instead, on the contrary, rather*
Dismissal	*Admittedly, after all, all the same, anyhow, anyway, at any rate, despite this/that, in any case, in spite of this/that, still*

Casuals	
General casual	*Accordingly, as a consequence, as a result, because, of it/this/that, in consequence, hence, naturally, so, therefore, thus*
Conditional casual	*All thing considered, in such a case, otherwise, then*

Sequential conjunctions	
Enumerative/Listing	*Afterwards, eventually, first/firstly, first and foremost, first of all, in the first place, to begin with, second/secondly, third/thirdly, fourth/fourthly, finally, last/lastly, last of all, next, then*

Simultaneous	*At the same time, in the meantime, meanwhile*
Summative	*All in all, in a word, in conclusion, in short, in summery/sum, to conclude, to sum up, to summarize*
Transitional to another topic	*By the by, by the way, incidentally*

The following steps were employed to examine the frequency and types of conjunctions in abstracts under investigation: First, Liu's taxonomy (2008) was employed to explore their frequency in the corpus. Next, the frequency of every item was entered into Excel 2015. The purpose of this step was to calculate the sum of items in each sub-corpus of Liu's taxonomy. The reliability of the study was performed by intra-rater reliability. The targeted objects were counted once by the authors. After a time-lapse, about one week, the objects were counted again. In every counting, the conjunctions were examined to check out that they function as the relation between sentences.

The following extracts are organized according to the general taxonomy by Liu (2008):

Additives
- **Emphatic**
  Purpose: to reemphasize the previous statement by adding more evidence
  - ***Moreover,*** *field-independent learners outperformed field-dependent ones in their post-test.*
  - ***Further****, listening self-efficacy was found to be significantly and positively related to planning-evaluation and problem-solving strategies.*

- **Reformulation**
  Purpose: to explain the previous statement by rephrasing with simpler words or more details
  - ***In other words****, the results of the findings show that Rorschach tests in recognition of depression and anxiety significantly outperform beck tests. (*Reformulation*)*

- **Similarity comparative**
  Purpose: to give some alternatives
  - ***Alternatively****, five orientations or causes of studying a FL were investigated: travel, job related, friendship, personal knowledge, and school achievement.*

Adversatives
- **Concessive**

Purpose: to softly refuse the previous statement and present the right one
- *However, in a re-specified model, a better fit was achieved.*
- *The circumstances of porosity preservation shown in this study may be unusual, **nonetheless** have profound consequences for exploration.*

- **Contrastive**

Purpose: to display the contraction between the previous statement and the coming statement
- *… **on the other hand**, with low slope angle, the stripping ratio is increased considerably*

- **Correction**

Purpose: to correct the previous sentences.
- ***On the contrary,** to large scale mining, the level of technology, management, and capital investment is not so high.*

- **Dismissal**

Purpose: to strongly refuse what has said been before and present the corrected statement
- ***Despite** this interest, very little is known of how it has changed in recent years.*

  Causals
- **General**

Purpose: to indicate that the following statement is logical result of the previous one.
- *Estimation of these variables is made under uncertainty condition of basic data **and therefore**,   the sensitivity of output of the project should be evaluated for these uncertainties. (general)*
- *a greater number of errors whereas reflective people, referred to as "thoughtful", are slow and accurate, weigh all the possibilities, take longer to respond, **and consequently**   make fewer errors. (conditional)*

  Sequential conjunctions
- **Listing/ Enumerative**

Purpose: to list series of steps, ideas, pursues or indicate the priorities
- *a future circular collider could first provide electron-positron collisions, **then,** hadron collisions (proton-proton and heavy-ion), **and finally,** the collision of muons.*

- **Simultaneous**

Purpose: to compare the following statement with the previous one

- ***Meanwhile***, *the priorities of American students were "marriage and family formation".*

- **Summative**
  Purpose: to summarize or draw a conclusion from what has been discussed.
  - ***In conclusion***, *the main hypothesis of the research showed that there is a significant relationship between virtual e-learning on the level of knowledge absorption capability.*

Finally, the obtained results were fed into SPSS 20 for statistical analysis. For every research question a chi-square test was conducted to explore the relation between variables under investigation.

6. Results and Discussion

6.1. Conjunction Used by ENWs and PNWs

In the first research question, the pattern of conjunction used by native and non-native writers was explored.

The value of the chi-square test indicating $\chi2= 9.590$, degree of freedom, three, was 0.022 which was significant at level 0.05. The coefficient value, highlighting the strength of relation, equals 0.225 that is roughly a weak relation between variables, i.e., conjunction use and writer's nationality. As Figure 1 displays, in ENWs' abstracts, adversatives were the most frequently used conjunctions followed by additives, sequential conjunction, and casuals while in PNW's writings, additives were the most frequently used conjunctions followed by sequential (temporal) conjunctions, adversatives, and casuals.
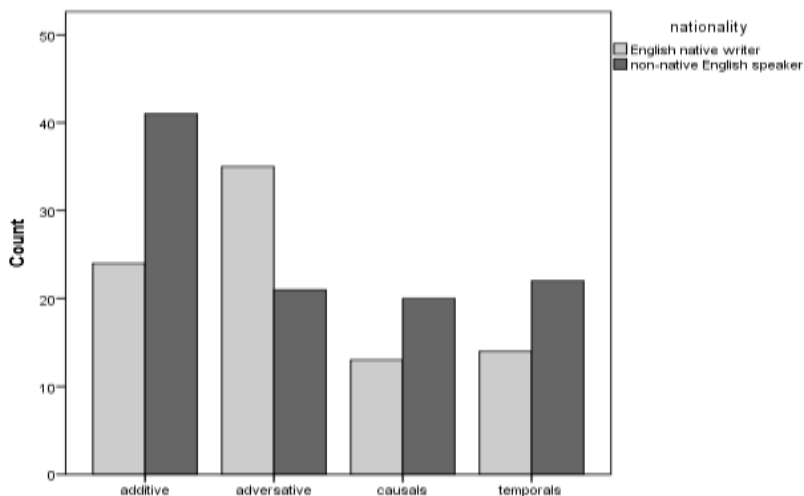
Figure 1: Frequency of Conjunction Types Used By Enws And Pnws

According to the results obtained, additives in PNWs' writings, constitute 40 percent of all conjunctions. Iranian writers used 14 types of additives while ENWs employed only 8 types of additives. Among these 14 additives, 'also' ('also', 'and also', 'not only … but also') and 'moreover' have the highest frequency. Similar results are reported by other researchers. Rahimi (2011) found out that in Iranians' writings, 'and', 'also' and 'moreover' are the most frequently used additives. Also, Liu (2008) reported that 'and' and 'also' have the highest value in Chines' writings.

For adversatives, the result was quite the opposite. Adversatives in PNWs' writings were half of the adversatives used in ENWs' writings. More than 40 percent of all conjunctions in ENW's writings were adversatives while this value in Iranians was only 20 percent. 'However' and 'although' were the most frequently used conjunctions in both groups of ENWs and PNWs' writings. 'However' and 'although', are reported as the most frequently used adversatives by other scholars who compared different corpus types: Kuzborsk and Soden (2018) compared Chinese students' essays at three levels. They found out that 'although', 'however' are frequently used in high scores essays.

Aull and Lancaster (2014) found out that 'however' and 'although' are frequently used in their three corpora of study: first-year students' papers, upper-level students and academic sub-corpse. They also pointed out that first-year students tended to use adversatives that are more flexible like 'however' and 'though' while avoid using of adversatives that make a strong concession such as 'nevertheless', 'in contrast' or 'on the other hand'. Hinkel (2003), found out that concessive markers such as 'although', 'even though', 'while', and 'whereas' were rarely used in the writing of first-year NS and academically-advanced NNS students. She states that "because concession clauses are syntactically and semantically advanced subordinate constructions", are rarely used in both groups of NS and NNS. In the present study, it was found that an abundant use of 'though' or 'although' in two groups of ENS and NNS scholars can be observed. Hinkle's view implies that the participants of the present research could be expert academic writers, because both groups use 'though' or 'although' abundantly.

Overuse and underuse of additives and adversatives are also reported by scholars who compared different groups of scholars or students. Granger and Tyson (1996), found out that French speakers overuse additives and underuse adversatives. Tapper (2005), reported that Swedish advanced learners overuse all the conjunctions especially additives. Also, Ishikawa (2010), reported that Asian researchers tended to overuse additives. Higher use of additives in research articles written by Iranians are reported by many researchers too. (Rahimi 2011, Jalilifar 2008, Ahangar et al., 2012). Shirazi and Mousavi (2017), found that the use of

adversatives in research articles written by Iranians is half of the adversatives in ENWs' research.

Undeniable discrepancies between two groups of native and non-native writers were uncovered: high use of the additive, and low use of adversatives by Iranians. To shed light on such a discrepancy, we have to move beyond the literal meaning of conjunctions that Hyland (2004) presents: Conjunctions are not only connectors with which sentences are organized and cohesion created in a text. By conjunctions, writers indicate their stance toward a claim. They employ conjunctions just in a way that they think. Conjunctions are as tracts that address the reader, how the writer understands the logical relations of sentences. This function of conjunction use is especially dominant in adversatives. By adversatives, the writer predicts readers' respond or determine what is unexpected (Hyland, 2004). For example, a writer uses 'however' instead of 'nevertheless' because he predicts his readers' anticipation toward rejecting a common claim. To put it another way, a writer with a conscious choice of adversatives indicates how he wants to argue: implicitly or explicitly.

On the other hand, English and Persian native speakers follow completely different patterns of argumentation. Arguments in English are presented in a liner pattern with subordinate sentences (Hind, 1987; Min, 2008; Xing, Wang, & Spencer, 2008). Even though Persian arguments are presented in a circular pattern with coordinated sentences (Beigi & Ahmadi, 2011), in Persian writing, the main focus is on the richness of facts and the writers are not expected to show their direct stance toward a claim or argue explicitly. Considering that a writer argues with the conscious choice of conjunctions and culture of implicit argumentation in Persian; it could be concluded that the culture of Persian writing dominates conjunction choices in their essays. Language of every discourse community is rooted in 'tribal life' and 'custom of people' (Malinowski et al, 1923, p. 305). Persian native speakers without being informed, apply their own writing culture in conjunction choices. The parallel and coordinated sentence are much more common in Persian and some studies confirmed this fact:

Faghih and Rahimpour (2009) explored the frequency of conjunctions in three types of text. They found out that although the frequency of conjunctions decreases when Iranians want to write in English in comparison to their Persian essays, there is still a significant difference in conjunction use between ENWs and PNWs' essays (Faghih & Rahimpour, 2009). Iranians use fewer adversaries because their writings are influenced by their writing culture. As mentioned above two adversatives of 'however' and 'though' are used the same by ENWs and PNWs. These contrastive conjunctions are usually used when the writer wants to show their partial agreement with a common remark or counter reader's anticipations, and also make their personal claims recognized (Tirkkonen-condit 1996, Aull & Lancaster2014). These conjunctions are common in Iranians writings because maybe it is in congruent with their culture of implicit argumentation, while the frequency of conjunctions like 'despite' or 'in spite' is almost zero.

But the results of the present research are in contrast with some other researchers' works. Gao (2016) did not find any difference in the use of conjunctions by Chinese scholars compared to ENSs. Gao who also used Liu's taxonomy believed that reported overused in Ishikawa's (2010) result is the result of employing "different semantic categorizations of linking adverbials for analysis" (Gao, 2016). But in the present study, Liu's taxonomy is employed and the results found are similar to those by Ishikawa (2010).

Milton and Tsang (1993) who carried out a qualitative analyzes about two items of 'moreover' and 'therefore', argue that overuse is rooted in lack of language proficiency: 'moreover' is used mistakenly in texts that logical relations between sentences are clear, all ideas are in the same direction and nothing new is introduced. About 'therefore' they pointed out that most of the students have a problem in identifying the relation of cause and effect and can't distinguish between their personal opinion and a normal fact (Milton & Tsang, 1993). We can't refuse this idea that overuse of some conjunctions could have root in lack of language competence. 'Also' in additives and 'therefore' in casuals have extremely high values. But for any decision, we need a qualitative analysis that is beyond the present study.

6.2. Conjunction Use across Soft and hard Sciences

In the second research question, conjunction use was compared across soft and hard science. The value of the chi-square test indicates an insignificant relation between soft and hard science in conjunction use. The value of the chi-square test indicating $\chi2= 4.748$, degree of freedom, three, was 0.1 which was significant at a level (0.05). The coefficient value, highlighting the strength of relation, equals 0.022 which shows a weak relation between the variables, i.e., conjunction use and field of science. Although the visual figure, demonstrates higher use of conjunctions in soft-science, this difference is not so significant (Figure 2).
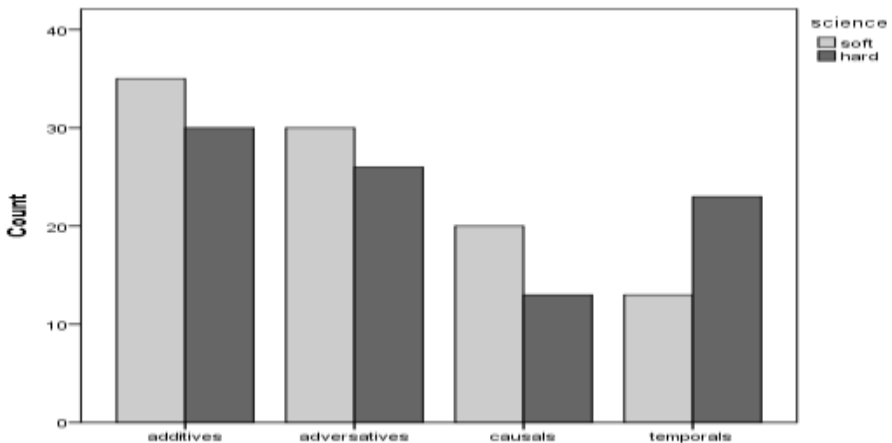
Figure 2: Frequency of Conjunction Types Used Across Soft and Hard Science

The obtained result is in contrast with the general belief in which inherent features of science type, lead to a remarkable difference in conjunction use. For the interpretation of such discrepancy, it would be beneficial to review the concept of genre. Genre generally is definable in a discourse community. When you as a member of discourse community write in a genre you draw from your repeated experience without difficulties and your readers recognize your text just like the other ones in discourse choices and constrain that are applied (Hyland, 2003). Consider two disciplines of physics and geology, used in this study as representative of hard science. The language used in particle physics includes only presenting the experiment findings without extra explanation of processors and methods. Because every reader in this field knows what the accelerators are, how they work or the possible problems that have arisen. Although geology is included in hard-science, the findings must be reported with a complete definition of the problem, the method used and the exact place of the samples. Genre is a "class of communicative events" (Swales, 1990, p. 58). It doesn't matter whether a discipline is categorized in a hard or soft science genre. What is worthy of attention is how the communication takes place in the specific discipline. Communication could be performed in an abstract with less than 50 words or in an abstract with over 300 words."…communication does not entail adherence to a set of universal rules but involves making rational choices based on the ways text work in a specific context" (Hyland, 2002). Therefore, the genre is specific in every discipline, irrelevant of being categorized in soft or hard science. Conjunctions also, as the discourse choices vary across disciplines. Peacock (2010) pointed out, linking adverbials vary sharply across different disciplines. Or Hyland in his study across several disciplines explained that "there is a less stark contrast between soft and hard fields and greater variation between disciplines" (Hyland 2004).

Among the four categories of conjunctions, sequential conjunctions are the only conjunctions used more in hard science with a remarkable difference than soft science. Higher frequency of sequential conjunctions in hard science is incongruent with what Peacock utters about the difference of 'science and non-science disciplines'. In science disciplines, the aim of writers is mainly to describe the methods that have employed and also presenting the findings that are resulted from those methods. The writers do not try to argue or persuade the reader because the experimental proofs and statistical data are sufficient. In fact, interpretation of facts is left to the reader and the writer only tries to show the order of events and steps to the reader (Peacock, 2010). Sequential conjunctions consist of connectors that determine the sequence of events and identify the type of coming paragraph as a conclusion or summery.

Although the chi-square rejected any significant relation between conjunction

use and science type because of the reasons that have been explained, the visual figure shows the higher use of the additive, adversatives and casual conjunctions in soft science. So at the most general level, it could be assumed that inherent features of soft science, cause a higher use of conjunctions.

6.3. Conjunction Used by ENWs and PNWs in Soft Science

In the third research question, the pattern of conjunction used by English native and non-native writers are compared only in the sub-corpus of soft science. The value of the chi-square test indicating $\chi2= 15.486$, degree of freedom of three corresponding 0.001, was significant at a level (0.05). Again, the bar chart demonstrated overuse of three kinds of conjunctions by Iranians as it was expected (Figure 3).
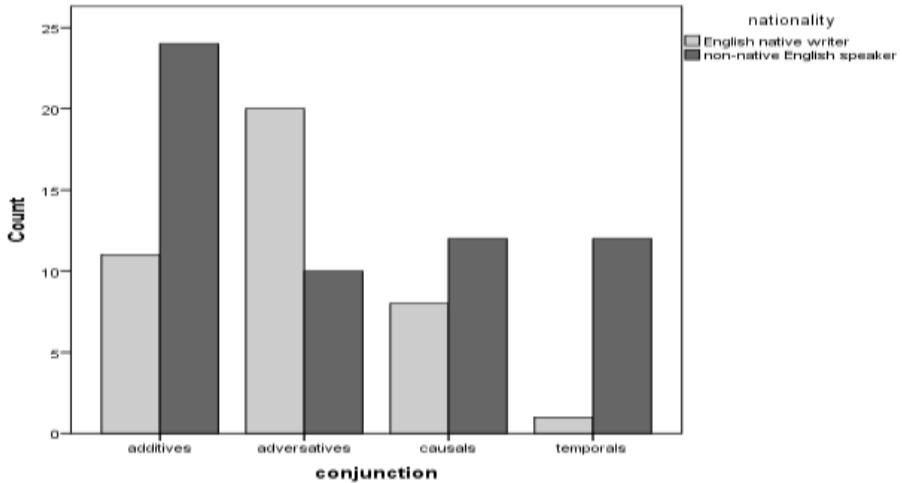

Figure 3: Frequency of Conjunction Types Used Across Soft and Hard Science

Statistical analysis indicated that additives constitute 41 percent of conjunctions in Iranians' abstracts. While this value in English native writings is 27.5. Adversatives constitute half of the all used conjunction in English native writings. Compare this value with the frequency of adversative used in Iranians' abstract that is only 17 percent. The discrepancy that is achieved is greater than what we have been obtained in research question one. The Phi value that indicates the strength of the relationship between variables is near to 0.4 while this value in research question one corresponds to 0.22. It is clear that the overuse of conjunction greatly happens in soft science. The less abstractive nature of science and culture of writing lead Iranians to employ conjunctions abundantly for enriching their claims and convincing the intended reader. Comparison of conjunctions in hard science only will shed more light on the influence of science type in conjunction use.

6.4. Conjunction Used by ENWs and PNWs in Hard Science

In the fourth research question, the Chi-square test indicated that the difference between variables of nationality and conjunction in hard science is not significant. Figure 4 demonstrates the distribution of conjunction types used by ENWs and PNWs in hard science.
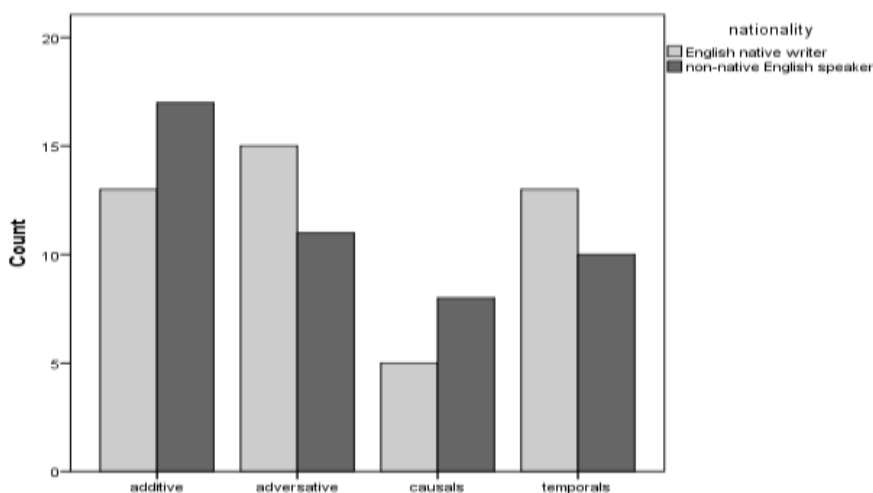

Figure 4. Frequency of Temporal Conjunctions Used by Enws and Pnws

Iranians use additives, adversatives and causal conjunctions higher than their English counterparts. But this time, their discrepancy is much less in comparison to soft science. In ENWs' abstracts adversatives are the most frequently used conjunction, followed by additive and temporal conjunctions (with the same frequency) and causals at the end. In Iranians' abstracts, as usual, additives have the most frequency followed by adversative, temporal and causal conjunctions. The obtained pattern for Iranians has changed: In soft science, adversatives had the least frequency but in hard science, adversatives have the second priority in PNWs abstracts.

In hard science, both the writer and reader privilege from "a certain amount of background knowledge" (Hyland, 2015). The intended readers in hard science as members of the discourse community knows the process of experiment, the percentage errors and all of the related limitations. Therefore, the writers only present their finding and achievements in authentic quantitative proofs (Hyland, 2004, pp. 203-204). They do not need to involve explicitly in the text or engage the reader with themselves as soft science researchers do (Hyland, 2015).

Reporting the most significant findings of the study could be enough. In the present study, either the English native writer or the Persian native writer share a rich background knowledge that is irrelevant to language proficiency or writing culture.

7. Conclusions

Kaplan as a pioneer in the contrastive rhetorical study explored the organization of paragraphs and explained that every nation has a rhetorical pattern in writings that are influenced by their culture (Kaplan,1966). "Extensive parallel sentence" is the most important characteristic of languages like Persian or Arabic whose speakers rely on the use of conjunctions for connecting the sentences and adding extra information. (Kaplan, 1966; Pishghadam and Attaran, 2015). This writing culture is even projected when they write in English. According to Mariani's results, Persian native speakers use logical connectors the most while English native speakers use them the least (Mardaini, 2002). A higher use of additives is a projection of the 'cultural model' in which writers try to enrich the facts and underuse of adversatives are again the projection of the same culture in indirect argumentation in Iranians' writing. The richness of facts could be a positive point of Persian writers but texts are valued effective when they follow the rhetorical practice accepted by discourse community (Hyland, 2004). In academic writings, "concessive clauses are more common" (Aull & Lancaster 2014). Concessive clauses and opposition relations are as ways that writers establish an "authoritative stance" and build an identity in the world of science "(Hyland, 2002; Aull & Lancaster, 2014). Although the results show that in both types of science, PNWs use more conjunctions than ENWs counterparts, the mentioned culture of writings is especially significant in soft-core science. Soft science is mainly interactive and is built more on the citation (Hyland, 2015). Therefore, writers employ more conjunctions to present and support the claims to persuade their readers. But in hard science, the writer has access to the main body of knowledge and strong proofs (Becher, 1994, p. 15). So it is only enough to present the order of events and leave the interpretation to the reader. And because of this characteristic in the nature of hard-science, there is no significant difference in conjunction use in both groups of English native and non-native speakers. Apparently here, writing cultures are ineffective.

The chi-square test rejects any significant relation between conjunction use and science type. It means that science type does not necessarily lead a change in conjunction use. Drawing a separation line between soft disciplines and hard disciplines could not be true because every discourse community exploits the specific 'social ways' to 'communicate' the new findings and achievements (Swales,1990, p. 54). So genre is not specific to the type of science but is specific to the discipline. The features that are counted as common features of soft and hard science are the features that could be attributed at the most general level (Zangani, 2009). Students need a genre instruction, irrelevant of being categorized in soft or hard science, in which the attention will be drawn to cultural differences of the first

language and the target language. This genre instruction includes "how target texts are structures and why they are written in the ways they are"(Hyland,2007).

Overall, the native and non-native dichotomy is significant in academic writings and is more significant in soft-core science. The observed discrepancy is caused by the interference of L1 culture writings. This study highlighted the importance of need analysis of students not in two regions of soft and hard science but in specific disciplines. We cannot deny the fact that overuse or underuse of conjunctions could be because of lack of language proficiency, especially about conjunctions that have extremely high value like 'also' or 'therefore'. But exploring this fact would need an exact qualitative exploration that is beyond the scope of this study and is recommended for future studies. It's also recommended to take the writers' experience into consideration by classifying abstracts based on the academic ranking of their writers (eg., assistant professor, associate professor or graduate students).

English as a dominant language by which scientific achievements are transmitted is not independents of culture (Hyland, 1997). But we have to keep in mind, that non-native English speakers do not privilege the same writing culture as English native writers do (Hyland, 2007). Therefore, any grammar instruction must be integrated into the exploration of writing culture and context. Instead of instruction of conjunction through a list and their approximate translation into the first language, the students need to be exposed to authentic texts specific to their discipline and be encouraged to analyze the syntactic and semantic context in which the conjunctions are used. In addition, the students need explicit instruction of the writing culture that structures the target discourse, the writing culture of subordinate sentences and explicit argument. On the other hand, the graduate students must be inspired that conjunction employment does not necessarily create cohesion but the rich organization of sentences in their mind, constitute a cohesive structure. Rather, cohesion or texture is a realization of coherence.

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