Cohesion in literary and scientific texts
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Abstract
Cohesion refers to relations of meaning that exist within the text, and that defines it as a text. The detection of these meaning relations is important to its interpretation. These relations are achieved by the use of cohesive devices. This means that the presence or absence of these devices in a text helps to make a text coherent or incoherent respectively.

This paper is a statistic study of two types of cohesion: the grammatical cohesion and lexical one in selected scientific and literary texts. Three scientific essays as well as three literary ones have been chosen for the purpose of analysis. The study aims at presenting data verifying the assumption that both lexical and grammatical cohesive devices are more frequent in use in scientific texts than those occurred in literary ones. Also, some categories in each type are more widely used than others such as conjunctions and reiteration in both scientific and literary texts. The study shows that such conclusions can be traced back to the writer's intention to use rather simple, comparative, and descriptive language in expressing rather complex topics presented in scientific texts. That is to say, the use of indirect and complex language makes the reader's task more difficult. Moreover, the frequent categories of each one help the writer elaborate, illustrate, compare, and even add new information and ideas to his/her reader. The paper starts with an introduction that acquaints the reader with the concept of cohesion and its two types: the grammatical and lexical cohesion. Then, an analysis and a statistic study of six essays are carried out that reflect the frequency of occurrence of both types of cohesion in these texts. Three scientific essays as well as three literary ones have been chosen for the purpose of analysis. The study ends with some conclusions resulted through the study.

الخلاصة
يشير التجانس في النص إلى علاقات المعنى التي توجد فيه، والتي تعرف كنص فعلي وإن تعقب تلك العلاقات مهم جدا في تفسيره. يتم أن البحث الحالي هو دراسة إحصائية لتوحي التجانس (الوسائط القوا عدية و الوسائط ذات
1-Introduction

A text is not a set of sentences each on some random topic, but the sentences and phrases of any sensible text tend to be about the same thing. That is to say, the text must have a quality of unity. This is the idea of cohesion which means that the sentences are put together to function as a whole.

In any kind of text, the ties and connections that make texts more attractive or less convincing, i.e., coherent. (Conner, 1996: 49).

Cohesion, as Finch(2000: 211) says: "signifies the surface ties which link sentences together ". It refers to relations of meaning that exist within the text, and defines it as a text. These relations are achieved by the use of cohesive devices. This means that the presence or absence of these devices in a text helps to make a text coherent or incoherent respectively. Widdowson (2007 : 45) points out that the term 'cohesion' refers to the connections that are linguistically signaled like those between a pronoun and a previous noun phrase.
the present study aims to answer the following questions:

1- Do all categories of grammatical cohesion and lexical one occur in both scientific and literary texts?
2- Are lexical and grammatical cohesive devices more frequent in use in scientific texts than those occurred in literary texts? why?
3- Which category of both grammatical and lexical cohesion is more widely used than others? why?

So, it is hypothesized in this study that both types of cohesion (grammatical and lexical) are more widely used in scientific texts than those occurred in literary texts. Also, conjunctive markers, being a category of grammatical devices, are more highly used in both scientific and literary texts. In addition, reiteration, a category of lexical cohesion, is more widely used than the other category (collocation).

To achieve the aims of this study, the researcher follows the following steps:

1- Explaining the concept of cohesion and its two types: grammatical and lexical.
2- Showing the frequency of occurrence of both grammatical and lexical cohesion through static study in three scientific texts written by different British writers and taken from the Internet.
3- Identifying the frequency of occurrence of both lexical and grammatical cohesion in three literary texts written by different writers and taken from the Internet and books.

are combined to make every paragraph, every sentence and every phrase contribute to the meaning of whole piece.

Cohesion, according to Farrokhpey (1999: 15), is like other semantic relations which is expressed through the stratal organization of language. Language can be explained as a multiple coding system comprising three levels of coding, the semantic (meanings), the lexico grammatical (forms) and the phonological and orthographic (expressions).

Meanings are realized as forms, and forms are realized in turn as expressions. The guiding principle in language is that the more general meanings are expressed through grammar and the more specific meanings through vocabulary. Cohesive relations fit into the same pattern. That is to say, cohesion is expressed partly through grammar and partly through the vocabulary. We can refer therefore to grammatical cohesion and lexical one. Cohesion can be systemized by classifying it into small number of distinct categories: reference, substitution, ellipsis, conjunction, and lexical cohesion. Each of these categories is represented in the text by particular features such as repetition, omissions, occurrences of certain words and conjunctions (ibid).

Both grammatical and lexical cohesion are expected to be present in any type of text whether it is scientific or literary. However, no one can determine which one is more frequent in use than the other. Thus,
Comparing between the two texts (scientific and literary) in connection with the occurrence of lexical and grammatical cohesion devices.

Analyzing the results obtained with some drawn diagrams that illustrate the frequency of occurrence of grammatical and lexical cohesion in both types of texts.

Concluding which type of cohesion is more frequent in use than the other in each type of texts and showing the reasons behind that.

Types of Cohesion
Cohesive ties are the demonstration of semantic relations that form the basis for cohesion between the messages of a text. Such cohesive ties can be classified into two types:

2.1. The Grammatical Cohesion
Grammatical cohesion involves four categories. These are stated as follows:

2.1.1. Reference
It is the act of using referring expressions to refer to referents in the context. When there is no previous mention of the referent in the text, we call it exophoric reference dependent on the context outside the text for its meaning, (McCarthy, 1999: 35). When we refer to something inside the text, we call it endophoric reference. Let us take this example:

We have been established by an Act of Parliament as an independent body to eliminate discriminations against disabled people and to rescuer equal opportunity for them.

(The Disability Right Commission Leaflet, 2000)

Endophora avoids unnecessary repetition which makes the text seem over-explicit, it sounds as if the writer is assuming that readers will not understand unless it is all spelt out. It gives more information than it needed, as all readers would be able to make the connection between the pronoun and the phrase that it links with, if their short term memory is functioning normally.

2.1.2. Substitution
Mathews (2007: 384) describes it as a replacement, in the process of analyzing a language, of one unit or sequence of units by another. So, it is a grammatical relation; a relation in the wording rather than in the meaning. In English the substitute may function as a noun, as a verb, or as a clause. To these correspond the three types of substitution, nominal, verbal and clausal. Let us consider the following examples:

1. A: Did you call your father? B: I did (called my father).

2.1.3. Ellipsis
Andrew ford(2004:449) states that ellipsis is a process by which an expression is omitted in a certain context as it is possible to leave out words or phrases without repeating them. what is essential in ellipsis is that some sentences are omitted from the surface structure of text, but they are still understood. Hamer (2004:
sense, these elements perform the role of connectives between one unit and another which has already been introduced. Farrokhpey (1999: 282) has identified four types of conjunctive meanings:

A.
Additive: It is a text forming component of the semantic system. In general, the relation is, therefore, a semantic one. Halliday and Hassan (1976: 8) in turn divide the additive type into:
1. Simple such as, and, nor, or, …etc.
2. Complex such as, inaddition, alternatively, …etc.
3. Complex (de-emphatic)such as, bytheway, incidentally, …etc.
4. Comparative such as, bycontrast, similarly, …etc.
5. Examplificatory such as, forinstance, and forexample.

B.
Appositive or Adversative: This relation has the meaning contrary to the expectation. This expectation is either derived from the context of what is being said or from the relation that can be expressed by communicative process. For example however, but, …etc.

C.
Causal: Notions such as reason, result, and purpose are expressed by this relation. The elements used to express this relations are: So, if, forthisreason, …etc.

D.
Temporal: This is a relation of sequence in successive sentences. One sentence is in sequence to the 24) defines it as words that are deliberately left out of a sentence when the meaning is still clear. Starkey (2004: 50) points out that on some occasions, ellipsis is used instead of substitution for the sake of conciseness. Redford (2004: 449) explains that ellipsis is a process by which an expression is omitted in the sentence like (I will do it, if you will do it). We can omit the second occurrence of (do it) to avoid repetition (ibid).
2.1.4. Conjunction
Crystal (1985: 66) indicates that conjunctions are terms used in grammatical classification of words or morphemes to refer to expressions that link linguistic units. According to Halliday (1985: 325), these elements stand in a particular way to encode semantic relations which are referred to as conjunction for example( but ) as a conjunction in (He came but didn't stay). Conjunction is rather different in nature from the other cohesive relations, from both reference, on the one hand, and substitution and ellipsis on the other. It is not simply an anaphoric relation (Wikipedia, 2006: 34). These are explicit makers of connective relations. They have the function of the realization of cohesion, and therefore, they are text forming agencies (ibid). Quirk et al (1985: 632) refer to these elements as a class of adverbials used by the speakers to express "his assessment of how he views the connection between two linguistic units". In this
other in time. In addition, the presupposing sentence may be temporally cohesive not because it stands in particular time relation to the presupposed sentence, but it indicates the terminal of some process or series of processes. Thus, this meaning does not involve only sequence relation, but also conclusive and summary relation. The elements used to indicate this relation are; *then* finally,… etc

2.2. Lexical Cohesion

Cohesion is maintained not only by grammatical cohesion but also by lexical cohesion. Hoey (1991: 21) insists on the importance of lexical patterning and believes that much of coherence as well as cohesion of a text is created by lexical ties of individual words with each other. It includes reiteration and collocation.

2.2.1. Reiteration

It is a form of lexical cohesion which involves the repetition of a lexical item at one end of the scale, the use of a general word to refer back to a lexical item, at the other end of a scale, and number of things in between the use of synonym or near synonym. (Andrewford, 2004: 349). Accordingly, reiteration includes the following subcategories:

A. Repetition

Of all the lexical cohesion devices the most common form is repetition, which is simply repeated words or word-phrases, threading through the text. Take this example from D. H. Lawrence's short story *O douro of Chrysanthemums*:

The child put the pale chrysanthemums to her lips, murmuring: 'Don't they smell beautiful!' Her mother gave a short laugh 'No', she said, 'not to me'. It was chrysanthemum when I married, him and chrysanthemums when you were born, and the first time they ever brought him home drunk, he'd got brown chrysanthemums in his button hole'. (Lawrence, 1981).

Here, the repeated 'chrysanthemum' have the effect of pounding through the text and showing how they have been repeated and unwelcome feature of the mother's life. So, while substitution and ellipsis avoid repetition, the lexical repetition exploits it for stylistic effect.

B. Synonyms

Instead of repeating the exact same word, a speaker or writer can use another word that means the same or almost the same. This is a synonyms. Here, we are back to avoiding repetition. Raphael (1995: 9) presents the following example:

"Accordingly, I took leave and turned to the ascent of the peak. The climb is perfectly easy."

The words (ascent) and (climb) do not have exactly the same meaning. But, in this example, they refer to the same thing or idea. So, they are synonyms.

C. Super ordinates

In order to observe the lexical cohesion device of super ordinates, let us go back to *O douro of Chrysanthemums* and continue with the story:

The candle-light glittered on the lousier-glasses, on the two vases
information in themselves; they mostly depend on the co-text for their meaning, so are used when hearers and readers can identify what is being referred to from the rest of the text. Like pronouns, substitutions, ellipsis, synonyms and super ordinates, they avoid repetition and give just the amount of information as is necessary. (http://www.slideshare.net/cupidlucid/cohesion).

A general noun as a cohesive function is always accompanied by the reference item "the". For example:

1. A: "Didn't anyone make it clear they expected the minister to resign"?
   B: "They did. But it seems to have made no impression on the man".

2. A: "Can you tell me where to stay in Geneva?"
   B: "I've never been to the place".

2.2.2. Collocation
It is a relation within syntactic unit between individual lexical elements, for example (my computer hates me). In this sentence "computer" collocates with "me". It is used especially where words specifically or habitually go together. (Mathews, 2007: 93). The following diagram summaries what both types of cohesion consist of:

that held some of the pink Chrysanthemums, and on the dark mahogany. There was a cold, deathly smell of chrysanthemums in the room. Elizabeth stood looking at the flowers.

(Lawrence, 1981).

Here again there is repetition of "chrysanthemums", but then they are referred to with the words "the flowers". This is not a synonym of "chrysanthemum", it is amore general term which is known as a super ordinate an umbrella term that includes 'pansies', 'tulips', 'roses', …etc. This is another way of avoiding repetition and still referring to the referent with a noun. Lawrence could have used a personal pronoun in endophic reference instead and said 'Elizabeth stood looking at them', although this might have given them less prominence, and he does want them at the centre of his story.

D. General Words
The last form of lexical cohesion is the general words. These can be general nouns, as in 'thing', 'stuff', 'place', 'person', 'women', and 'men', or general verbs, as in 'do' and 'happen'. In away, the general word is a higher level super ordinate: it is the umbrella term that can cover almost every thing. General nouns and verbs do not carry much
Diagram (1): Types of Cohesion

3. Analysis of Result and Discussion

Table (1) below shows the frequency of occurrence of both grammatical and lexical cohesion in two types of texts: scientific and literary.
Table (1): Frequency of occurrence of grammatical and lexical cohesion in literary texts (3) and scientific texts (3).

<table>
<thead>
<tr>
<th>Cohesive Devices</th>
<th>Literary Texts</th>
<th></th>
<th>Scientific Texts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Relative Frequency</td>
<td>Frequency</td>
<td>Relative Frequency</td>
</tr>
<tr>
<td>Grammatical Cohesion</td>
<td>324</td>
<td>%95.36</td>
<td>391</td>
<td>%4.87</td>
</tr>
<tr>
<td>Reference</td>
<td>63</td>
<td>%15.36</td>
<td>20</td>
<td>%0.73</td>
</tr>
<tr>
<td>Substitution</td>
<td>4</td>
<td>%0.73</td>
<td>3</td>
<td>%2.92</td>
</tr>
<tr>
<td>Ellipsis</td>
<td>27</td>
<td>%6.58</td>
<td>12</td>
<td>%56</td>
</tr>
<tr>
<td>Conjunction</td>
<td>230</td>
<td>%56</td>
<td>356</td>
<td>%86.82</td>
</tr>
<tr>
<td>Lexical Cohesion</td>
<td>88</td>
<td>%20.97</td>
<td>124</td>
<td>%24</td>
</tr>
<tr>
<td>Reiteration</td>
<td>49</td>
<td>%11.25</td>
<td>68</td>
<td>%13.2</td>
</tr>
<tr>
<td>Repetition</td>
<td>13</td>
<td>%3.17</td>
<td>26</td>
<td>%5.04</td>
</tr>
<tr>
<td>Synonyms</td>
<td>8</td>
<td>%10.95</td>
<td>16</td>
<td>%3.10</td>
</tr>
<tr>
<td>Opposites</td>
<td>5</td>
<td>%1.21</td>
<td>5</td>
<td>%0.97</td>
</tr>
<tr>
<td>General Words</td>
<td>0</td>
<td>%0.24</td>
<td>Zero</td>
<td>%0</td>
</tr>
<tr>
<td>Super ordinates</td>
<td>10</td>
<td>%2.43</td>
<td>9</td>
<td>%1.74</td>
</tr>
<tr>
<td>Collocation</td>
<td>535</td>
<td>410</td>
<td></td>
<td>279</td>
</tr>
</tbody>
</table>

That is to say, the writer tends to convey his/her message more through forms (grammar) rather than through lexis (meaning) since the latter is rather more difficult than the first. The second reason is that grammatical devices such as ellipsis, substitution,…etc help to make the
scientific texts, like those of economy, biology, …etc, writers deal with rather complex topics. So, they tend to convey their messages by using somehow a simple way that really express their idea and the best way to achieve this aim is the use of devices such as conjunctions, references opposites, synonyms, …etc since they really help the writer literary ones, are rather accurate and complex. So, the writers cannot explain such accurate ideas without using fixed expressions (vocabulary) which is impossible to be substituted by others.

Table (2) below illustrates that in scientific texts the conjunction markers, being a category of grammatical devices, are more widely used (356) than those occurred in literary texts (230).

<table>
<thead>
<tr>
<th>Conjunction</th>
<th>Literary Texts</th>
<th>Scientific Texts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Relative Frequency</td>
</tr>
<tr>
<td>Additive</td>
<td>171</td>
<td>%74</td>
</tr>
<tr>
<td>Causal</td>
<td>14</td>
<td>%6.8</td>
</tr>
<tr>
<td>Contrastive</td>
<td>23</td>
<td>%10</td>
</tr>
<tr>
<td>Temporal</td>
<td>22</td>
<td>%9.56</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td></td>
</tr>
</tbody>
</table>

Furthermore, additive conjunctives such as 'and', 'also', …etc being one of conjunctions are more frequent in use than other types of conjunctions like contrastive, temporal, …etc. in both scientific texts (%76: 96) and literary ones (%74). Also, it is noticed that causal conjunctives both literary texts (%10) and scientific ones (%14) are the least in use in both: the literary texts (%6.8) and the scientific ones (%2.80). Moreover, contrastive conjunctions are less in use than additive conjunctives in text shorter. This means that writers can avoid repetition by using those grammatical devices. In addition, grammatical devices in scientific texts specifically are more widely used (%95. 36) than those occurred in literary texts (%79). The same can be said about lexical devices. That is, i.e, scientific (%24) and (%20.22) in literary texts. This may be due to the type of the text itself. That is, in elaborate, explain, and even compare between two completely different ideas. Moreover, lexical devices in scientific texts are more widely used than those occurred in literary texts. This can be traced back to the fact that scientific topics, compared with
additive devices such as 'and', 'also', ...etc. (2) The writers can add new information to the readers by using such devices.

Concerning table (3), it identifies the lexical cohesion in both texts: the scientific and literary texts and (%6.7) in scientific ones. Additive conjunctions especially are highly used in scientific and literary texts because they achieve the following aims: (1) Writers can elaborate in any subject (literary or scientific) by using additive conjunctions such as 'and', 'also', ... etc. (2) The writers can add new information to the readers by using such devices.

Table (3) : Frequency of occurrence of reiteration in scientific and literary texts.

<table>
<thead>
<tr>
<th>Lexical Cohesion</th>
<th>Literary Texts</th>
<th>Scientific Texts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Relative Frequency</td>
</tr>
<tr>
<td>Reiteration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repetition</td>
<td>49</td>
<td>%64.47</td>
</tr>
<tr>
<td>Synonymy</td>
<td>13</td>
<td>%17.10</td>
</tr>
<tr>
<td>Opposites</td>
<td>8</td>
<td>%10.5</td>
</tr>
<tr>
<td>General Words</td>
<td>5</td>
<td>%6.37</td>
</tr>
<tr>
<td>Superordination</td>
<td>1</td>
<td>%1.31</td>
</tr>
</tbody>
</table>

Table (3) above shows that reiteration which includes repetition, synonym, ...etc phrase and even the words which are similar relatively in meaning.

Conclusion
The study leads to the following conclusions on the theoretical level: - 1. Both grammatical cohesive devices and lexical ones help to make continuity in any type of text. That is, the absence of such devices leads to incoherent text.
2. Ellipsis, substitution and reference are used to avoid repetition. However, repetition is regarded as a lexical device which also results in coherent text.

is more widely used than the second category of lexical cohesion i.e, collocation although both of them create a coherent text. Reiteration has high frequency in both scientific texts (115) out of (515) and (76) out of (410) in literary texts. Collocation, in comparison with reiteration, has frequency of (10) and (9) in both literary and scientific texts respectively. Also, repetition, being a category of reiteration, is more widely used than other categories in both literary (%64.47) and scientific texts (%59.13). This may occur as a result of the writer's intention, in general, to repeat the same word or
On the practical level, the study results in the following conclusions:

1. Both grammatical and lexical devices are more frequent in use in scientific texts than those occurred in literary ones.

2. In both texts (scientific and literary) the grammatical cohesive devices are more widely used than lexical ones.

3. Conjunctive markers in scientific and literary texts are higher in use than other types of grammatical cohesion.

4. Whether the text is scientific or literary the additive conjunctives like and'also',…etc. are more frequent in use than other kinds of conjunction (temporal, oppositives,…etc.).

5. Reiteration occurs more than collocation in both scientific and literary texts although both of them achieve lexical cohesion in the text.

6. Repetition, being one of lexical cohesive devices, is higher in use than other categories although repetition may be accused of making a boring text.

References


*Wikipedia. 2006. Linguistics. *

[http://www.slideshare.net/cupidlucid/ cohesion.](http://www.slideshare.net/cupidlucid/cohesion)