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Comparing and Contrasting in Scientific Texts

A paper

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا ۖ إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ (٣٢)

صدق الله العظيم

سوره البقره ايه (٣٢)

In the name of ALLAH, The most Gracious the Most Merciful,

Glory is to You, we have no knowledge except what " you have taught us. Verily, it is You , the knower , the Wise".

God Almighty has spoken the truth

Surat Al Baqara , Verses

Ali (٢٠٠٦: ٣٢)

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Dedication

To my great father

To my generous mother ...

To my supportive brothers and sister

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Section One

Introduction

١.١ Introduction

Science texts are complicated documents for the native speaking student quite apart from the student studying in a second language. At present due to the development of information and communication technologies, the contemporary scientific texts are characterized by the complicated information structure, changes in language use and increased degree of intersexuality. Language of science as a language for specific purposes is defined as the language “used for particular and restricted types of communication”, containing “lexical, grammar and other linguistic features which are different from ordinary language” (Richards et al., ١٩٨٥, p. ١٥٩). In informative texts “the dominant appeal form is logos as the sender needs to persuade the receiver that the text presents a credible picture of subject matter” (Helder, ٢٠٠١, p. ٥٣). Comparing and contrasting are ways of looking at things to determine how they are alike and how they are different. **Comparing** involves identifying similarities and/or differences (e.g., apples and oranges are both fruit) whereas **contrasting** involves comparing two or more objects or events in order to show their differences (e.g., an apple has a thin skin that we can eat; an orange has a thick skin that we cannot eat)

This study attempts to find solutions to the following questions:

The Problem

١-What is meant by Scientific text?

٢-what are the types of Scientific text?

١.٢ The Aims

The study aims at:

- ١-Showing what is meant by Scientific text .
- ٢-Surveying Scientific text types.

١.٣ The Hypotheses

The study hypothesizes that :

١. There many definition of. Scientific text
٢. There are many types of Scientific text.

١.٤ The Procedure

- ١-Presenting a theoretical background about the definition of Scientific text.
٢. Conclusion of the study .

١.٥ The Limits

The paper is limited to the explain Scientific text .

١.٦ The Value

It is hoped that this paper would be of help to those who have interest in grammar whether they are students or teachers, text book writers , linguists and syllabus designers.

Section Two

۲.۱ Scientific Texts

All scientific discourse is carefully structured to ensure effective communication. It generally has a title, abstract, introduction, materials and methods, results, discussion, summary, and reference sections. The purpose of writing the title at an early stage is to clarify the author's aim and intentions. It accurately reflects the content of the article. The title is the reader's first encounter with the paper and so it should be informative. The abstract appears at the head of the article. It is valuable for the reader. It gives an idea about the whole article. The abstract, being brief and accurate, saves the readers time and effort. Then, the scientist introduces what he is going to do, how and why, the materials he is going to use in his experiments and the methods applied to arrive at his results. Finally, he discusses his results and arrives at his findings and conclusions. This logical organization in scientific writing is part of the scientific way of thinking which is concise, accurate, factual, logical and well-organised. This logical way of thinking is reflected in the use of language.

Scientific discourse also employs non-verbal items like charts, graphs, tables, signs, diagrams, and symbols to serve several communicative functions:

a. These devices support the scientist's conclusions and clarify his own thinking and communicate information. A table or a figure is a unit of communication completely informative by itself. It carries messages clearly and shows data meaningfully. It also reveals comparisons or changes.

b. Tables and figures describe an experiment and its purpose in a highly abbreviated way.

c. Figures reveal trends and relationships. Graphs can present precise values. Tables and figures reveal purpose and results at a glance. Each table has a title. The title announces the purpose of the table. It is indicative of the experimental design. Using non-verbal items, the scientist can economize on space by eliminating repetition of words.

These items are dictated by the need for extreme brevity, condensation and universality of the scientific way of thinking which is reflected through the use of tables, lines, curves, histograms, figures and symbols. Therefore, it must be part of the language teacher's job to explain the function of symbols and formulate in the text or give practice in transferring from the written to the spoken form or vice versa. A student can also learn abbreviations without much trouble. He has to translate them and should be given opportunities to practice this skill during note-taking exercises.

The vocabulary of scientific English may include words which are never used outside the subject or field in question. In science, new terms are invented to define new phenomena and to explain new things and processes. Each scientific subject has its store of terms with precise, narrow meanings.

Scientific language as a whole uses many different semiotic resources, such as oral or written language, images, diagrams, layout, and so on. This study focuses on written language. Below is an exploration of typical linguistic features of written language found to be relevant in earlier research for analysing science texts. The suppression of agency is a common attribute in scientific language. It allows texts to be written without – or at least with fewer – personal pronouns, thus reducing the level of personalized connections within the text. This is often achieved through extensive use of passives.

Passives allow the author to shift focus from objects or the people responsible for an action and to emphasise instead the phenomenon/process/result. Some studies show that although use of the passive voice makes a text seem more objective, it may also make the text alienating for most students, because they are not familiar with the way in which it is written (Fang, ۲۰۰۶:۲۲) state that items are to be written in the active voice. Use of abstractions is another way to reduce personification, i.e. to shift the focus from “the doers” to “what is done”. The level of abstraction in a text depends on several factors, but two related factors stand out as especially important: technicality and grammatical metaphor (Edling, ۲۰۰۶:۸۹).

Technicality is more than a set of terms; it is taxonomically related to technical terms, which organize reality in a different way than common sense does (Martin, ۱۹۹۳, ۱۰۰). Most technical terms are nouns (Martin, ۱۹۹۳, ۱۰۱), often created by noun compounding or expanded noun phrases with multiple modifiers (Schleppegrell, ۲۰۰۴). Such modifiers are mostly adverbs or adjectives that specify certain characteristics, thus enhancing the precision of the language.

A grammatical metaphor refers to when one kind of grammatical structure replaces another. In science, nominalizations – i.e., turning adjectives or verbs into nouns – are a grammatical metaphor commonly used to express processes or qualities as entities, thus often hiding the agent. Scientific writing privileges nouns – especially extended and nominalized nouns, thus increasing the packing of the information. Verbs and nouns can thus be regarded as complimentary, as dense language use (as in science) has more nouns and fewer verbs, and vice versa for less dense language (Graesser, 2013:99). The use of scientific language to display knowledge in an objective way creates lexically dense and logically structured language (Schleppegrell, 2004:100). Wellington and Osborne (2001) find the single use of readability tests of little value for evaluating science textbooks, as they do not measure lexical density. This implies that a measure of information load (i.e. how much information is packed into a text) should also be included when analysing texts used in school. Examples of such measures of information load include the nominal ratio: the number of nouns, prepositions and participles divided by the number of verbs, pronouns and adverbs.

scientific texts enable readers to get knowledge on a specific scientific issue. By this way, readers can get the required information on what they need. Scientific texts are a part of informative texts as they provide information for their readers. The purpose of such texts is to discuss a scientific problem which forms the subject of their study. Therefore, in a scientific text, the problem should be stated clearly in order to make the readers comprehend the crucial point of the research (Şenöz-Ayata, 2005).

Coursework is a self-study and research work with the elements of research, is carried out in order to consolidate, deepen, and generalize knowledge.

Bachelor's paper is a qualifying research work done by a student at the final stage of the study, with the aim of protecting and obtaining an academic bachelor's degree.

Master's work is qualifying research done by a student at the final stage of the study, for the purpose of public defense and obtaining an academic master's degree.

Dissertation is a document submitted in support of candidature for an academic degree or professional qualification presenting the author's research and findings.

Article is a publication containing a summary of the intermediate or final results of a research study that highlights a specific issue that combines analysis, structuring, formulation, and expressing opinions.

Theses are materials of the scientific report, published at the beginning of the scientific conference.

Monograph is a scientific work, which contains a full or in-depth study of a problem or subject belonging to one or more authors.

۲.۳ Characteristics of Scientific English

۱) Scientific writing must be clear.

Without a doubt, this is one of the most important characteristics of scientific writing. While literature may be flowery and poetic with many complex meanings, scientific writing CANNOT follow the same principles. (Khatib, ۲۰۱۱:۵۹)

٢) Scientific writing must be concise.

Concise does not necessarily mean short. It means you don't include additional, irrelevant information. If you are talking about prokaryotic bacteria, talking about cell nuclei (which only eukaryotic cells have) and cell walls (plants and some other eukaryotic cells) is beyond the cope and adds no value. (Al Masuadi, ٢٠١٣: ١٧٩)

٣) Scientific writing must be “easy to read”.

With this, I do not mean that even a five-year-old should be able to understand your research (although if they do, even better). Scientific writing uses specific terminology for very specific things that very few people might understand. “Easy to read” means that the rest of the writing is not complex. A reader unknowledgeable about the subject should be using a dictionary or reference material to figure out terms they do not understand. They should not be trying to figure out exactly what you are referring to with a verb that is on the other side of a sentence from the subject or object because of how you wrote it. If the sentence becomes slightly hard to understand, it is a guarantee that someone will misunderstand what is written. Write sentences as simply as possible!

(Klarer, ١٩٩٥: ٢٦-٢٧)

Section Three

A linguistic Analysis of a Literary Text and Scientific Text

Traditionally, the study of literature aims at the understanding of literary texts. Their meaning, structure, and means of expression. Text-oriented approaches like formalism and structuralism concentrate on the internal mechanism of texts while reader oriented approaches discuss the active participation of the reader in the realization of the literary work. Another way to understand literature is the context-oriented approach. (Klarer, ١٩٩٥: ٢٦-٢٧)

Context-oriented approaches differ depending on the cultural aspect they focus on in their examination. Feminism, for example, is a contextual approach which stresses the connection between gender concepts and literary texts while New Historicism includes a historical dimension into the discussion of texts. All contextual-approaches establish, one way or another, a relation between text and culture and insofar as they enter the territory of a different discipline while doing so they can also be called interdisciplinary approaches. To see literature in the context of history can only be successful when it involves the knowledge of history and literature. To examine philosophical influences on literature requires an understanding of both philosophical and literary texts. (Ibid)

The difference between science and other human endeavours is often regarded as fundamental insofar as science “aims at the discovery of causes and regularities in the physical world . . . with an existence apart from us”, (Anthony O’Hear, ١٩٨٩: ٢٢٨) in other words at objective truth, while the humanities and the arts are said to be concerned with “the way things appear to us, matter to us, and have significance for us”, (ibid: ٢٣٠) i.e. with subjective truth and impressions. In this view science is a human activity but by no means a human construction.

٢.١ A Scientific Text vs. Literary Text (١)

A Scientific Text: Mathematics in Ancient Mesopotamia

Until the ١٩٩٠s it was commonly supposed that mathematics had its birth among the ancient Greeks. What was known of earlier traditions, such as the Egyptian as represented by the Rhind papyrus (edited for the first time only in ١٨٧٧), offered at best a meagre precedent. This impression gave way to a very different view as Orientalists succeeded in deciphering and interpreting the technical materials from ancient Mesopotamia. Owing to the durability of the Mesopotamian scribes' clay tablets, the surviving evidence of this culture is substantial. Existing specimens of mathematics represent all the major eras- the Sumerian kingdoms of the ٣rd millennium BC, the Akkadian and Babylonian regimes and the empires of the Assyrians, Persians, and Greeks. The level of competence was already high as early as the Old Babylonian dynasty, the time of the lawgiver-king Hammurabi, but after that there were few notable advances. The application of mathematics to astronomy, however, flourished during the Persian and Seleucid period (Al Masuadi, ٢٠١٣: ١٧٩).

A Literary Text: Shall I compare thee to a summer's day?

William Shakespeare, 1564 - 1616

Shall I compare thee to a summer's day?

Thou art more lovely and more temperate.

Rough winds do shake the darling buds of May,

And summer's lease hath all too short a date.

Sometime too hot the eye of heaven shines,

And often is his gold complexion dimmed;

And every fair from fair sometime declines,

By chance, or nature's changing course, untrimmed;

But thy eternal summer shall not fade,

Nor lose possession of that fair thou ow'st,

Nor shall death brag thou wand'rest in his shade,

When in eternal lines to Time thou grow'st.

So long as men can breathe, or eyes can see,

So long lives this, and this gives life to thee.

(Web Source)

Section Four

The Results

To make a comparison between these two text is valuable for the great differences and similarities that may exist between them. First of all, the ultimate aim of the first text, i.e. scientific text, is to deliver the message which is maths in Mesopotamia. Whereas, the ultimate aim of the second text, i.e. literary text, is to deliver a message and to create the beauty of the language. In other way, Shakespeare in the second text tries to express himself in artistic and emotional way.

Secondly, the author of the first text depended on facts in getting the information to write his text. While Shakespeare depended on his imagination and mental state to create his text.

Thirdly, there is no hidden message behind the first text. On the other hand, there may be more than one message. For example, the hidden messages that Shakespeare wanted to convey are the hidden beauty is the most important thing that a woman may have, the faithfulness in love, the appreciation of other along time and the true love. These are not all the required messages since there may be others that readers can discover.

Furthermore, there is no a mutual relation between the writer and the reader in scientific texts. For example, you as a reader has not any feeling towards the author of “Mathematics in Ancient Mesopotamia”. Yet you may sympathize with Shakespeare when expressing his thoughts and feeling.

Additionally, there are very limited techniques used by authors in writing the scientific texts, i.e. an introduction, the body and the conclusion, or sometimes the chronological description. For example, the writer of the first text uses the chronological description. While in literary texts, there are unlimited techniques that the writer uses to present his message effectively.

Besides, writers in scientific texts talk about the physical world. For example, the author of the first text talk about maths in relation to Arabic nations. On the other hand, writers in literary texts talk about the physical and spiritual worlds. For example, Shakespeare talks about nature and seasons “a summer’s day”, “nature’s changing course”.

Also, the language of the scientific texts is as simple as possible in that the author uses tense in showing the time of the events. While, the literary language is so complex in that the author uses many devices and tools in expressing the events. For example, in the first text, the author uses the past tense to indicate that the events occurred at ages ago; while Shakespeare uses tense in addition to many literary devices like metaphor “compare thee to a summer’s day”, alliteration “And every fair from fair sometime declines”, repetition “So long as men can breathe, or eyes can see, So long lives this, and this gives life to thee.”

As a conclusion, it is shown that scientific and literary texts behave as contrastive texts for the huge gap that exists between them.

4.2 Scientific Text vs. Literary Text (٢)

A Scientific Text: “Using a Thermometer”

Many thermometers are thin glass tubes filled with a liquid. Mercury and alcohol are often used in thermometers because they remain in liquid form over a large temperature range. Thermometers can measure temperature because of a property called thermal expansion. Thermal expansion is the increase in volume of a substance because of an increase in temperature. As a substance’s temperature increases, its particles move faster and spread out. So, there is more space between them, and the substance expands. Mercury and alcohol expand by constant amounts for a given change in temperature.

A Literary Text: Lost Hearts

It was, as far as I can ascertain, in September of the year ١٨١١ that a post-chaise drew up before the door of Aswarby Hall, in the heart of Lincolnshire. The little boy who was the only passenger in the chaise, and who jumped out as soon as it had stopped, looked about him with the keenest curiosity during the short interval that elapsed between the ringing of the bell and the opening of the hall door. He saw a tall, square, red-brick house, built in the reign of Anne; a stone-pillared porch had been added in the purer classical style of ١٧٩٠; the windows of the house were many, tall and narrow, with small panes and thick white woodwork. A pediment, pierced with a round window, crowned the front. There were wings to right and left, connected by curious glazed galleries, supported by colonnades, with the central block. These wings plainly contained the stables and offices of the house. Each was surmounted by an ornamental cupola with a gilded vane.

٤.٣ The Analysis

Linguistically, there are different areas that these two texts will be compared upon. These areas are: structure, tense, aspect, vocabulary, sentence type, etc.

Structurally, scientific texts stick to the normal structure of English sentences, i.e., S+V+C. While literary texts deviate from the norm. that is, to front the object is something normal since the most important thing is the idea of the story and the style. Furthermore, in poetry the structure is not as important as rhyme.

Regarding tense, scientific texts use the present simple tense since the ultimate goal of these texts is to convey facts. Whereas, literary texts vary in using tenses. That is, all the types of tense and aspects can be used by authors.

Moreover, scientific texts use the active voice; whereas literary texts use the passive voice.

Regarding vocabulary, scientific texts tend to use simple vocabularies to let readers understand the text as simple as possible. Yet literary texts tend to decorate words and vocabularies since the aesthetic side is important.

Examining sentence types, it is found that scientific texts use mostly declarative sentences; while literary texts use all the types of sentences depending on the situation and need.

Section Five

Conclusion

Works of literature (prose texts and poetry) are both written and read through processes of cognition (involving linguistic creation or comprehension, emotion, memory, and imagination), and describe characters who think, feel, see, remember, and imagine within the fictional world.

Scientific texts including psychology, cognitive linguistics, and neuroscience have helped us to understand how all these processes work. Thus the argument for scientifically investigating the ways in which literary texts are created and enjoyed is a persuasive one, and the means of doing so are varied and exciting.

Scientific texts can, for example, help us understand how a text's language is processed and what sorts of text features – at the levels of semantics, syntax, and narrative construction – may have what effects; empirical studies can test these hypotheses on real readers; neuroscience can draw conclusions from the neural correlates of text-comprehension processes.

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