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# Paragraph Development in Scientific and Technical Writing

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Introduction

A paragraph is a unit of thought. The pattern of paragraphs is a critical element in making an argument look coherent and well organized in English writing, much more than in many other languages. In general, a paragraph should make one point or one component part of a single broader point. When a paragraph addresses various unrelated topics, this function should be explicitly stated to readers because they will not anticipate it (Jones, 2007).

Conceptual paragraph
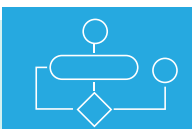
The conceptual paragraph is a group of organizationally (rhetorically) related concepts that develop a given core generalization in such a way as to form a coherent and complete unit of discourse. It is the basic unit of discourse in EST (English for Science and Technology) writing (Jordan, 2005). The important factor in relation to reading comprehension is for the reader to become aware of the core generalization of the paragraph. That is:

1. What does the paragraph refer to?
2. What subject is being discussed?
3. What is the paragraph's purpose?

The reader should also be aware of the nature of the core, whether it is a single statement or one that has two or more parts (Herbert, 2008). If the latter, the reader should be alerted to the possibility that more than one physical paragraph will make up the total paragraph—the conceptual paragraph—that is developing the core generalization. Having determined the core generalization, the reader should be aware of the techniques the writer is using to develop the information that supports the core. These techniques are usually marked by adverbs or prepositions (Murray & Moore, 2006).

Paragraph development

The relationships between the ideas in an EST paragraph and between the items of information and the core generalization are expressed by several techniques (Day & Gastel, 2006).
Natural techniques - the nature of the material the writer has available determines the techniques.
Logical techniques - the writer makes his own decisions as to the best way of presenting the relationships between his ideas.

Rhetorical techniques

Time order

Time chronology, in which the writer shows events taking place one after the other in clock or calendar time, or the development of something through history or over a shorter period of elapsed time, has been traced. In this type of development, the terms that indicate the time pattern are usually dates, i.e., calendar time, or hours and minutes, i.e., clock time. In these cases, key words such as *first, second*, etc. are used.
Time process is concerned with the steps in a procedure or process. The term can be defined as a series of two or more steps in which each step but the first is related to the preceding step; that is, a definite order of activity should be followed. Terms indicating time processes are often *first, second, etc. or now, then, after,* etc.

Spatial Order

The order of the components in a descriptive essay should correspond to their spatial locations or other relevant factors. The perspective and perception of details by the reader are influenced by the structural sequence of descriptive paragraphs. Place is emphasized, while time is disregarded. It is a rhetorical technique the writer uses when he wants to show the reader how objects are related spatially to one another. It is especially common in giving physical descriptions (Hayes, 2006).

Common spatial order words are: in, out, up, down, above, below (any adverb of place or position); first, second, last, next, following...

Cause and effect

Cause-and-effect essays give the reasons why something occurred or its results. These text structures are frequently utilized in persuasive and explanatory writing styles (Hayes, 2006). When a writer provides explanations for why something occurred, they are describing what created an effect (reasons are causes, and the thing that happens is the effect). When the outcomes of an activity are discussed, they are discussing the impacts of a cause, since outcomes are effects and causes are things that happen. It is likely that we have written a paragraph with one without realizing it since cause-and-effect text structures are so ubiquitous.

Examples

A representative is something that exemplifies the entire group. The knowledge the audience already possesses is used to help them learn something they do not know. Creative and captivating examples illustrate the points (Hayes, 2006). Examples are used to give the reader a specific case of the generalization represented by the core idea. This rhetorical technique is denoted by words, *as can be seen, as an example...*

Visual illustration

Words and illustrations can be combined in various different ways. Good readers can envision what they are reading in their minds. When reading technical writing, drawings can aid readers in picturing the settings and events that take place. In addition to assisting readers in visualizing what the text is describing, illustrations can also aid in word comprehension. The illustrator's choice of medium can help convey an appropriate tone for the text. It is used when the writer wants to make his point clear by referring the reader to a picture, a graph, or any other visual aid. This is often used as a kind of example. Words that indicate this technique are: *as figure n indicates (shows, illustrates, explains) as can be seen in figure n..., see figure n...*

Verbal illustration

A good visual illustration is not an excuse for a poor presentation. And often, a concept is too abstract to be represented visually. So this is when we use *verbal illustrations.* An example used by a speaker to evoke in the listener a vivid mental picture that best conveys the speaker's message is known as a verbal illustration (Graham, 2006). It is used when the writer wants to give the reader a very specific, detailed example. Terms that indicate this rhetorical technique are: *an illustration is, by way of illustration...*

Comparison and contrast

This structure emphasizes the similarities between things, happenings, or people through comparison and the differences between things or happenings through contrast. This format is typically used in technical writing. Writing in this format gives the author the opportunity to cite specific instances that support their point of view, which could be biased. A Venn diagram is a popular graphic organizer for students to use to separate and arrange their ideas (Graham, 2006). When comparing, writers that use this pattern may use words like *alike, similarly,* or both. Writers may employ contrastive words like *opposite, however, or while.*
They are used to make a difficult concept easier to grasp by comparing or contrasting it to something already known to the reader; or they are used to state the opposite of what might be expected from a preceding statement. Words that indicate these techniques are: *in comparison, in contrast, on the other hand, however, although, nevertheless, but, in spite of...*

Order of importance

The writer or speaker assigns ideas or actions rankings in accordance with a hierarchy of values. Information can be arranged from most important to least important or from least important to most important when adopting the order of importance pattern of organization. Both text structures would be regarded as having equal relevance (Hayes, 2006). It is a rhetorical technique used when a series of supporting details should be put in some order. Common words that indicate this technique are: *first, second, most important, least important, last, in the order of importance...*

Details

It is customary in technical writing to give specifics, details, and concise descriptions or explanations of unknown concepts. If a specific phrase or detail is not frequently used, it should be defined clearly. Details are used when simple supporting statements for the core idea of the paragraph are needed, often in descending order of importance. Details can be presented in *cause and effect, comparison or contrast, time, space,* and other rhetorical techniques. A common type of detail is statistical data (Hayes, 2006).

Analogy

It is a rhetorical technique used when the writer wants to make a comparison of things which are basically not alike. Comparison compares things that are basically similar, but analogy compares things that are basically dissimilar. Words indicating this rhetorical technique are: *by way of analogy, analogically, by analogy...*
Analogies have two types: correspondences and inferences. The first type of analogy is a relationship between two otherwise unrelated items. Analogies are used especially when the writer is unable to come up with any common examples of the topic since it is so strange. The second kind of analogy assumes that if two objects are similar in some ways, then they should also be similar in other ways (Murray & Moore, 2006).

Conclusion

The technical paragraph in its simplest and most common form begins with or has near the beginning a core idea—a generalization that tells the reader what the paragraph is about. Then this core is developed by one or a combination of the methods given above. By the writer's using the key terms listed, the reader is told what type of development is being used, and therefore the reader can understand the information given more quickly and more clearly. The types of development should be determined by the writer's analysis of the problem.

(1) Which type best expresses this core for the purpose for which the paragraph is written, and
(2) Which type is best suited to a specific reader or group of readers? A presentation should be more straightforward for readers with limited previous information than for readers with more knowledge.

A technical paragraph basically makes some kind of statement, and then it proves that statement or provides the reader with further information in some way. Also, it is a unit of organization for the material that makes up the entire piece of writing.

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