WHAT IS A PARAGRAPH?

You will find a variety of definitions offered in books about writing. In fact, it is hard to write a precise definition of a paragraph, that is, a definition that embraces every good paragraph and excludes every bad one. Therefore, I prefer a very general definition, and here it is:

A paragraph is a block of text that its intended reader will understand as closely related statements addressing a single topic.

This definition is so broad that it offers only limited help in discriminating among good and bad paragraphs. Therefore, in order to offer the class more help with this difficult concept, I expand herein by offering a taxonomy of common types of paragraphs. While not a complete list, the examples analyzed below are the most common types.

Paragraphs must also be constructed to establish their logical relationships to the paper as a whole. Sometimes the relevance of a paragraph is obvious and needs no explanation. Often, however, the writer chooses to help the reader with some sort of transitional work or sentence. Accordingly, we will also discuss transitions as a part of our discussion of paragraphs.

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**TYPE I: LEADING TOPIC SENTENCE**

**SUPPORTED WITH RELATED PROCESS DESCRIPTION**

Paragraphs 1-3 are all examples.

This, at least in scientific writing, is far the most common. The first sentence in each of these paragraphs clearly identifies the topic. The rest of the paragraph describes and elaborates on the process cited in the topic sentence.

**SUPPORTED BY LIST OF EXAMPLES**

Paragraph 4 also has an opening sentence that clearly states the topic. However, the supporting text is a list of related examples.

All but the first of these paragraphs give the reader help with the transition. Paragraph 2 does so by repeating a key concept word from the previous paragraph. Paragraph 3 uses a logical connector ("because"), and paragraph 4 uses a deictic word (pointing word) to refer directly to an issue already raised.

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On SDSC's DataStar [3], as on all parallel systems, processes must share resources. While the system does not time-share and consequently, each process receives its own processor with a level 1 cache, two must share a level 2 cache. The eight processors on each node must share a level 3 cache, main memory, an on-node file system, and bandwidth to off-node I/O.

Sharing, by its nature, entails compromise. In the realm of parallel processing, that compromise may lead to performance degradation. The more heavily coexisting processes make use of a shared resource, the more likely it is that the performance of that resource will suffer. Heavy use of the shared resource cache might lead to lower hit rates, and consequently, lower per-processor throughput. As more processes make simultaneous use of a shared I/O system, blocking times increases and performance degrades.

Because the consequences of resource sharing are often ill-understood, scheduling policies on production space-shared systems avoid inter-job sharing wherever possible. On DataStar, for instance, nodes are never time-shared and parallel jobs have exclusive use of the nodes on which they run. Even then, the system's General Parallel File System remains a shared resource among all running jobs.

This is not an ideal policy in several circumstances. Resource utilization and throughput suffer when small jobs are forced to occupy an entire node while making use of only a few processors. The policy also encourages users to squeeze large parallel jobs onto the fewest number of nodes possible since doing otherwise is both costly and detrimental to system utilization. Such configurations are not always optimal: the processes of parallel jobs often perform similar computations, consequently stressing the same shared resources and exacerbating the slowdown due to resource contention.
While those results are promising, it is essential to verify that symbiotic space-sharing is as effective for real applications as for smaller, specialized benchmarks whose resource bottlenecks are known and often intended. Is there as much opportunity for symbiotic space-sharing in production workloads as in benchmarks?

Due to the nebulous understanding of these inter-application effects, scheduling policies may attempt to minimize resources to jobs in minimally overlapping bundles. DataStar, for instance, allocates resources by the node, ensuring that jobs only share global off-node resources that are less likely to present significant contention-related slowdown. While such policy achieves fairness and predictability, it often achieves sub-optimal performance as well. A CPU or I/O-bound job that is not memory-intensive, for instance, may extract very little utility from the memory resources allocated to it. Memory-intensive jobs may require minimal node counts just to fit into memory or may choose to increase memory resources by running across more nodes than their processor counts demand: consequently, some processors can be left idle or lightly loaded.

If a busy shopping mall has got only a single cash counter, the customers will form a single queue, and wait their turn. If there are two cash counters, the task can be effectively split. The customers will form two queues and will be served twice as fast. This is an instance in which parallel processing is an effective solution.

Without cell phones, wives could not call husbands to ask them to do errands on the way home, students would be deprived of a refreshing break from study when interrupted by a frivolous call from a friend, and classmates would miss the pleasure of hearing the melodic rings of cell phones in the middle of class.

All of the paragraphs on page one were consecutive paragraphs from the same text. However, numbers 5 through 7 are isolated paragraphs that I picked because they are less typical structures.

While the first sentence is the topic sentence in number 5, this paragraph is interesting because it bridges to the previous paragraph with a relative clause (“while those results are promising”) and to the subsequent paragraph by posing a question in the last sentence. No new supporting information is included. The paragraph simply sets the stage to move from the previous discussion to a new discussion.

Paragraph 6 offers some explanatory information to establish the sentence topic. This could be split into two paragraphs, but as the material is closely related, it also works as a single paragraph. Paragraph 7 offers the support of examples for a topic that is stated in the last sentence.

Sometimes, the topic is so obvious that it does not need to be stated. Paragraph 8.