

Coherent Writing: Make the Logic Clear

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You have an idea that you want to communicate to others. Your goal in writing is to make that idea appear in the mind of your reader just as it appears in yours. Remember that you need to communicate, not just the single idea, but the way in which that idea relates to other important ideas. Those relationships may be obvious to you, but unless you make them explicit, your reader may miss them.

Help the reader: add connectors.

Make the logic of your writing clear by adding appropriate connectors such as conjunctions (*as, so, for, and, but, or*), connective adverbs (*however, therefore, etc.*) or connective phrases (*for this reason, one such robot, for instance, etc.*). Without the connectors, each sentence may make sense by itself, but the reader is left wondering, “Why is this information in one paragraph? What’s the point of the paragraph?” Compare this passage, without connectors and with them:

Without connectors:

Designing a robot that can autonomously traverse a variety of terrain types is difficult. One may refer to nature for inspiration and produce robots that mimic biological organisms. RHex is a six-legged breadbox-sized robot whose design resembles that of a cockroach.

Where is the author going? We can’t tell. Compare that passage with this next version, which includes considerable help for the reader in moving from idea to idea:

Designing a robot that can autonomously traverse a variety of terrain types is difficult. For this reason, one may refer to nature for inspiration and produce robots that mimic biological organisms. RHex is one such device, a six-legged breadbox-sized robot whose design resembles that of a cockroach.

(From Sam Burden, “The Role of Leg Differentiation in Hexapedal Running.” Report written for the 2006 REU SUNFEST program at the University of Pennsylvania. Used with permission of the author.)

In the next passage (modified from the same report), connectors have been left out. It’s not clear what these sentences have to do with each other:

Building a robot that mimics a living creature carries advantages beyond locomotive stability. Mathematical models that describe animal walking and

running can be applied to the device. An entire existing body of analysis can be used to characterize the robot's movement, saving time and increasing intuitive understanding. The spring-loaded inverted pendulum (or SLIP) model for animal running and hopping has been successfully applied to RHex's forward motion.

Here is the same passage with logical connectors. Now we see the logical progression of ideas:

Building a robot that mimics a living creature carries additional advantages beyond locomotive stability. For instance, mathematical models that describe animal walking and running can be applied to the device, so an entire existing body of analysis can be used to characterize the robot's movement, saving time and increasing intuitive understanding. One such model, the spring-loaded inverted pendulum (or SLIP) model for animal running and hopping, has been successfully applied to RHex's forward motion.

Choose the right connector!

You want to clarify your logic by adding a conjunction or connective adverb. But don't just throw in any connector: choose one that clarifies the connection between the sentences! In the following example from a student paper, the use of *on the other hand* actually misleads the reader:

Microsoft Word and Linux can both be considered software. Patents, *on the other hand*, are exclusive rights granted by the government to an inventor for his invention for a limited period of time, in exchange for full disclosure about his research.

On the other hand introduces a contrast, but the assumption is that we are contrasting items that are in some way alike: *Apples and peaches can be grown in temperate climates. Bananas and oranges, on the other hand, must be grown in climates that do not have freezing temperatures.*

How are Microsoft Word, Linux, and patents in any way alike? They are not. We are left wondering what possible point the author could be making.

The same is true in the next example (also from a student paper): Why did the author choose *in particular* to connect the two sentences? How is the second sentence a specific example of the first sentence?

As of April 1, 2010, 849 municipalities and 32 states have banned smoking in workplaces, and/or restaurants, and/or bars (ANR 2010). *In particular*, the effect of second hand smoke on the incidence of heart attacks has been well-studied (Ciruzzi 1998; Zhu 1994; Zhu 1997).

If you need a review of the meaning of various connectors, or of the punctuation that goes with them, go to **Compound Sentences and Coordination** and **Guidelines for Punctuation**.

Connectors are good, but wordiness is not.

Be alert to the possibility that you've said the same thing twice. Cut the repetition – and if needed, the connector!

The purpose of this report is to summarize progress to date. Specifically, this report reviews progress we have made in selecting and testing materials.

The authors could skip the first sentence and the word *specifically*, and just get to the point.

In the next example, *specifically* is appropriate, but the sentences are wordy:

There is a need to learn how to code inputs in VISSIM to create the model. Specifically, there is a need to understand how to create drivers in the model, how to specify driver interactions, and how road conditions will affect driver behavior.

The authors could take advantage of list format to express the information more clearly and succinctly:

We need to learn how to code inputs to

- create drivers
- model driver interactions
- model road conditions and their effect on driver behavior.

Guidelines for using sentence connectors

- Is the logic of the passage clear? If not, will adding a conjunction or connective adverb make the logic clear? Then add one.
- Make sure to add a connector that actually helps the reader follow the logic!
- If no logical connector seems to help, consider the possibility that there is no logical connection between the sentences. Maybe you need to restructure your writing or cut a sentence or two.

NOTE: As such does not mean therefore!

Beware of using **as such** to connect your ideas. These words do not mean **therefore**! The meaning of **as such** is **as a member of such-and-such a class**:

- Each revised draft of the report must be marked **as such** and submitted along with the marked-up original. (SEAS MSE 250 Lab Report Guidelines)

Here is another example:

- The laboratory rules are important guidelines meant to ensure both safety and accuracy; and **as such** (as important guidelines), they should be understood and meticulously observed.

Perhaps you are saying, ‘but **as such** means **therefore** in this sentence!’ No, it doesn’t. It would be quite possible to take out **as such** and replace it with **therefore** and to still have a meaningful sentence. The meaning would be similar, but not the same. And the fact that either meaning is possible in this sentence does not mean that the two expressions can always be used interchangeably.

As such is inappropriate and confusing in these passages from student papers:

Developers have designed videogames to teach specific subjects such as math or history, with little success. As such* videogames were abandoned by the industry as a venue for education.

*As what – as a member of what class?

The moving components are so small that they require very little power to run. As such**, we found that a lithium ion battery ... would provide sufficient power.

Are **we a member of some previously mentioned class?

The behavior of cells is profoundly affected by their environment, and as such***, it is important to study both the cells and their extracellular components.

***Just say ‘for this reason,’ ‘thus,’ or ‘therefore!’ Don’t misuse ‘as such!’