



THE WRITING PROCESS

Annotating a Text

Annotating a text, or marking the pages with notes, is an excellent, if not essential, way to make the most out of the reading you do for college courses. Annotations make it easy to find important information quickly when you look back and review a text. They help you familiarize yourself with both the content and organization of what you read. They provide a way to begin engaging with ideas and issues directly through comments, questions, associations, or other reactions that occur to you as you read. In all these ways, annotating a text makes the reading process an active one, not just background for writing assignments, but an integral first step in the writing process.

A well-annotated text will accomplish all of the following:

- clearly identify where in the text important ideas and information are located
- express the main ideas of a text
- trace the development of ideas/arguments throughout a text
- introduce a few of the reader's thoughts and reactions

Ideally, you should read a text through once before making major annotations. You may just want to circle unfamiliar vocabulary or concepts. This way, you will have a clearer idea about where major ideas and important information are in the text, and your annotating will be more efficient.

A brief description and discussion of four ways of annotating a text—**highlighting/underlining**, **paraphrase/summary of main ideas**, **descriptive outline**, and **comments/responses**—and a sample annotated text follow:

HIGHLIGHTING/UNDERLINING

Highlighting or underlining key words and phrases or major ideas is the most common form of annotating texts. Many people use this method to make it easier to review material, especially for exams. Highlighting is also a good way of picking out specific language within a text that you may want to cite or quote in a piece of writing. However, over-reliance on highlighting is unwise for two reasons. First, there is a tendency to highlight more information than necessary, especially when done on a first reading. Second, highlighting is the least active form of annotating. Instead of being a way to begin thinking and interacting with ideas in texts, highlighting can become a postponement of that process.

On the other hand, highlighting is a useful way of marking parts of a text that you want to make notes about. And it's a good idea to highlight the words or phrases of a text that are referred to by your other annotations.

PARAPHRASE/SUMMARY OF MAIN IDEAS

Going beyond locating important ideas to being able to capture their meaning through paraphrase is a way of solidifying your understanding of these ideas. It's also excellent preparation for any writing you may have to do based on your reading. A series of brief notes in the margins beside important ideas gives you a handy summary right on the pages of the text itself, and if you can take the substance of a sentence or paragraph and condense it into a few words, you should have little trouble clearly demonstrating your understanding of the ideas in question in your own writing.

DESCRIPTIVE OUTLINE

A descriptive outline shows the organization of a piece of writing, breaking it down to show where ideas are introduced and where they are developed. A descriptive outline allows you to see not only where the main ideas are but also where the details, facts, explanations, and other kinds of support for those ideas are located.

A descriptive outline will focus on the function of individual paragraphs or sections within a text. These functions might include any of the following:

- summarizing a topic/argument/etc.
- introducing an idea
- adding explanation
- giving examples
- providing factual evidence
- expanding or limiting the idea
- considering an opposing view
- dismissing a contrary view
- creating a transition
- stating a conclusion

This list is hardly exhaustive and it's important to recognize that several of these functions may be repeated within a text, particularly ones that contain more than one major idea.

Making a descriptive outline allows you to follow the construction of the writer's argument and/or the process of his/her thinking. It helps identify which parts of the text work together and how they do so.

COMMENTS/RESPONSES

You can use annotation to go beyond understanding a text's meaning and organization by noting your reactions—agreement/disagreement, questions, related personal experience, connection to ideas from other texts, class discussions, etc. This is an excellent way to begin formulating your own ideas for writing assignments based on the text or on any of the ideas it contains.

SAMPLE ANNOTATED TEXT

“How Come the Quantum”

By John Archibald Wheeler

Bold = Main Ideas

Universal Font = Descriptive Outline

Italics = Comments

intro of topic	What is the greatest mystery in physics today? Different physicists have different answers. My candidate for greatest mystery is a question now century old, <u>“How come the quantum?”</u> What is this thing, the “quantum”? It’s a bundle of energy, an indivisible unit that can be sliced no more. Max Planck showed us a hundred years ago that light is emitted not in a smooth, steady	Greatest mystery in physics is nature of quantum.
historical perspective	flow, but in quanta. Then physicists found quantum jumps of energy, the quantum of electric charge and more. In the small-scale world, everything is lumpy.	<i>lumps of energy?</i>
description	And more than just lumpy. When events are examined closely enough, uncertainty prevails; cause and effect become disconnected. Change occurs in little explosions in which matter is created and destroyed, in which chance guides what happens, in which <u>waves are particles and particles are waves.</u>	chance plays great role in change in this "small scale world" <i>This means they're the same and different at the same time?</i>
main idea of essay	<u>Despite all this uncertainty, quantum physics is both a practical tool and the basis of our understanding of much of the physical world.</u> It has explained the <u>structure</u> of atoms and molecules, the thermonuclear burning that lights the stars, the <u>behavior</u> of semiconductors and superconductors, the radioactivity that heats the earth, and the comings and goings of particles from neutrinos to quarks.	quantum physics has helped us understand material world <i>both what things are and how they work</i>

rhetorical
question

Successful, yes, but mysterious, too. Balancing the glory of quantum achievements, we have the shame of not knowing “how come.” Why does the quantum exist?

some things remains a mystery
Science can't tell us why anything exists. We still need religion for that.

one
interpretation

My mentor, the Danish physicist, Niels Bohr, made his peace with the quantum. His “Copenhagen Interpretation” promulgated in 1927 bridged the gap between the strangeness of the quantum world and the ordinariness of the world around us. It is the act of measurement, said Bohr, that transforms the indefiniteness of quantum events into the definiteness of everyday experience. And what one can measure, he said, is necessarily limited. According to his principle of complementarity, you can look at something in one way or in another way, but not in both ways at once. It may be, as one French physicist put it, “the fog from the north,” but the Copenhagen interpretation remains the best interpretation of the quantum that we have.

Bohr suggested it's measurement that makes the quantum useful

Its mysterious quality is a separate issue.

This is best theory we have.

anecdote

Albert Einstein, for one, could never accept this world view. In on-again, off-again debates over more than a dozen years, Bohr and Einstein argued the issues—always in a spirit of great mutual admiration and respect. I made my own effort to convince Einstein, but without success. Once, around 1942, I went around to his house in Princeton to tell him of a new way of looking at the quantum world developed by my student, Richard Feynman.

Einstein didn't accept this

I'm with Einstein on this.

name-dropper!

second
interpretation

Feynman pictured an electron getting from point A to point B not by one or another possible path, but by taking all possible paths at once. Einstein, after listening patiently, said, as he had on other occasions, “I still cannot believe God plays dice.” Then he added, “But maybe I have earned the right to make my mistakes.”

Feynman proposed another explanation.

Einstein recognizing the limits of science?

third interpretation

Feynman's superposed paths are eerie enough. In the 1970s, I got interested in another way to reveal the strangeness of the quantum world. I called it "delayed choice." You send a quantum of light (a photon) into an apparatus that offers the photon two paths. If you measure the photon that leaves the apparatus in one way you can tell which path it took.

Another explanation is "delayed choice."

explanation of third interpretation

If you measure the departing photon in a different way (a complementary way), you can tell if it took both paths at once. You can't make both kinds of measurements on the same photon, but you can decide, after the photon has entered the apparatus, which kind of measurement you want to make.

You can look at 2 measurements, but not both at once.

explanation, continued

This makes no sense. What's too bad?

Is the photon already wending its way through the apparatus along the first path? Too bad. You decide to look to see if it took both paths at once, and you find that it did. Or is it progressing along both paths at once? Too bad. You decide to find out if it took just one path, and it did.

Your "delayed choice" of how to measure influences the outcome.

anecdote

But does a lab have anything to do with the "real" cosmos?

At the University of Maryland, Carroll Alley, with Oleg Jakubowicz and William Wickes, took up the challenge I offered them and confirmed that the outcome could be affected by delaying the choice of measurement technique—the choice of question asked—until the photon was well on its way. I like to think that we may one day conduct a delayed-choice experiment not just in a laboratory, but in the cosmos.

theory confirmed in lab; may be confirmed in cosmos some day

Analogy

One hundred years is, after all, not so long a time for the underpinning of a wonderfully successful theory to remain murky. Consider gravity. Isaac Newton, when he published his monumental work on gravitation in the 17th century, knew he could not answer the question, "How come gravity?" He was wise enough not to try. "I frame no hypotheses," he said.

The "why" of gravity was a mystery at first, too.

development of
analogy

It was 228 years later [that] Einstein, in his theory of general relativity, attributed gravity to the curvature of space-time. The essence of Einstein's lesson can be summed up with the aphorism, "Mass tells space-time how to curve, and space-time tells mass how to move." Even that may not be the final answer. After all, gravity and the quantum have yet to be joined harmoniously.

Einstein explained the "why" of gravity, but even that may not be the final word.

That's a description, not an explanation.

speculation

On the windowsill of my home on an island in Maine, I keep a rock from the garden of Academe, a rock that heard the words of Plato and Aristotle as they walked and talked. Will there someday arise an equivalent to that garden where a few thoughtful colleagues will see how to put it all together and save us from the shame of not knowing "how come the quantum"? Of course, in this century, that garden will be as large as the earth itself, a "virtual" garden where the members of my imagined academy will stroll and converse electronically.

Perhaps physicists will one day solve the "why" of the quantum.

nice reference to the Internet

conclusion

Here, a hundred years after Planck, is quantum physics, the intellectual foundation for all of chemistry, for biology, for computer technology, for astronomy and cosmology. Yet, proud foundation for so much, it does not yet know the foundation for its own teachings. One can believe, and I do believe, that the answer to the question, "How come the quantum?" will prove to be also the answer to another question, "How come existence?"

quantum physics, foundation for so many fields, is itself built on a mystery

He thinks we can understand meaning through science-a purely descriptive field.