

# Developing Critical Thinking

CSCI 240 Computers and Society

## Introduction

The development of critical thinking and analytical thinking is the key to the understanding and use of information. It is what allows you to discuss and argue points of opinion and points of fact. It is the basis for your formation of independent ideas. Once formed, these ideas can be written about and integrated with both similar and contrasting information.

There are a number of cognitive skills involved in critical thinking that are fundamentally interrelated.

- Differentiating between fact and opinion
- Recognizing and evaluating author bias and rhetoric
- Determining cause-and-effect relationships
- Determining the accuracy and completeness of information presented
- Recognizing logical fallacies and faulty reasoning
- Comparing and contrasting information and points of view
- Developing inferential skills
- Making judgments and drawing logical conclusions

## Differentiating Between Fact and Opinion

A *fact* is a statement that can be proven true by other verifiable facts. An *opinion* is a statement of a person's feelings or impressions. After reading an article, a good exercise is to set down three statements of fact and three of opinion. Guidelines might be:

- What externally verifiable information is presented that makes this statement true, or factual?
- How does the author differentiate between the interpretation of information and the presentation of factual data?

Some other questions you might ask yourself include the following:

- What rules or techniques can be used to identify statements of fact? Of opinion?
- Can a statement contain both fact and opinion?
- Can some opinions be considered reliable? Why?

## **Recognizing and Evaluating Author Bias and Rhetoric**

You should always try to analyze and evaluate author bias and the author's use of rhetorical ploys and techniques. Upon reading the article in question, you may ask yourself the following questions:

- What qualifications does the author have for writing on this subject? (What are the qualifications of the individuals the author quotes?)
- When and where was this article first published? Does this information affect the credibility of the article?
- What do you think the author wants his/her readers to think or do?

## **Determining Cause-and-Effect Relationships**

Through attentive reading of an article, you may come to understand that one situation causes a second. As an example, an article on health may take up the effect of smoking and consumption of alcohol on the body. In an attempt to clarify the cause-and-effect relationship, you might ask the following questions:

- What are the effects of alcohol on the liver?
- Can the combination of alcohol and cigarettes increase the risk of acquiring diseases? What diseases?
- What effects on diet does alcohol consumption have?

Similar questions could just as easily be put to world affairs, psychology, or government. The issue here is of determining factual data and then of determining its effect in the real-world order.

## **Determining the Accuracy and Completeness of Information Presented**

Once fact and opinion have been differentiated, author bias known, and a rudimentary understanding of cause-and-effect relationships examined, it must be determined if the information presented is complete and accurate. Is more information needed?

Articles within a particular topic area may give you an opportunity to evaluate the bias of one article in the face of another. It may also give you a chance to examine divergent opinions gleaned from the same data. For example, several articles on the effects of acid rain may include a number of articles written by both Canadian and American authors. You should ask yourself whether each article provides enough information for an unbiased assessment of the situation. Questions that you might ask yourself when considering a group of articles on a subject include:

- What facts do all the articles in the discussion use?
- What important facts are used in some of the articles, but not in all of them?
- What sources could be used to check the information presented in each of the articles?

## **Recognizing Logical Fallacies and Faulty Reasoning**

Critical thinking requires the ability to recognize faulty logic. Here are seven major examples of fallacies of reasoning that students should be able to recognize. Notice that several of them are variations of the criteria for critical thinking. The fallacies are:

1. Incorrect assumption of cause/effect relationship. For example: Every time I wash my car, it rains; therefore, if I wash my car, it will rain.
2. Inaccurate or distorted use of the interpretation of numerical statistical information. For example: Lowering of the speed limit on highways to 55 mph results in fewer traffic fatalities. (Such information should be checked against the number of people using the highways since the institution of such laws. Are there now fewer people driving?)
3. Faulty analogy, comparison carried too far, or comparison of things that have nothing in common. For example: Apples and oranges are both fruit and grow on trees; therefore, apples and oranges taste the same.
4. Oversimplification. Potentially relevant information is ignored in order to make a point. For example: The majority of voters in the United States are Democrats; therefore, Democratic candidates will win every election.
5. Stereotyping. People or objects are lumped together under simplistic labels. For example: Hispanic Americans all speak Spanish; therefore, Spanish language advertising will appeal to all of them.
6. Ignoring the question. Digression, obfuscation, or similar techniques are used to avoid answering a question. For example: When asked about a tax increase possibility, a senator replies “I have always met the obligations I have to those I represent.”
7. Faulty generalization. A judgment is based on insufficient evidence. For example: Ducks and geese migrate south for the winter; therefore, all waterfowl migrate south for the winter.

## **Comparing/Contrasting Information and Points of View**

To compare and contrast, you must have a wide variety of material at hand. By comparing and contrasting a number of articles related to a single topic, you can identify facts and draw conclusions more readily.

## **Developing Inferential Skills**

Sometimes it is useful to take a line of argument from one article and apply it to another. A guideline for this is:

- In article A, the author claims that the reason for the current state of affairs was the result of X, Y, and Z. If that has been proven false, how do those findings affect the related arguments in article B?

## **Making Judgments and Drawing Logical Conclusions**

Making judgments and drawing logical conclusions require the implementation of all the previously examined critical-thinking skills. Questions such as the following can help you successfully grasp the information that has been presented:

- What are the conclusions drawn by the author of this article?
- Do you agree or disagree with the author's conclusions?
- What other conclusion is it possible to draw from the same information?
- What other information might be important to know before making any judgment of the value and import of this article?

## **Using an Evaluation Form**

Sometimes an evaluation form may focus your thinking. Such a form forces you to summarize the article in your own words and briefly analyze what you have read. A sample evaluation form you may wish to use is after the Index in *Computers in Society*, Fifth Edition, edited by Kathryn Schellenberg.