Critical Thinking Skills

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In order to receive any benefits from using the Scientific Method, one must become a critical thinker. The data collected must be analyzed and interpreted to form valid conclusions. If these conclusions are lacking credibility, then the data collected is worthless. One thing scientists know is that data can be interpreted in many different ways, and some of these ways may not be totally correct. In the following exercise you will be exposed to several situations that will help develop your critical thinking skills.

**What is Truth?** Truth can either be objective (discovered) of subjective (created). Objective truth is the actual state of affairs about things. Subjective truth is based on people making their own truth, hoping that believing something will actually make it so. As scientists we must seek objective truth.

Read the following statements and place an "**a**" if you think the truth is objective, and a "**b**" if it is subjective. Be prepared to explain your choices.

A \_\_\_\_ A tax consultant preparing your income tax.  
A \_\_\_\_\_ A laboratory researcher attempting to find a cure for cancer  
B \_\_\_\_\_ A person drinking some poison thinking it is Pepsi Cola and won't hurt him.  
B \_\_\_\_\_ A person standing on the sea shore looking at the horizon, thinking the world is flat. A sports referee making a crucial call in a game.

**Why is it important for scientists to be objective when it come to examining scientific data?**  
  
If we fabricate a fact then others may build other conclusions on this theory. Once it is disproven then any compounded research needs to be re-evaluated and an assessment of its credibility concluded.  
  
Therefore creating facts instead of discovering evidence based truths is not only high counter-productive, and you are literally slowing down the progress of mankind.

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**Fact or Opinion?** Opinions are beliefs about reality. Unlike facts, they are open to question and analysis by critical thinking. Classify the following examples as either a fact or an opinion.

1. The New York Knicks were the N-BA champions in 1999. **Fact**
2. Camel's hair brushes are made of Siberian squirrel fur. **Fact**
3. Eyewitness testimony is generally unreliable.  **Opinion**
4. Stalin's oppression of the Russians was more brutal than Hitler's oppression of the German people.  **Opinion**

Many times statements seem to be factual but need some kind of documentation. If the proof can be found the statement is not an opinion. Determine if the following statements are "**a**" clearly a fact, "**b**" possible fact, but not clear without documentation, or "**c**" an opinion.

1. Short, stocky men are more attractive than tall, thin men….. c
2. All religions share the same fundamental truths…… b
3. Darwin's theory of evolution continues to be controversial….. a
4. Most high school drop outs lack the intelligence to succeed……. b
5. Religious history is filled with examples of inhumanity committed in the name of God….. a

Look at the answers to the statements in the above exercise and do as follows:

For each that you classified "**b**" state one or more reliable sources that could be cited to support the statement.

For “all religions” and “most school drop outs” a specific detail is being applied to an extremely broad audience. The audience needs to be reduced or additional references applied.

For example- all religions, perhaps all mainstream religions (use specific target); or reference something that has done the analysis such as “*According to an independent study of 1000 religions across the world, all of them <fact>*” The same can be stated about #4

For each that you classified "**c**" write questions that might be raised about the statement.

* What evidence was used to conclude this?
* If true, why hasn’t evolution removed more tall thin men?
* More attractive to who?
* What is the sample size for both the subject and the viewer?
* During which time period

Evaluate Evidence: Many times the data we receive comes in the form of opinions. Opinions are not wrong just because they are opinions. It is important to evaluate the data that is used to support the opinion and make judgments from there.

In each of the following cases, the **first statement** states an opinion, and the **second sentence** states supporting evidence. Decide whether the evidence is the best supporting statement that can be offered. If the evidence is faulty, replace the evidence with some that would correctly support the opinion.

1. Your Honor, I believe I was justified in hitting my wife. She kept nagging me to get a job.  
     
   She was strung out on drugs and was going to hurt the children.
2. I did not sign that petition. The person who asked me to sign refused to support my proposal last year.  
     
   There were collecting signatures during the month of March and I was in Alaska.
3. Drugs should be legalized. Enforcing the nation's drug laws has proved an impossible task.  
     
   Empirical evidence shows that the cost and overhead is significant, while the resulting success metrics are flat lined or degrading over time.

Characteristics of Critical Thinkers:

1. They ask questions.
2. Produce many ideas instead of a single answer.
3. Base their judgments on evidence.
4. Acknowledge complexity in issues. There is no simple answer to problems.
5. Intellectually independent, they reassess views when new evidence comes to light.
6. Concepts can be applied to a multitude of different subjects.

Using the 6 characteristics of a critical thinker, write about **one** of the following issues. Decide what you think about that issue and list the evidence for your view. Next, seek other views and additional evidence. Then decide which view is most reasonable. Then write a paper of at least several paragraphs persuading the reader to accept your view.

1. Do you favor subjecting animals to painful experiments in order to find cures for disease?
2. Do you believe that atheists can be as moral as religious believers?
3. Do you think it is a good idea to abolish compulsory attendance laws in the nation's high schools?
4. Do you believe one can be a sincere Christian and believe in the theory of Evolution?
5. **Would you favor a mandatory prison term for first time DWI convictions?**
6. Why is drug consumption in the United States the highest in the world?

No, I do not agree that people should be sent to prison for a DWI; jail perhaps, but not prison. These are different institutions that serve different purposes. Prison should be reserved for violent criminals, while jail is for the normal nonviolent criminals.

The reason we incarcerate these people is to teach them their behavior is wrong, and they need to change their ways. It is no different than giving a child a timeout. Hopefully during this period they consider how to optimize their life.

However they have been placed in a hostile environment, which studies have shown can lead to Post Traumatic Stress Disorder (PTS). It is difficult for a person to gain a positive experience is such an environment, making it toxic or neutral at best.

An argument can be made toward the scare tactic, that the threat of prison reduces the likelihood of the crime being committed. Studies show people view it as a situation that “won’t happen to me” or “I won’t get caught.” This mentality is fundamentally wrong.

To those people evidence should be provided that education and understanding the personal impact would be more effective. For example data from anti-smoking ads success show that people are down play the concern. Yet examples from behavioral studies demonstrate how people consistently get better results under positive situations.