

QRMS Project 1

Due February 5, 2008

In this class, we will look at ways to use different mathematical and scientific ideas, but will focus less on the foundations for these systems of knowledge. However, it's nonetheless important to remember that science and mathematics are more a set of *methods* for determining truth than they are a set of *facts* or *algorithms*. The following essays by prominent mathematicians and scientists discuss different opinions about these foundations.

- Richard Feynman, “Cargo Cult Science” http://www.physics.utah.edu/~detar/phys4910/readings/misconduct/feynman_cargo_cult_science.html
- Bertrand Russell, “On the Value of Scepticism” http://www.solstice.us/russell/value_scepticism.html
- Eugene Wigner, “The Unreasonable Effectiveness of Mathematics in the Natural Sciences” <http://www.physics.utah.edu/~detar/phys4910/readings/fundamentals/Wigner.html>
- Richard Hamming, “The Unreasonable Effectiveness of Mathematics” <http://www.physics.utah.edu/~detar/phys4910/readings/fundamentals/Hamming.unreasonable.html>
- Steven Weinberg, “The Revolution that Didn't Happen” <http://www.physics.utah.edu/~detar/phys4910/readings/fundamentals/weinberg.html>

For this project, read *all* of these essays and think about the main point of each (and please don't become distracted by the incidental details or examples used). Briefly summarize the main idea of each in a sentence (or two, at most). Then, pick one or more of the articles to discuss in a typed essay of one to two pages, in which you should look at specific ideas discussed by the authors and consider their value, correctness, and/or significance (for example). Your choice of topics is fairly open, but make sure that you have a strong thesis and are not merely summarizing what the authors have already said. Some questions you might consider addressing include: What are science and mathematics? What are their roles in society? What should their roles be? What is the point of considering them? Similarly, what is not science or not mathematics? How can these be distinguished from actual science and mathematics? What is “truth” in the context of these subjects? How can we determine whether an idea is “true” (or “correct”)? What role do/should experts/laypersons play in determining this? How do mathematics and science differ? For each of these, how would the author(s) of the article(s) you're examining respond? Some questions are, of course, more applicable to certain articles than to others. Note also that you are not limited to these questions in formulating your thesis. Also, don't attempt to answer all of these questions, as it will lead to your essay being unfocused and superficial.

Note that this project differs from those you will do later in the semester and is probably closer to the sort of essays you have written for other classes. The main point of this project is to encourage you to consider these ideas *critically*. Remember: I don't care what conclusions you reach, as long as you are examining these ideas carefully and are presenting a strong, well-thought-out, and well-reasoned argument. In particular, feel free to disagree with what these authors say.

Helpful Hints and Other Notes:

- (1) Spell-check. Grammar-check. Proof-read. If you have more than one page, staple them—don't just do origami with the corner; it won't work. Outline your argument

before you begin if you think it would help you organize your thoughts. Give your essay a title. This is all standard stuff that applies to all writing, including this project.

- (2) Remember, this is a piece of formal writing, not a letter to the editor in the newspaper. Avoid colloquialisms and informal arguments.
- (3) Don't let the summaries at the beginning run too long. I'm interested only in seeing whether you've grasped the main point of each article. It's probably simplest to include these at the beginning before your main essay, but if you wish you may work them into the main body of the paper **if** you can do so clearly and cogently.
- (4) Make sure you know what your thesis is before you begin writing. Choosing a strong thesis is the most important step in the process. If you're not sure if you have one, feel free to ask me about it before you begin writing. Also, make sure it's specific enough to adequately discuss in two pages.
- (5) Similarly, it's better to examine one article in depth than to analyze all of them superficially. If you want to discuss more than one, make sure you know why you need to do so in order to express your point. (For example, the Hamming article is a response to the Wigner article, so it might make sense to analyze them as a pair, depending on what your thesis is.)
- (6) On the other hand, you might want to combine the Feynman or Russell articles with one of the others if you choose to discuss either, as they're rather short.
- (7) If you're claiming that an author is suggesting something, it may be clearest to provide a quotation. You should include citations, but they may be informal (e.g., just the author's name).
- (8) The examples in these essays discuss politics, religion, marriage customs, etc., but these are not the main ideas. If you are discussing these at length, you may be missing the point.
- (9) Using other sources is permissible (but not necessary). In particular, if an article refers to someone/something that you aren't familiar with, you might consider a quick search for information in another source. Alternatively, if the idea doesn't seem critical to the main point, you may be able to simply interpret it in context without having to fully understand the idea, especially the brief mentions of physics theories.
- (10) Don't wait until the last minute; you'll do better if you give yourself time to reflect upon and ponder these ideas.
- (11) You're supposed to write both a short summary of each article's main point and a deeper analysis of one or more; make sure you do both.
- (12) You can also bounce ideas off of other people or ask them to read a draft, but your final product should be exclusively your own work.
- (13) Since we're discussing effective argumentation, take a look at how these authors construct their arguments. You probably don't want to discuss this directly in your essay, but it's worth noting since they do so with great skill.
- (14) Have fun with this. Mathematics is supposed to be fun.