

## MA110 - Mathematical Explorations – Fall 2012

### Paradigm Shift Poster Assignment

**What is a poster?** Poster Sessions are used to publicize, announce, and/or present the results of research investigations. They are widely used in professional conferences (including virtually all conferences for mathematicians and scientists), college and university courses, and meetings of all kinds. They are useful because many posters can be displayed without the time and space limitations that traditional presentations impose. Additionally, it makes it easier for participants to browse and find research of interest.

**What are our posters about?** For this assignment, you are to make a poster which describes a paradigm shift, its importance, and its relevance to our work in this course.

**What is a paradigm shift?** As a graduate student in theoretical physics Thomas Kuhn began a project which he later published a “full report” on. The report is the book The Structure of Scientific Revolutions, one of the most important books ever written in the philosophy of science.

This book begins by “appropriating” the word *paradigm* from its Latin and extending a new meaning to it in the context of the philosophy of science, one approximately captured by a typical dictionary definition:

**Paradigm** - A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline.

A *paradigm shift* is a when a dominant paradigm is overthrown; rejected and replaced by something else.

As Wikipedia tells us<sup>1</sup>, “social scientists have adopted the Kuhnian phrase ‘paradigm shift’ to denote a change in how a given society goes about organizing and understanding reality. A ‘dominant paradigm’ refers to the values, or system of thought, in a society that are most standard and widely held at a given time.”

In fact, the word paradigm shift has made it into the popular lexicon. On Monday, 26 September, 2011 the lead story on SI.com was entitled “Paradigm Shift” and described the huge surprise among NFL fans that the Buffalo Bills and Detroit Lions, two of the most losing teams in professional football in the past decade, had begun the season undefeated at 3-0. As a tongue-in-cheek reference this is fine. But this is not a meaningful use of the term.

Kuhn helped us understand how the dominant paradigm can affect our scientific worldview. I believe that the use of the idea of paradigms in many social sciences and humanities similarly helps us understand how our beliefs can bias our perceptions of reality.

Einstein’s theory of relativity was a historic paradigm shift. If the widely reported experiment at CERN in which a beam of neutrinos purportedly travelled at greater the speed of light – violating

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<sup>1</sup> One should be very careful trusting what you read on the Internet. However, to not utilize the Internet is absurd. I have studied the philosophy of science for many years – much of it with my father – and this statement is certainly a valid statement.

Einstein's theory of relativity as we know it – is validated then we may be on the verge of a paradigm shift that overthrows Einstein's theory.

I also view the Wizard of Oz as a paradigm shift. It certainly was a paradigm shift for the Munchkins when they discovered the Wizard was a fraud. It was a paradigm shift for Dorothy when she realized that she could not discern the difference between dreams and reality – perhaps a tip of the hat to Descartes' famous cogito? And with Wicked we have a more subversive reality – Elphaba the “Wicked Witch” as a victim of racism, bullying, and false accusation at the hands of Glenda the “Good Witch” – which I also consider a paradigm shift. Of course, this is a fictional paradigm shift. But it does provide us with a metaphor that helps us understand paradigms and so I view it as appropriate for the current assignment.

**Poster content.** You should let your own interest and research guide your decisions on what to include in your poster, but each poster should include the following:

- ∞ A concise description of the paradigm shift that is the focus of your poster.
- ∞ A description of the history of and/or context for the paradigm shift.
- ∞ Why you consider this an important and/or interesting paradigm shift.
- ∞ The focus of our course is logic, truth, certainty, and proof. As part of this we have spent considerable time talking about doubt. Describe ways in which this paradigm shift is related to topics that we are considering in this course.
- ∞ You must give several references where the interested reader can find more information about this paradigm shift and its relationship to questions of knowledge. This should include diverse references which are not limited only to Internet citations.

**Purpose of the posters.** Our focus in this course is truth, logic, certainty and proof. No discussion of these topics would be complete in any sense if we did not consider some of our underlying assumptions about the nature of knowledge. Paradigms play a central role in this discussion. As the famous author Anais Nin said, “We don't see things the way they are, we see things the way we are.” I would like us to see how people, over time, have seen paradigms change so dramatically in the hopes that it will enrich our investigation of truth, knowledge, certainty, and proof.

**Poster presentations.** All posters will be hung in the 4th floor hallways of Wilson Hall. All posters are due on a Wednesday and will be displayed at least until the following Wednesday. You must either meet with me or make arrangements so your poster is displayed appropriately prior to the beginning of Wednesday's class. The posters will be hung from two screws that are exactly two feet apart using clips that I will provide for your posters. **All posters must have the author's name clearly on the front, must have a comment envelope, and must be accompanied by a handout.**

**Damage disclaimer.** Because of the public nature of the display of the posters, they are vulnerable to vandalism. Students who are not willing to take the small risk that appropriate display of their posters entail must contact me well in advance about alternative arrangements.

**Requirements.** The due date for your poster will be announced early in the course.

- You must sign up for a subject for your poster, checking to insure that nobody else has chosen the same subject area. A list will be posted on the blackboard next to Prof. Fleron's office. This list will be posted on Wednesday, 8 February at 8:00 a.m.

- Two weeks prior to your due date you must submit, in writing, a brief proposal which identifies the subject of your poster. You should keep a copy of your proposal so you can keep working on your poster while I consider your proposal.
- One week prior to the due date you must submit, in writing, a more detailed proposal about your project. It should contain several references, layout and content ideas, and an outline or rough draft of the handout will accompany your poster.
- Your poster must include a list of references either on the front or the back. These references must be diverse, they cannot simply be a few obscure Internet sites. Internet sites should be reputable and you **must** include several references beyond the Internet.
- Normal rules regarding appropriate referencing and citation must be followed. I.e. **every passage you use that you have not written must be quoted and appropriately cited.**
- Your poster must be original. You cannot simply cut and paste passages from reference materials and glue them to posterboard.
- You must assess the posters of at least ten other students and these assessment reports must be submitted with your final report.
- You must prepare and make arrangements to copy a one-page handout (front and back is ok) to accompany your poster so interested parties can take one. (You will need at least 35 copies and one must be given to Prof. Fleron.)
- Your final self-assessment report must include a tabulation of the scores you received and must conclude with a suggested letter grade (on the standard A+ - F scale) for your poster.

**Assessment criteria.** Assessment, on a scale of 1 - 5, will be used to reflect how well each poster achieved each of the following:

- ∞ An interesting, engaging, and/or important choice a paradigm shift.
- ∞ An informative and accessible description of this paradigm shift, including: the history and context of this paradigm shift; the impact and importance of this paradigm shift; why this paradigm shift is of interest to you; the current status of this paradigm shift.
- ∞ An accessible survey of the connections between this paradigm shift and issues of truth, logic, certainty, and proof.
- ∞ An appropriate collection of additional information interested readers can use to pursue the topic in greater depth. These may include: book, journal, audio, video, and other media and multi-media citations; Internet resources; reviews; museum holdings; event dates; etc.
- ∞ A physical construction of a high quality poster and handout, including: appropriate design, pleasing visual layout, effectiveness, appropriate mix of media and information, effort, etc.

**Suggestions.** Choose a paradigm shift that you find interesting. A major portion of this project is the search for an appropriate topic. I will not “give” anybody a topic for their poster – this is your job. But I have compiled a significant list of appropriate topics and I am happy to have discussions with you about possible topics.

**Assessment.** Using the criteria above, your poster will be assessed by peers in your class, by your professor, and by yourself.

Peer Assessment - Each student is required to assess the posters of at least ten other students during the course of the semester. For each poster that you assess you must completely fill out an assessment form, including written comments. One copy of this assessment form is to be submitted to the author. Duplicate copies are to be kept by the assessor until the end of the

semester when they will be turned in to Prof. Fleron. Peer reviews will be blind - the author of the poster will not know the identity of the reviewers.

Self Assessment - After your poster has been removed from the presentation you are to read all of the assessment forms and comments that have been submitted. You must tabulate all of the scores submitted on all of the assessment forms. Based on this feedback and your own evaluation of your work, you are then to write a brief one- to two-page report which critiques your poster, suggests a final grade for your poster (on the standard A+ - F scale), and provides rationale for your grade determination. Your poster report can be submitted at any time before the end of our regularly scheduled exam period at the end of the semester.

Assessment by Professor - Based on peer feedback and your report, your Prof. Fleron will assign a final grade for your poster. This grade will be included on your report when it is returned to you. Peer assessment will not work unless everybody participates. Students who do not assess at least ten other posters and turn the corresponding assessment reports in to Prof. Fleron will receive a failing grade on their poster.

### Information about Posters

For more information on posters, the following Internet sites may be useful:

<http://writing.colostate.edu/guides/speaking/poster/>

<http://www.math.sunysb.edu/posterproject/www/index.html>

<http://www.awm-math.org/workshops/posters.html>

[http://www.kumc.edu/SAH/OTEd/jradel/Poster\\_Presentations/PstrStart.html](http://www.kumc.edu/SAH/OTEd/jradel/Poster_Presentations/PstrStart.html)

### **Poster Checklist**

- I know the due date of my poster.
- I have signed up on the list and have checked that nobody else has chosen the same subject that I have.
- I handed in my poster proposal two weeks prior to the due date.
- I handed in a more detailed proposal one week prior to the due date.
- My name is on my poster.
- I put a comment envelope on my poster.
- There is a bibliography of references I used on the front or back of my poster.
- I found Prof. Fleron on the due-date and helped him hang up my poster.
- I distributed copies of my handout to class.
- I reviewed at least ten other posters from our class.
- I submitted a poster report that included
  - o Average scores in each of the five categories in my report.
  - o A discussion of the feedback that I received on my poster.
  - o A discussion of the grade that I believe I should receive on my poster.
  - o A clear statement of the letter grade (A+ - F) that I should receive on my poster.
  - o Both the 10 poster evaluations forms that I filled out and the 10 that were filled out by my peers for my poster.

“We don’t see things the way they are, we see things the way we are.”

Anais Nin

## Paradigm Shift Posters

This semester Prof. Fleron’s MA110 – Mathematical Explorations (001) students are doing posters on paradigm shifts.

The word paradigm in this context came from the 1962 book The Structure of Scientific Revolutions by Thomas Kuhn. One attempt at a definition of a paradigm is:

**Paradigm** - A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline.

A *paradigm shift* is a when a dominant paradigm is overthrown; rejected and replaced by something else.

Why are we studying paradigm shifts? Because history has shown, repeatedly, that some of our most closely held “truths” are really prejudices that have biased much of what we “know”. One of the signs of the ability to truly learn – what many would call “to be educated” – is to be able to look beyond your biases. We study paradigm shifts to build a wealth of examples that will always remind us of this.

“Every generation needs a new revolution.”

Thomas Jefferson

Maybe I need to describe the purpose of the posters more colloquially: History has shown, repeatedly, that some of our most closely held “truths” are really prejudices that have biased much of what we “know”. One of the signs of the ability to truly learn – what many would call “to be educated” – is to be able to look beyond your biases. We study paradigms to illustrate how important this is.