

"It is far better to grasp the universe as it really is than to persist in delusion, however satisfying and reassuring."

"Science is more than a body of knowledge. It's a way of thinking."

(both quotes are by Carl Sagan - astronomer, scientist, communicator)

Introduction

Supplementary Material for CFB3333/PHY3333
Professors John Cotton and Stephen Sekula
August 26, 2013

Based on the following information on the web:

<http://www.physics.smu.edu/pseudo/Intro/>

The Big First Day To Do List

- **Lecturers' background information**
- Explanation of code names
- Survey of beliefs
- Why do I need this course?
- Course information and requirements
- Plagiarism warning
- Astrology information
- Explanation of code numbers
- Attendance Quiz #1

Meet your instructors

Professor John Cotton

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Both of us can be reached by email at pseudo@physics.smu.edu. We check this address 1-2 times per week during the semester.

BEST WAY TO REACH US: SEEK US OUT!!!!

Astronomer, computer programmer, engineer,
jack of all trades (“generalist”)!



Subatomic particle physics:

- Study the origin of the cosmos using massive subatomic particle colliders
- Try to understand the properties of the newly discovered “Higgs particle” using the ATLAS Experiment at CERN in Geneva, Switzerland
- Trying to find the more complete laws of nature, more encompassing than those we already know.



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Code Name Example

Do not use your actual name (middle name, etc.).

NO PERSONALLY IDENTIFIABLE INFORMATION!!!!

A nickname nobody else knows is fine.

“Pretty Pony”

(nobody gets to use this one
now . . . but you get the idea!)

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Why do I need this course?

- 28% of Americans surveyed believe in astrology – the idea that where the stars are located at the moment of your birth determines who you are; 18% aren't sure if they believe in it.
- 60% believe in ESP, that there is a “sixth sense”
- 30% believe in visits by extraterrestrials
- 25-50% believe in ghosts, faith healing, communication with the dead, and lucky numbers
- You're entitled to your beliefs . . . but in this class, you will learn to assess WHY you and others believe what you believe. THIS IS CRITICAL – firm beliefs can be totally wrong, and can harm or even kill.

Cognitive Dissonance/Confirmation Bias

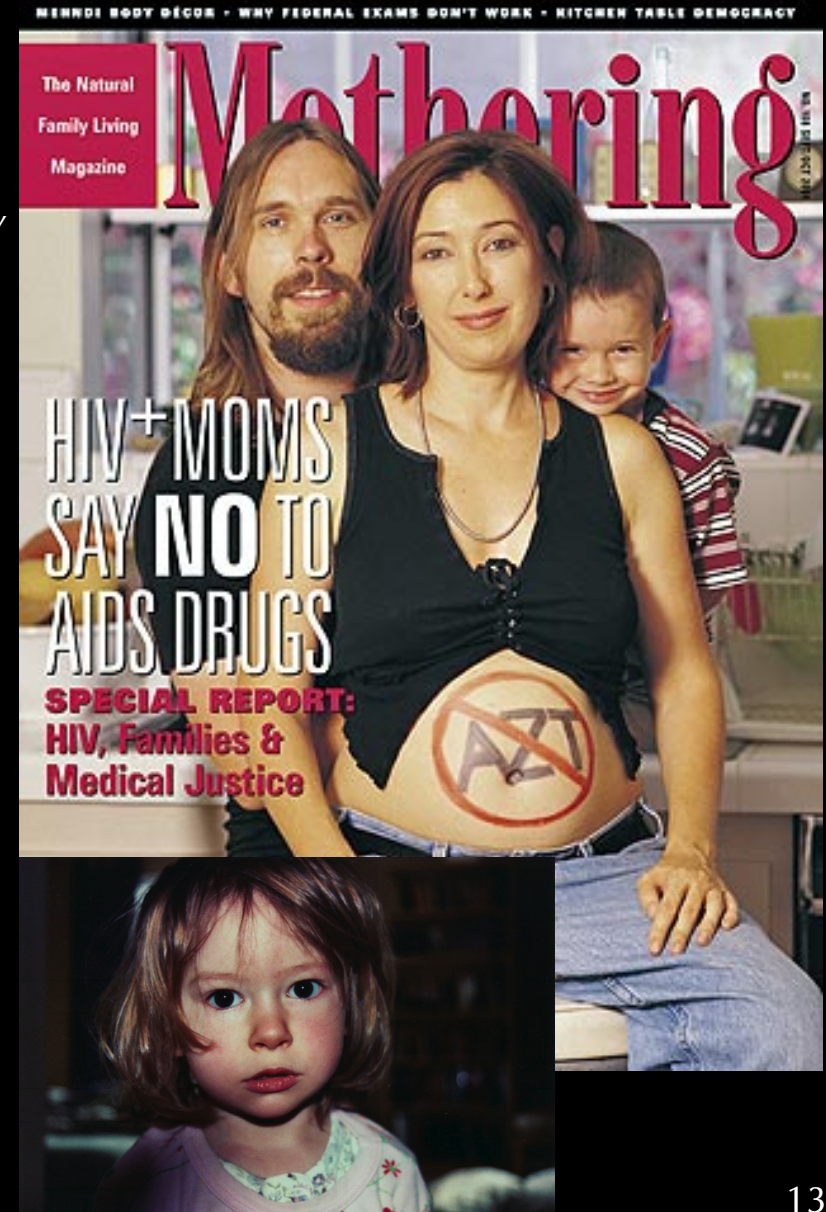
- These are well-documented psychological phenomena of which you need to be aware, so you can spot them in yourself
- As a result
 - humans tend to resist or ignore evidence that doesn't confirm their existing beliefs (political, ethical, values, moral, etc.)
 - humans hold positions counter to the weight of the reliable evidence for fear of letting go of beliefs placed in them by trusted external entities (e.g. authorities)
- Fight your fear – fight your urge to only confirm existing beliefs.
 - you will no doubt encounter hard issues in this class
 - you must fight, fight, fight the instinct to refute based on “feelings,” “something my teacher/friend/parent/pastor/etc. told me,” etc.
 - all that matters in science is the evidence to support a claim, the quality of the evidence, and whether or not a claim can be critically and openly assessed.

Class Poll

- AIDS (Acquired Immune Deficiency Syndrome) is caused by ...
 - (A) a person's behavior
 - (B) an invasive virus
 - (C) divine punishment

Pseudoscience Kills

- **What the science says unequivocally:**
 - *AIDS is caused by the Human Immunodeficiency Virus (HIV) – treat HIV, prevent AIDS.*
- **What some people believe**
 - *Peter Duesberg, Professor at UC Berkeley, denies that HIV causes AIDS.*
 - *Christine Maggiore, founder of Alive & Well AIDS Alternatives was HIV positive. She followed the teachings of Duesberg, and did not treat her HIV nor take drugs to prevent it from being passed to her children through breast milk.*
- **Consequences:**
 - *Her daughter, Eliza Jane (age 3), died of AIDS-related pneumonia in May 2005. Maggiore died of AIDS-related complications in 2008.*



Class Poll

- What is “Chiropractic Medicine”?
 - A) A practice of manipulating the body that resulted from decades of good research, on par with the best modern medicine.
 - B) An ancient form of Chinese medicine based on the presence of 365 “meridians” in the human body, one for each day of the year.
 - C) Invented by a grocer in Iowa, it is no better than doing nothing, and rejects the germ theory of disease.

Pseudoscience Kills

- **The science says unequivocally that:**
 - *medical problems are explained by biology, chemistry, and the “germ theory of disease” that unites these two to explain how invasive organisms or measurable failures in our bodies lead to disease.*
- **“Chiropractic medicine” claims:**
 - *disease is not caused by germs, but by sometimes undetectable displacements of bone that “block nervous energy from flowing.” That energy cannot be measured, and the displacements can only be detected by a chiropractor.*
- **As a result:**
 - *Most chiropractors have no medical training (they are not M.D.s)*
 - *They reject vaccination to prevent disease*
 - *There are famous examples of people suffering stroke or paralysis from neck manipulation (e.g. actor Kevin Sorbo).*



Dr. Marcus Ettinger delivers a chiropractic adjustment to C1 (neck) of a 4 week old baby

Class Poll

- Vaccines are known through multiple research studies to . . .
 - A) prevent illnesses that once killed or maimed major fractions of the human population, with negligible negative side-effects.
 - B) prevent illnesses that once killed or maimed major fractions of the human population, but also cause huge modern problems like autism.
 - C) be ineffective against diseases that affect the human population, having only negative side-effects with no benefit to the population.

Pseudoscience Kills

- **The science unequivocally says that...**
 - *vaccines prevent disease, and vaccinated people protect the unvaccinated through “herd immunity” by blocking disease transmission. There is no evidence that vaccines cause things like autism, despite over a decade of study and dozens of independent research efforts.*
- **What some people believe**
 - *Andrew Wakefield published a now thoroughly discredited claim that vaccines are linked to autism*
 - *Jenny McCarthy is a vocal advocate for Wakefield and his claim*
- **The consequences**
 - *As more people refuse vaccination for their kids, once trivial and almost forgotten diseases have resurged, causing illness and death.*



Andrew Wakefield. He lives in Texas now.



Jenny McCarthy (left). McCarthy's son was diagnosed with autism and she claims he recovered thanks to diet. She claims he got autism from vaccination. He was likely mis-diagnosed.

More Examples on the Web

<http://www.physics.smu.edu/pseudo/Intro/>

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Goals, Objectives, Learning Outcomes

This course will provide you with an understanding of the scientific method sufficient to detect pseudoscience in its many guises: paranormal phenomena, free-energy devices, alternative medicine, intelligent design creationism, denial of human-induced climate change, propaganda, science-based-medicine denialism, misuse of data and statistics, and many others. You will learn to think critically and to question outlandish claims, hype, and outright BS.

Your writing will improve. You will be able to distinguish credible sources of information from nonsense; you will become an intelligent consumer of information. Expect to do a lot of reading, writing, and, most of all, thinking.

Learning Outcomes:

Too many to list these days! Go check out:

<http://www.physics.smu.edu/pseudo/goals.html>

Etiquette

- Be on time to class
 - quizzes are at the start of class, 11:00 SHARP
 - if you're late, you will have less time to work the quiz
 - if you miss the quiz, you get a zero for the quiz but your attendance will be counted.
- Behavior in class
 - **TURN OFF YOUR MOBILE DEVICE RINGER/ALERT/ALARM**
 - computers should be used for taking notes or course-related activities. Otherwise, close them. If you're Facebooking, Tweeting, Instagramming, Vining, Snapchatting, or anything else, we will employ your computer and you to help us teach class. You have been warned.
 - No casual conversation during class, even after you finish your quiz. Even if you think you're being quiet enough, you're actually just disrupting the environment in this very small and densely populated classroom. Participate in discussion, respect your peers and your instructors, and we'll respect you.

Grades

CFB 3333

Attendance / Participation	5%	
Homework / Abstracts	10%	(drop lowest one)
Reading quizzes	10%	(drop lowest one)
Book report #1	10%	
Book report #2	10%	
7-page paper	15%	
(average first and second attempts of midterm paper)		
15-page paper	20%	
Final examination	20%	

Extra Credit

- First rule: don't ask – we don't give it.
- Second rule: if we choose to give it, it's offered as an equal opportunity to EVERYONE
- **Flash Cards:** you have them now. Keep them. Bring them to every class, as we might want to poll you now and then. We will enforce this by offering occasional extra credit: bring cards to class, attach to quiz, get 1 point extra credit.

Attendance Policy

- Attendance is part of your final grade
 - checked via attendance quizzes, etc.
- You are allowed 6 UNEXCUSED ABSENCES
 - As of the 7th, you automatically fail the course
 - No pleading, no whining, no “buts”
 - Excused absences don’t count as part of your 6
 - see <http://www.physics.smu.edu/pseudo/attendance.html>
and <http://www.physics.smu.edu/pseudo/disability.html>

Plagiarism Warning

- Examples (by no means exhaustive!)
 - copying your neighbor's quiz answer as yours (you will both be punished – for cheating, and for enabling cheating)
 - stealing a paper from *any source* (except yourself) and representing it as your own (e.g. a former student, a current student, a friend, a foe, the web, a magazine, a journal, a book review, a paper mill, etc.)
 - using sentences, figures, tables, ideas, etc. copied from sources (even if you significantly modify the content) without clearly citing the source.
- **We minimally reward such misbehavior with an “F” in the course. We additionally reward such behavior by filing academic violation paperwork, which can result in suspension or expulsion from the university (and has, in the past!)**

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Code Numbers

Choose a FOUR-DIGIT NUMBER

NO PERSONALLY IDENTIFIABLE INFORMATION!
No numbers from your social security number, no birthdays, no numbers from your student ID, or your bank account, or your credit card . . . NONE OF THAT!

This number will be used to list your grades, so you don't want anyone to know who you are or gain personal information about you in the process!

MAKE IT UP.

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