

Critical Thinking For Educators



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Part 1

How to Teach Critical Thinking When You Already Teach Critical Thinking

How to Teach Critical Thinking When You Already Teach Critical Thinking

◆ What is critical thinking (really)?

The transition from beliefs you already hold
to new beliefs (or reasons for those beliefs)
in a way that preserves truth.*

* or, in a way that preserves an interpretive framework.

Why Teach Critical Thinking?

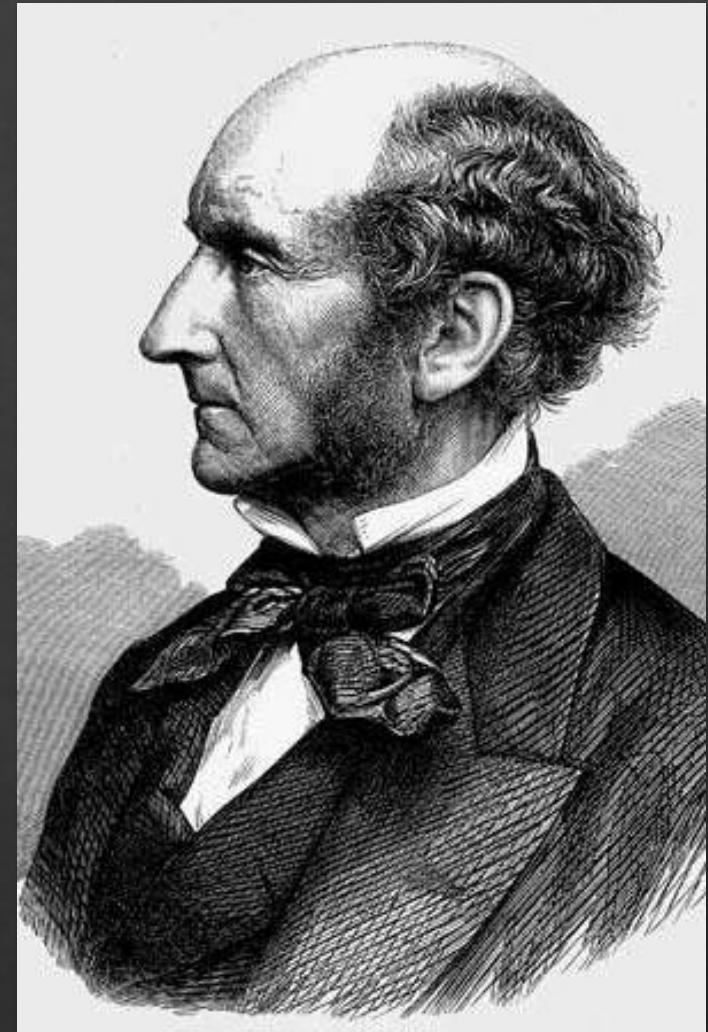
- ◆ **Personal reasons**
 - ◆ **We all need practice.**
- ◆ **Practical reason**
 - ◆ **All of our courses require it to some degree.**
- ◆ **Civic reason**
 - ◆ **There is an increased burden on individuals to reason well about social and political matters.**

John Stuart Mill

He who knows only his own side of the case knows little of that.

His reasons may be good, and no one may have been able to refute them. But if he is equally unable to refute the reasons on the opposite side, if he does not so much as know what they are, he has no ground for preferring either opinion.

The rational position for him would be suspension of judgment....



On Liberty, ch. 2, 1859

Who Wouldn't Want to Think Critically?

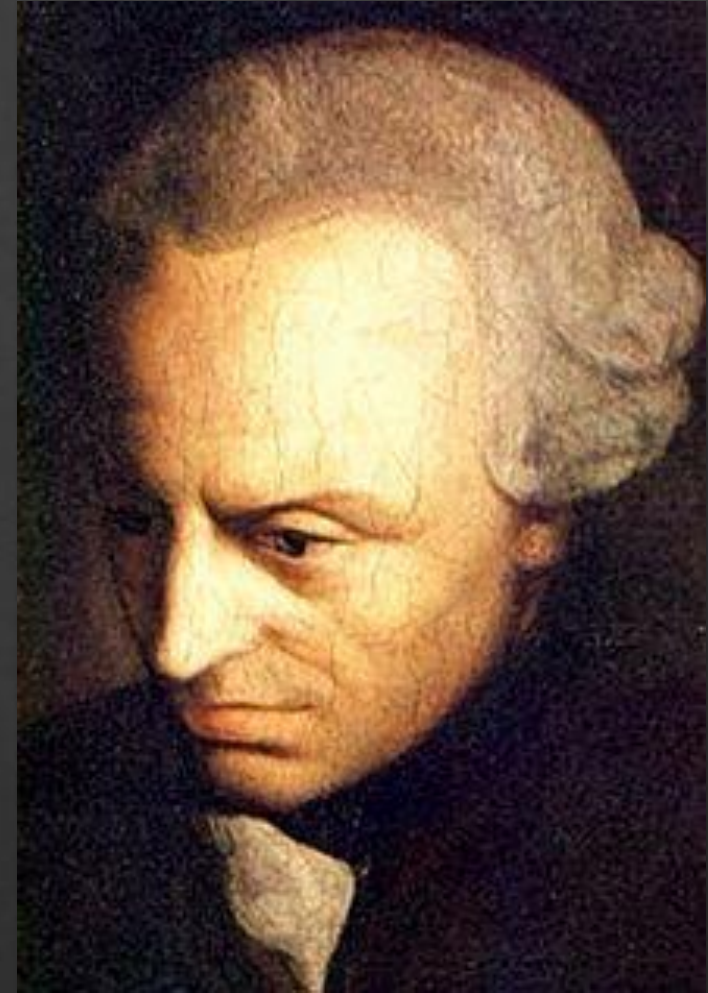
Us! All of us!

- ◆ **Conscious avoidance**
 - ◆ cognitive slacking
 - ◆ mismanaged time devotion
- ◆ **Subconscious barriers**
 - ◆ heuristics and biases
 - ◆ implicit bias
- ◆ **Educational barriers**
 - ◆ Very few of us have been taught how.

Immanuel Kant

It is so easy to be immature.

If I have a book to serve as my understanding, a pastor to serve as my conscience, a physician to determine my diet for me, and so on, I need not exert myself at all. I need not think, if only I can pay: others will readily undertake the irksome work for me.



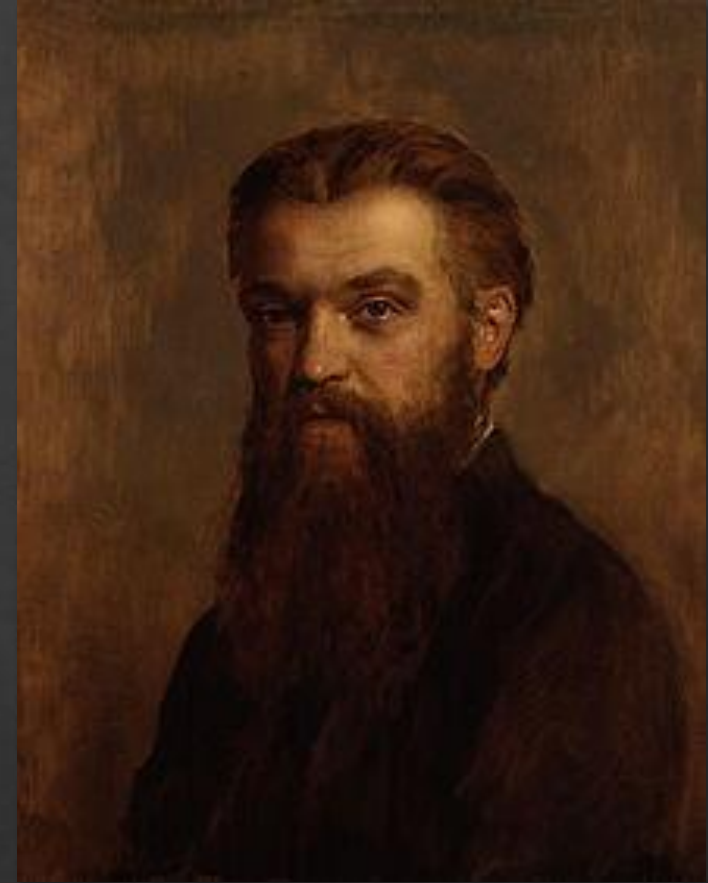
“What is Enlightenment?” 1784

W. K. Clifford

[T]his duty is a hard one, and the doubt which comes out of it is often a very bitter thing.

It leaves us bare and powerless where we thought that we were safe and strong.

It is the sense of power attached to a sense of knowledge that makes men desirous of believing, and afraid of doubting.



“The Ethics of Belief” 1877

The Rest of Today

- ◆ **Approaches to Critical Thinking**
(Didactic: 00:00-00:00)
- ◆ **Tools for Helping Your Students Think Critically**
(Didactic 00:00-00:00)
- ◆ **Assessment - General Q & A**
(00:00-00:00)
- ◆ **Break**
(00:00-00:00)
- ◆ **Enhancing Your Classroom with Critical Thinking**
(Interactive 00:00-00:00)
- ◆ **Assessment Housekeeping**
(00:00-00:00)

Part 2

Approaches to Critical Thinking

Approaches to Critical Thinking

Three Classic Approaches

◆ Bloom's Taxonomy

- ◆ An approach to learning that can facilitate critical thinking



◆ The Paul/Elder Model

- ◆ A holistic model of identifying, interpreting, and reasoning about claims and arguments



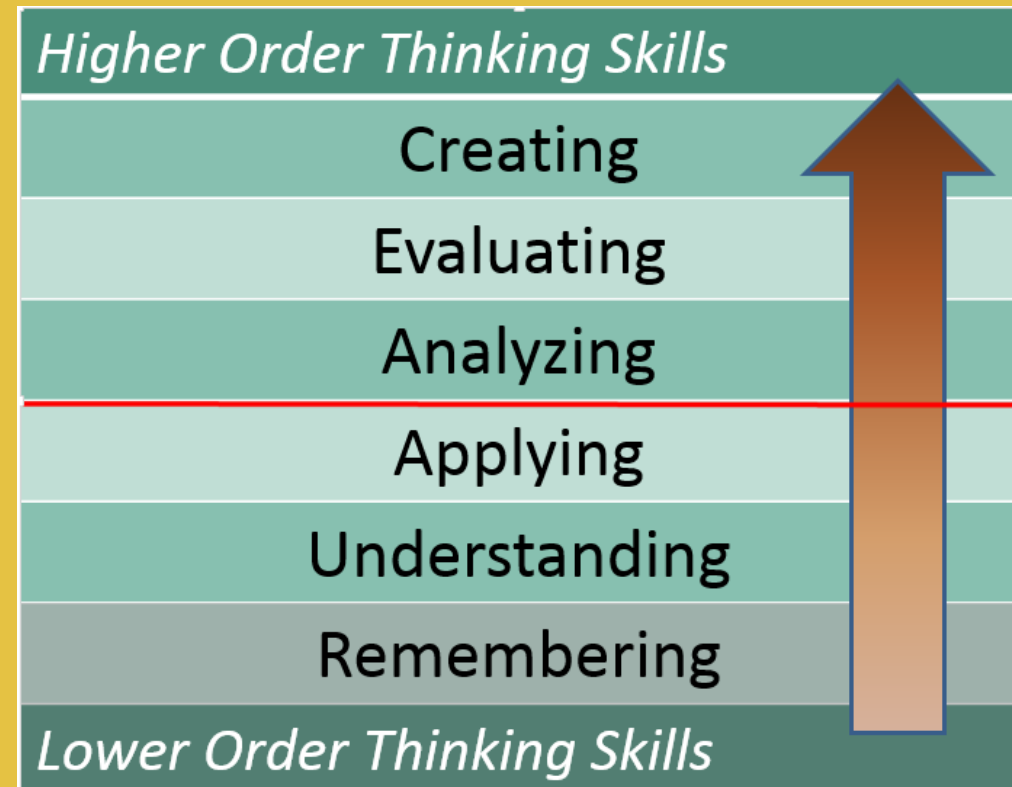
◆ The Toulmin Model

- ◆ A general model for evaluating claims



The Bloom's Taxonomy Approach

- ◇ **Remember**
 - ◇ **Retrieve relevant knowledge from long-term memory**
- ◇ **Understand**
 - ◇ **Determine the meaning of content, including oral, written and graphic**
- ◇ **Apply**
 - ◇ **Carry out or use a procedure in a given situation**



The Bloom's Taxonomy Approach

◆ Analyze

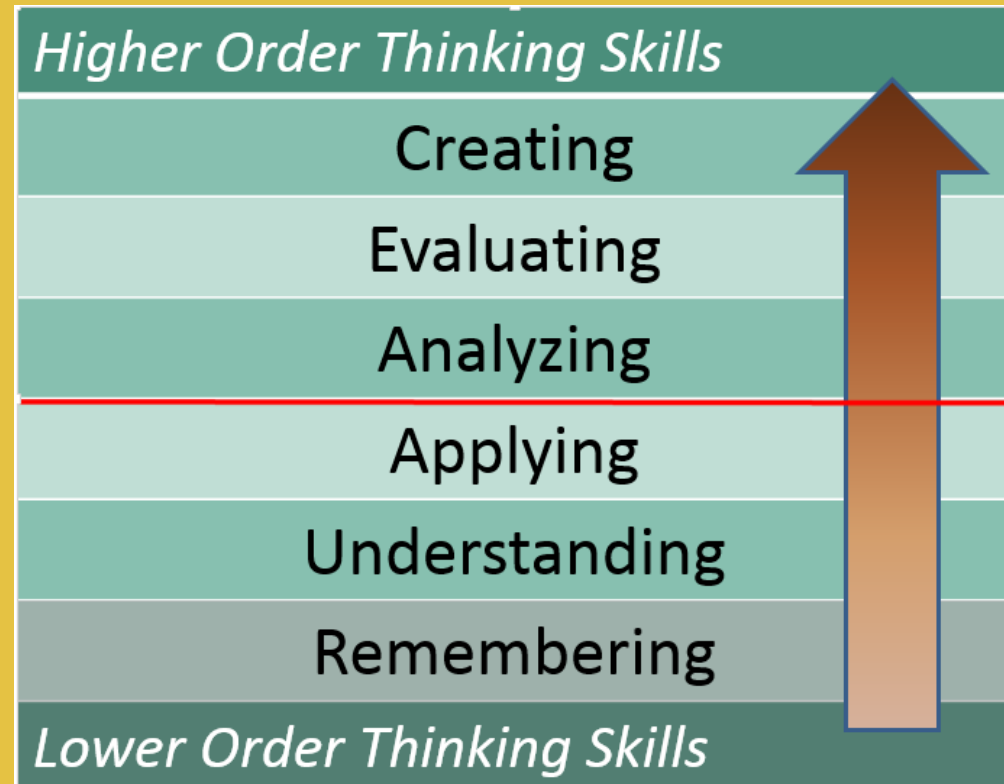
- ◆ Break material into constituent parts, detect how the parts relate to one another and to overall structure/purpose

◆ Evaluate

- ◆ Make judgments based on standards

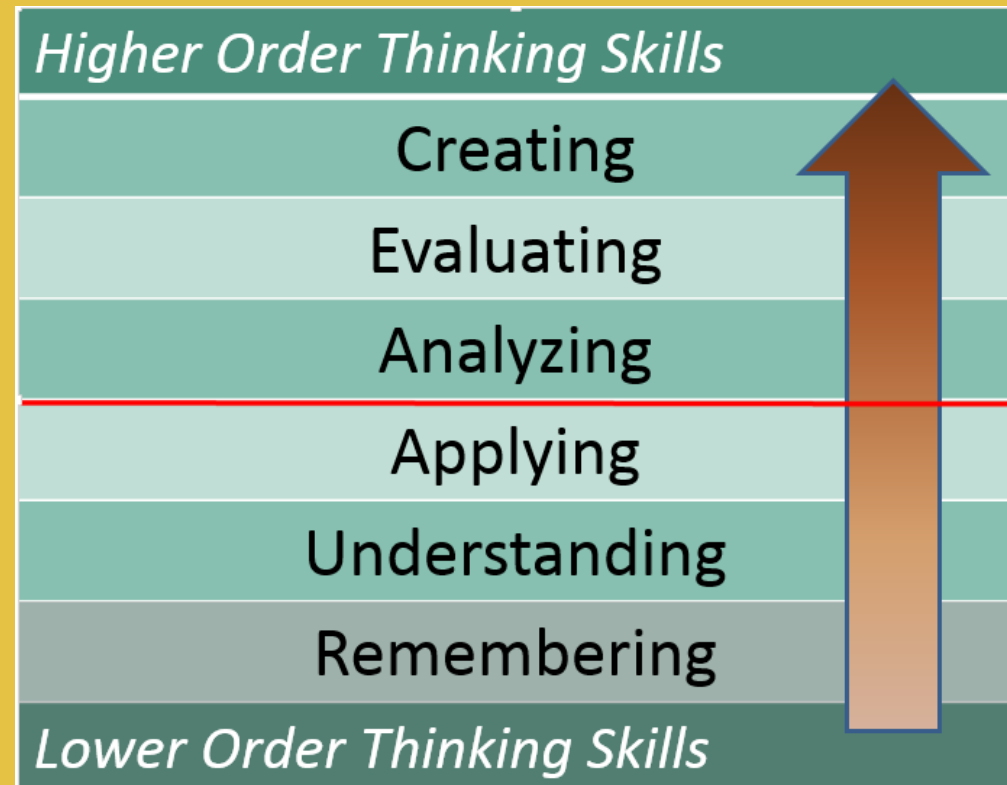
◆ Create

- ◆ Putting elements together to form a novel, coherent whole or original product



The Bloom's Taxonomy Approach

- ◇ Remember
 - ◇ Define terms
 - ◇ Answer objective questions
- ◇ Understand
 - ◇ Write reports
 - ◇ Deliver presentations
- ◇ Apply
 - ◇ Work word problems
 - ◇ Perform simulation/role play



The Bloom's Taxonomy Approach

◇ Analyze

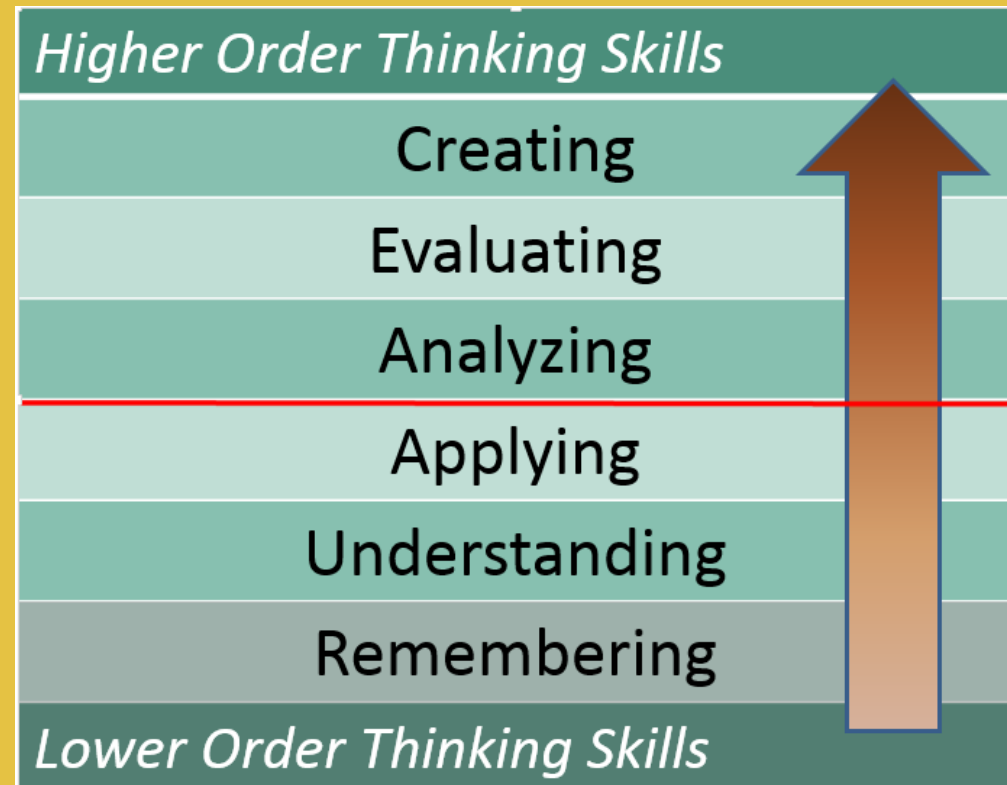
- ◇ Describe strengths and weaknesses
- ◇ Determine relevant information in a case study

◇ Evaluate

- ◇ Critique an article
- ◇ Diagnose the problem

◇ Create

- ◇ Video
- ◇ Develop a portfolio



The Paul/Elder Approach

◆ Intellectual Standards

- ◆ **A set of goals that help ensure good belief**

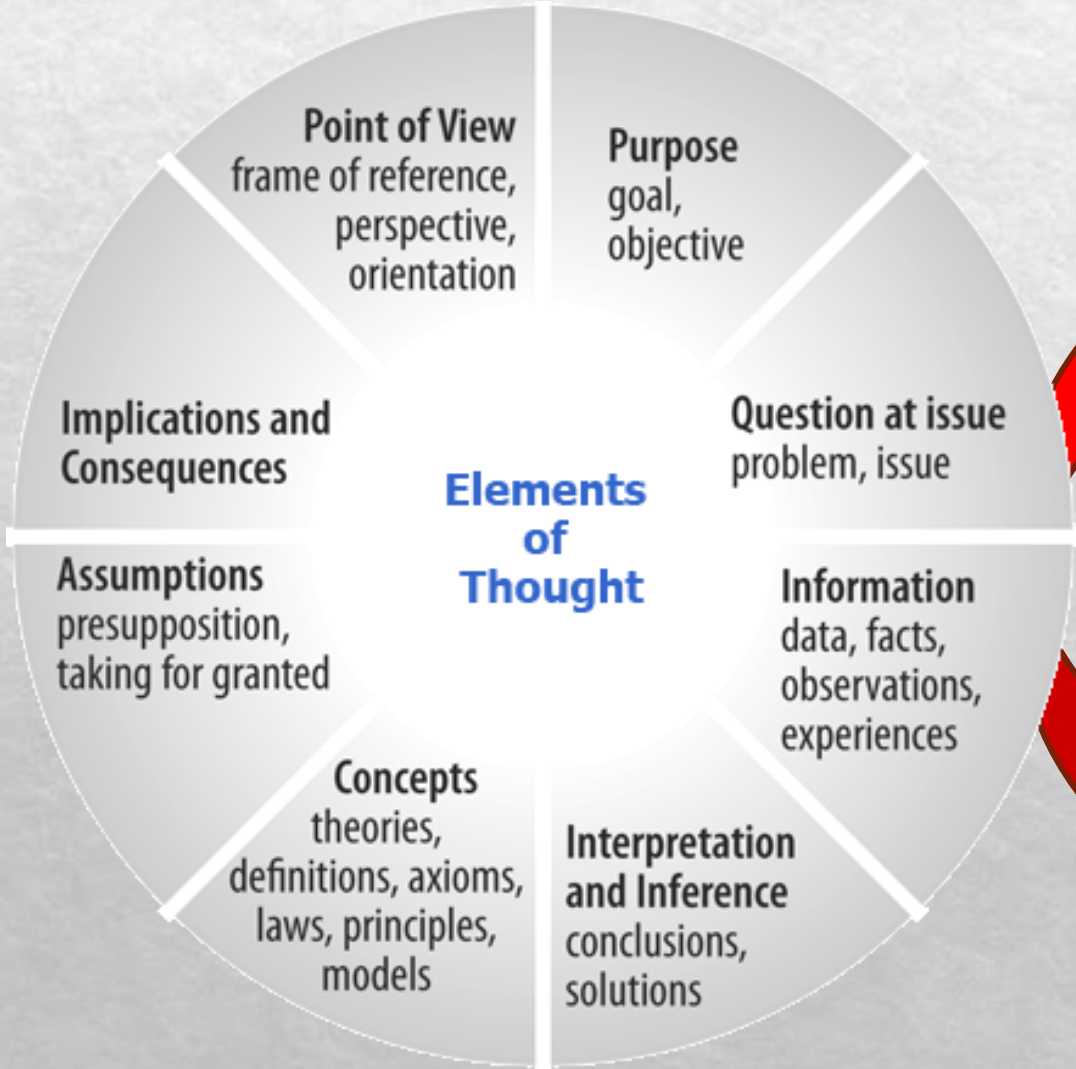
◆ Elements of Thought

- ◆ **The concepts at stake in every instance of critical thinking**

◆ Intellectual Traits

- ◆ **The attitudes that help us meet the standards**

Approaches to Critical Thinking



THE STANDARDS	
Clarity	Precision
Accuracy	Significance
Relevance	Completeness
Logicalness	Fairness
Breadth	Depth

INTELLECTUAL TRAITS	
Intellectual Humility	Intellectual Perseverance
Intellectual Autonomy	Confidence in Reason
Intellectual Integrity	Intellectual Empathy
Intellectual Courage	Fairmindedness

The Paul/Elder Approach

Examples of Assignments

- ◇ **Article summaries with word limits to evaluate accuracy, relevance, and precision**
- ◇ **SEE-I Activities**
 - State; Elaborate; Example; Illustrate**
 - State; Elaborate; Evaluate; Implication**

Paul/Elder Approach

Tailored Questions – logic

Complete the following argument, making it a strong inductive argument:

- 1.
2. You fell asleep while driving.
3. Therefore, you probably had an accident.

Complete the following argument, making it a strong inductive argument.

1. Most people over 40 years old order tomato juice when flying.
- 2.
3. Therefore, you probably order tomato juice when flying.

Paul/Elder Approach

Tailored Questions – depth and breadth

For each of the following pairs of explanations, indicate which lacks depth and which lacks breadth.

1a. Computer screens light up because they have gremlins inside them.

1b. Computer screens light up because they receive electricity from the power cord plugged into an outlet.

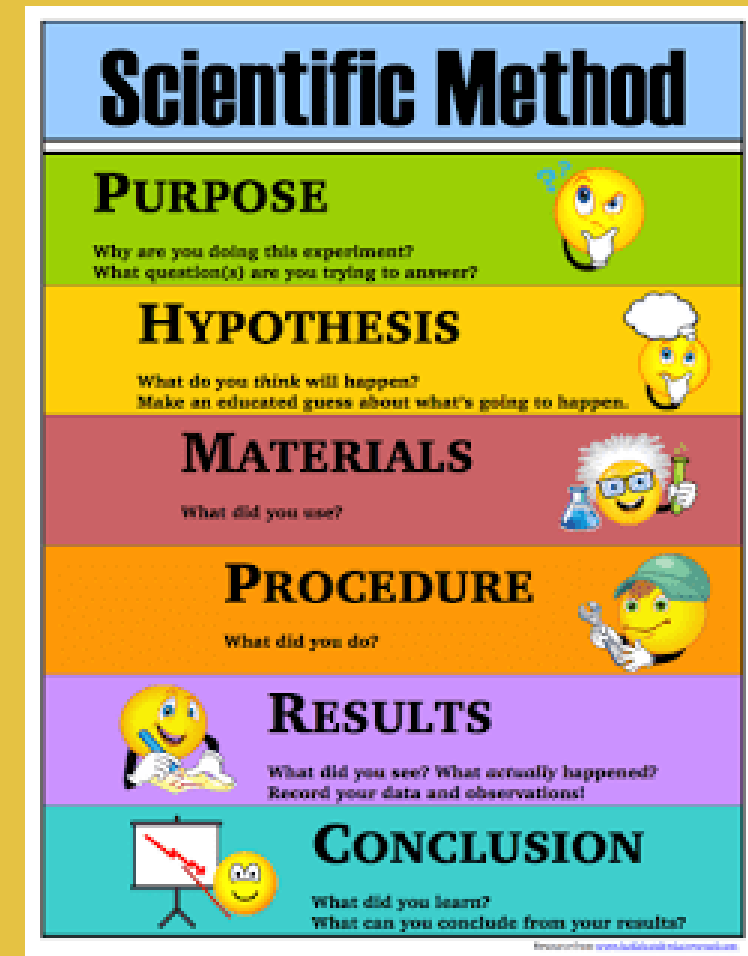


2a. This pen falls when I drop it because it weighs 3 ounces and is denser than the surrounding air.

2b. Objects fall when dropped because of gravity.

The Toulmin Approach

- ◆ A version of the scientific method:
 - ◆ Question/Observation
 - ◆ Hypothesis
 - ◆ Conduct experiment
 - ◆ Formulate conclusion



The Toulmin Approach

◆ Basic Concepts:

◆ Fact

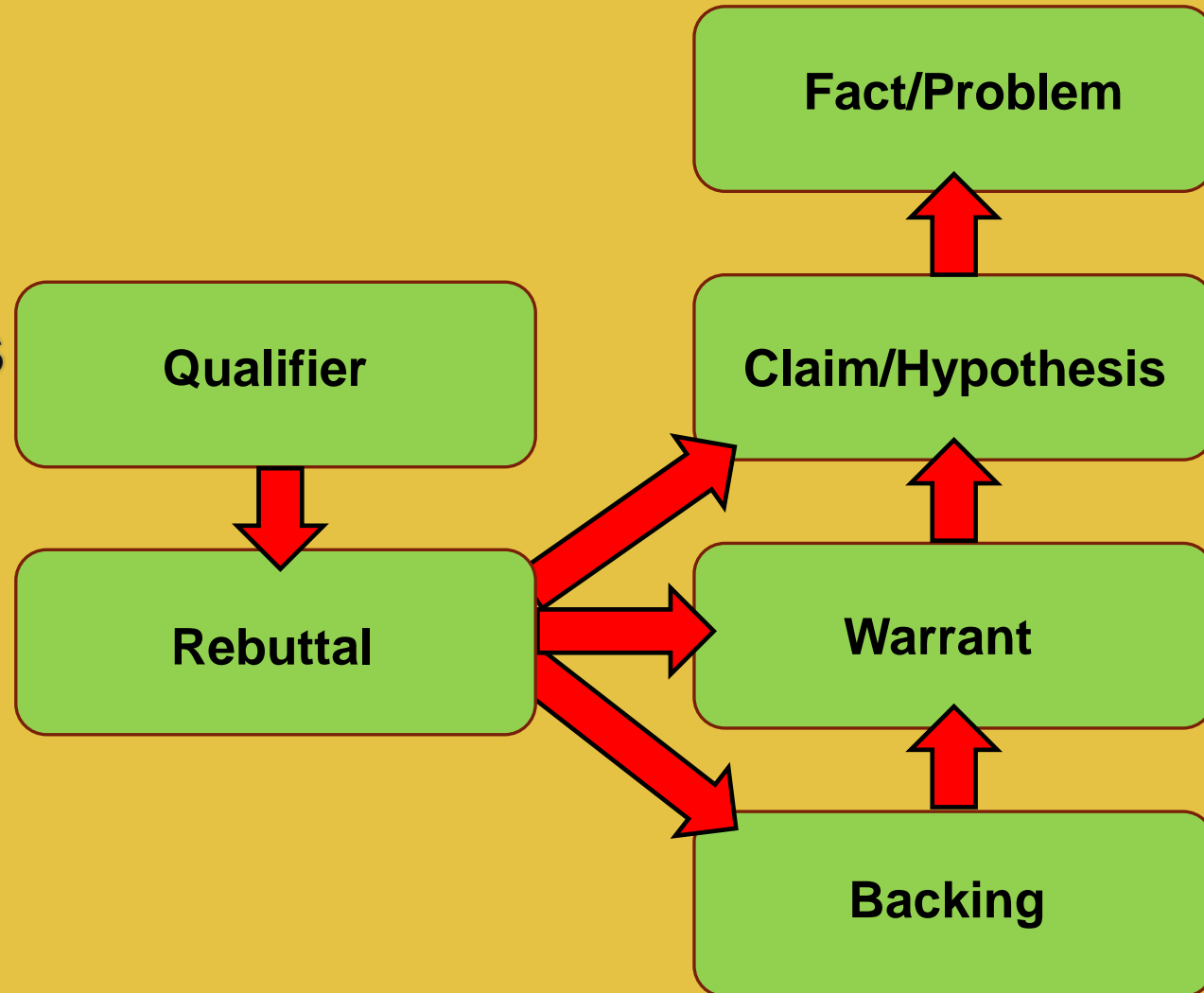
◆ Claim/Hypothesis

◆ Warrant

◆ Backing

◆ Rebuttal

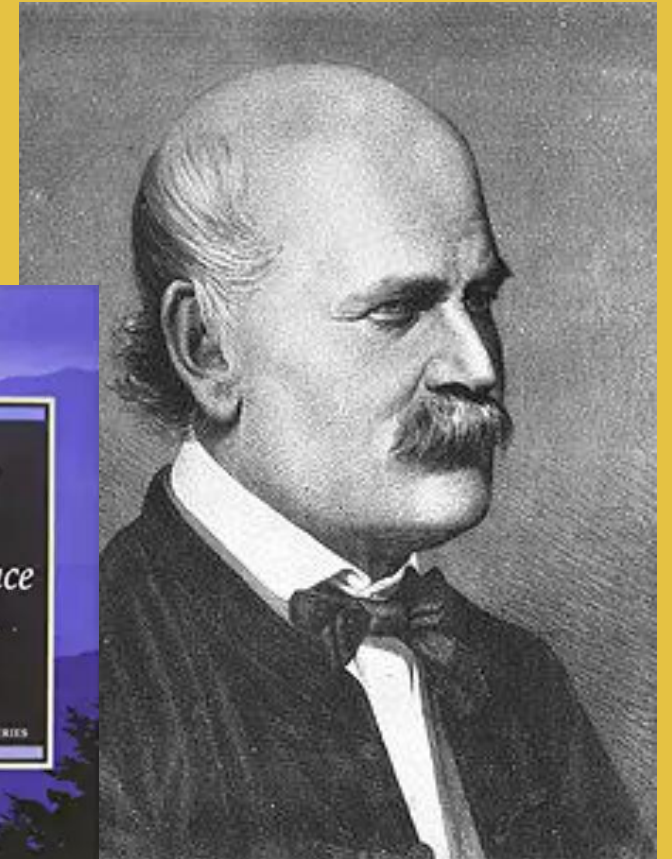
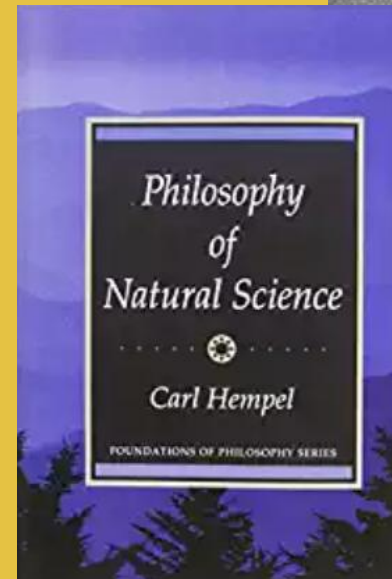
◆ Qualifier

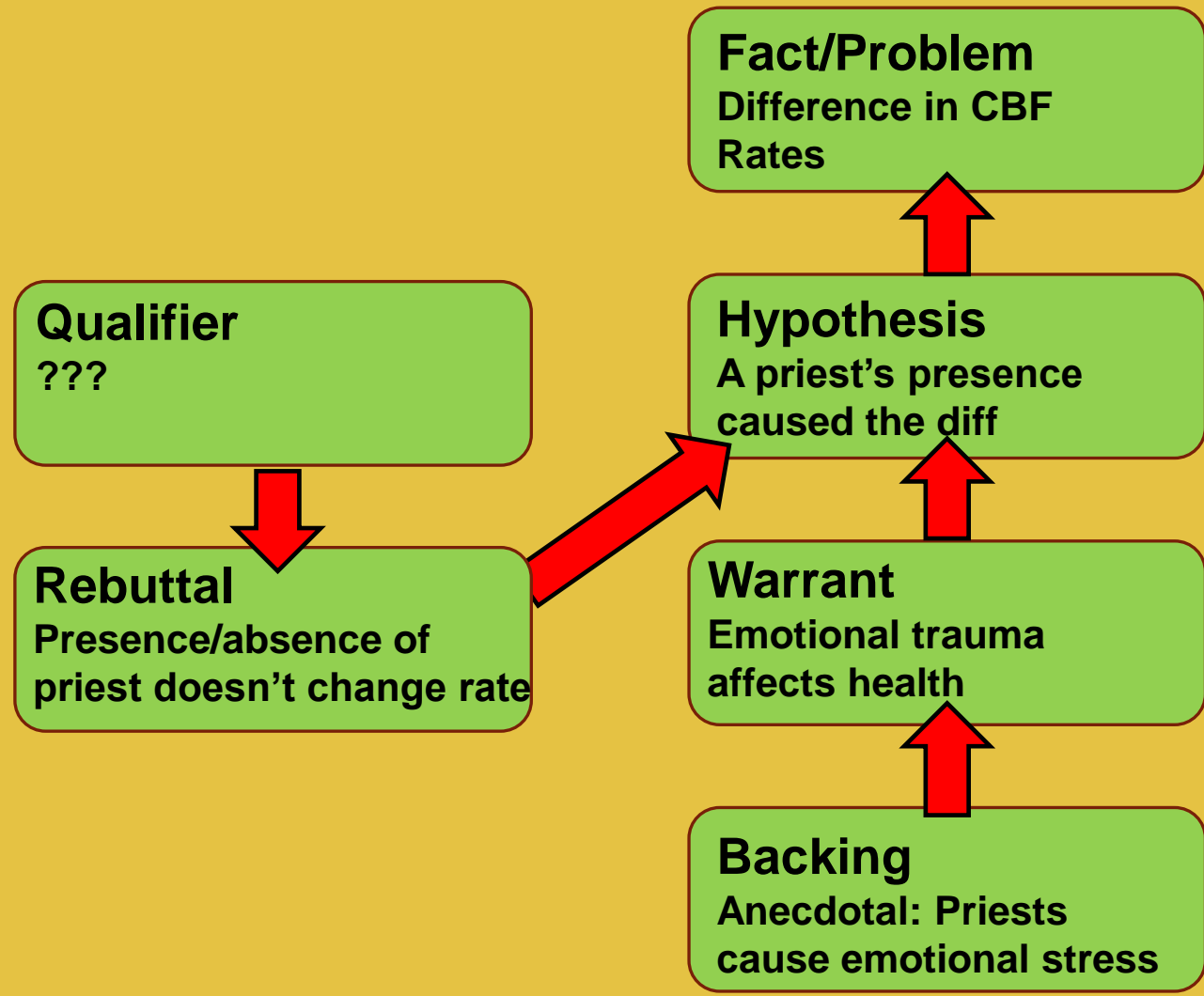


The Toulmin Approach

Ignaz Semmelweis (1818-1865)

- Hungarian physician, OB
- Solved high childbed fever rates in his Austrian hospital
- Discovered the importance of sterilization in medical contexts





Qualifier
???

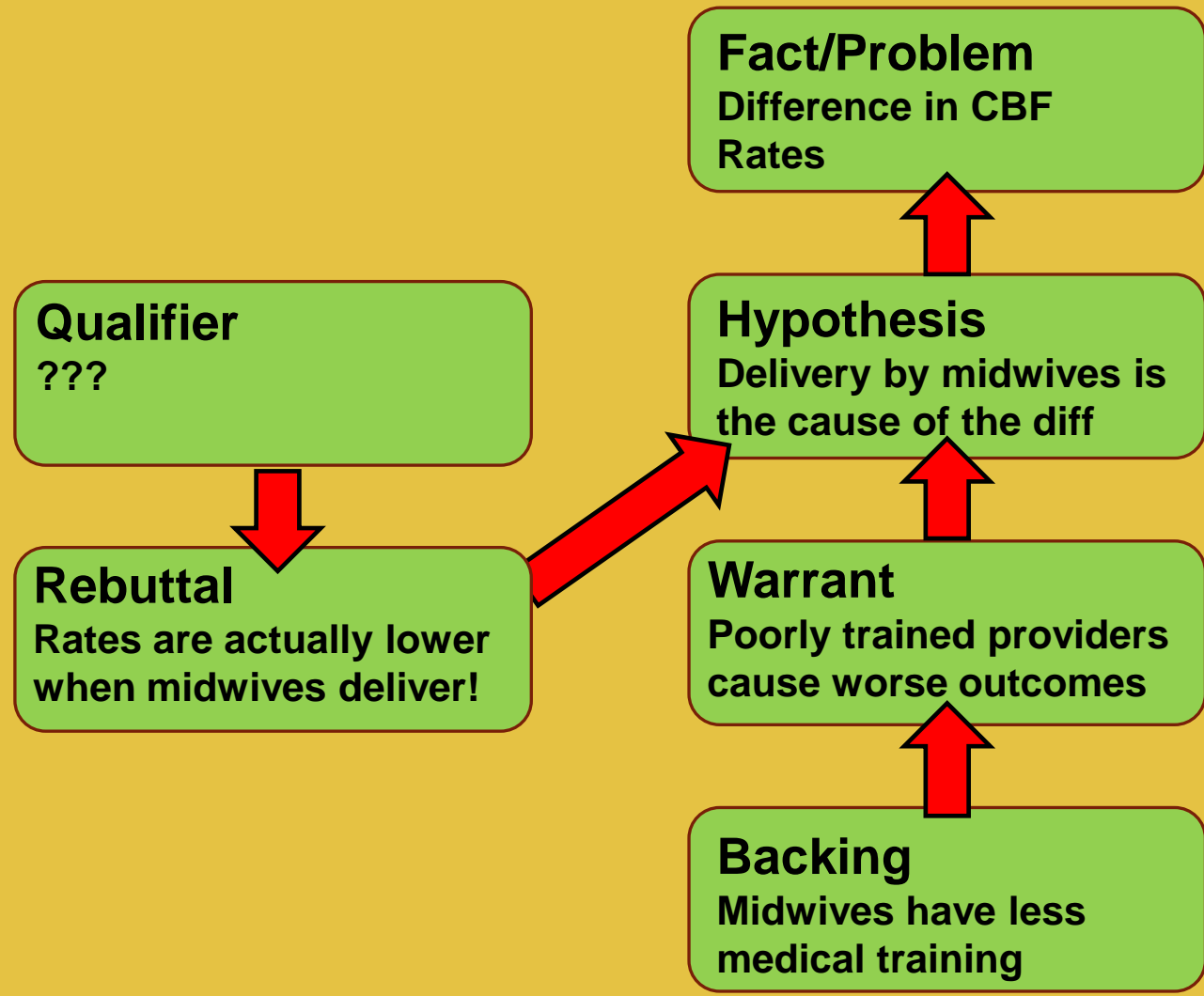
Rebuttal
Presence/absence of
priest doesn't change rate

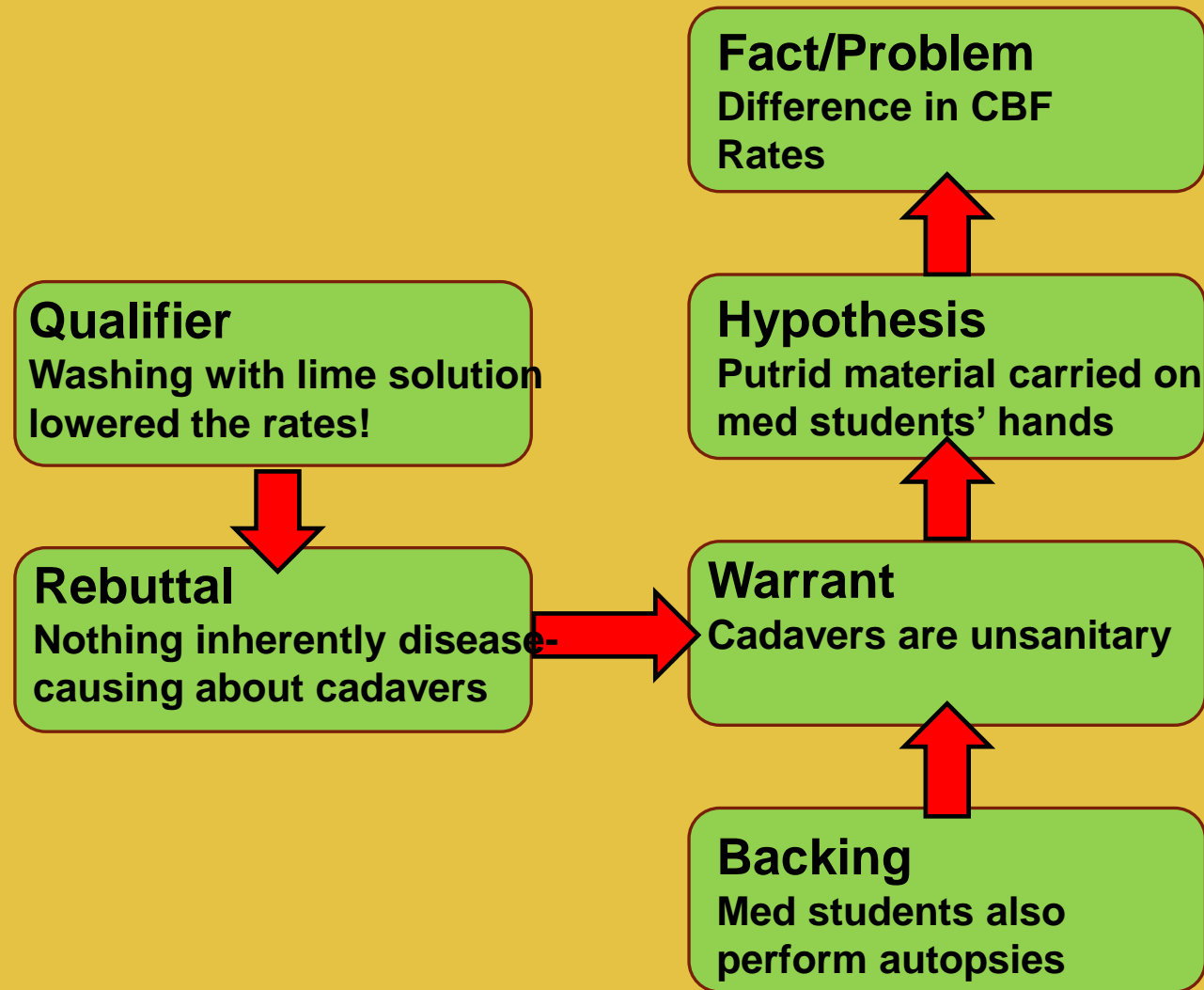
Fact/Problem
Difference in CBF
Rates

Hypothesis
A priest's presence
caused the diff

Warrant
Emotional trauma
affects health

Backing
Anecdotal: Priests
cause emotional stress





Approaches to Critical Thinking

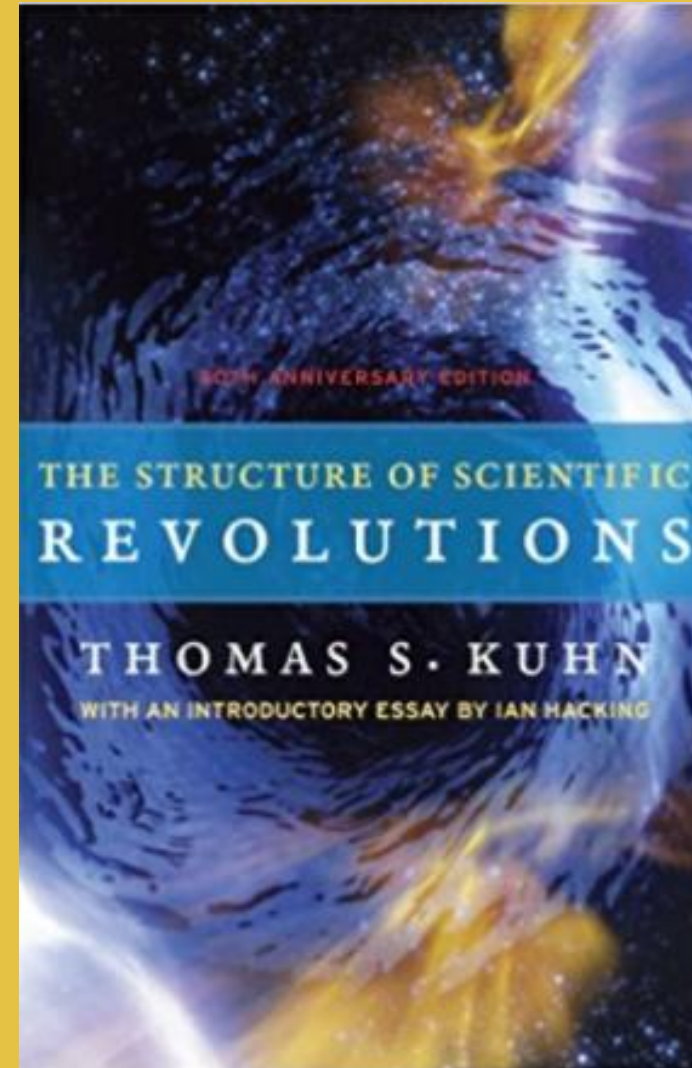
Examples for use in:

History

General Science

Pre-Med

Philosophy



Part 3

Critical Thinking Across the Curriculum

Critical Thinking Across the Curriculum

What Do Your Students Need to Know *about* Critical Thinking?

- ◆ We all start from some set of beliefs we unreflectively hold.
- ◆ We all have limited time to attend to any given belief.
- ◆ We all have a tendency to not think critically when it comes to beliefs we
 - (a) don't find valuable or
 - (b) find **VERY** valuable.

REASONABLE

Critical Thinking Across the Curriculum

I. Getting CT started in your classroom

II. Tools for helping students think well

III. Core Practices

IV. Assessment

I. Getting CT Started in Your Classroom

- ◆ **Help students see the importance of agreeing on a set of definitions.**

(What do you mean by X? Can you give me an example?)

- ◆ **Help students see the importance of agreeing on a starting point.**

(What can we agree about? What do you take as good evidence?)

Four Techniques

The Socratic Method

The Footing Method

The Distancing Method

The Why/How Method

The Socratic Method

What do you mean by...?

English

Justice

Racism

Harm

Business

Fairness

Benefit

Cost

Philosophy

Logical

Debit/Credit

Sociology

See

Science

The Socratic Method

What do you mean by...?

Art

Art

Beauty

Symmetry

Dance

Inflection

Presence

Balance

Theatre

Feel

Natural

The Footing Method

What evidence do you agree on?

Physical Science

Biological Science

Medical Science

Anecdote

Bible/Q'ran

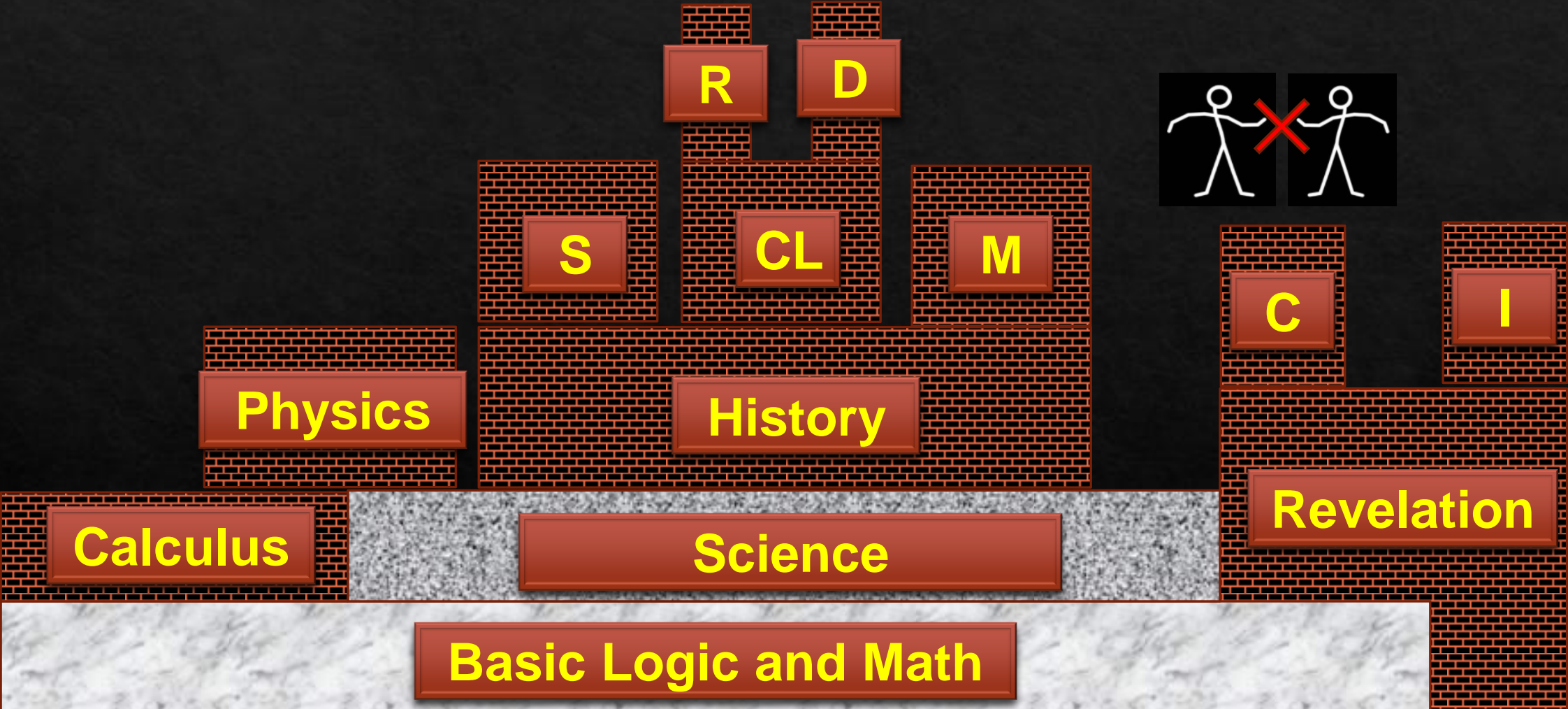
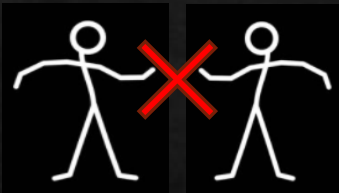
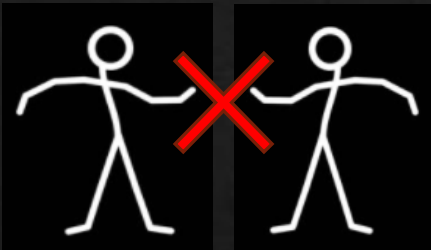
Tarot cards

Hollywood stars

Statistics/Logic

Political Commitments

The Footing Method



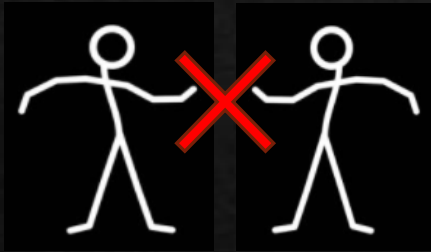
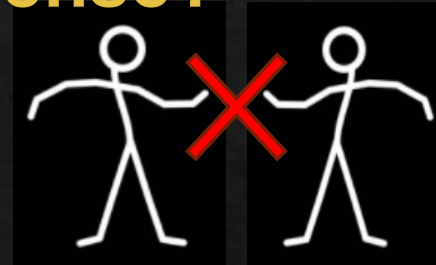
Math

The Footing Method

Is the continuum hypothesis true?

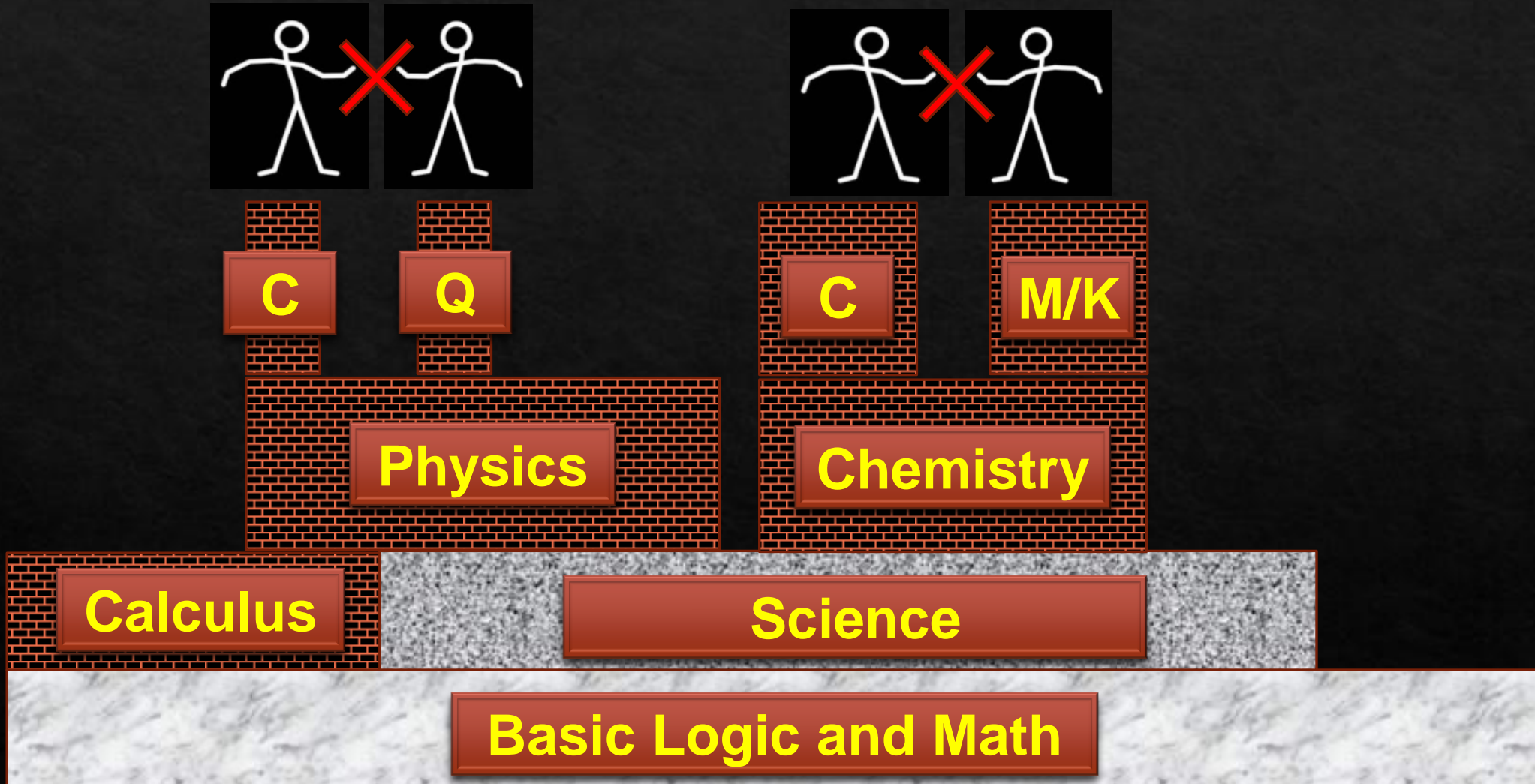
Are numbers real? And if so, in what sense?

Why do we trust axiomatic systems?



Science

The Footing Method



The Distancing Method

“What have you heard about...?”

- ◆ What have you heard about abortion?
- ◆ What do people say about evolution?
- ◆ What big concerns do people in the news seem to have about climate change?

DACA Racism Sexism Gender Inequality

Gender/Sex Identity Guns Assisted Suicide

◆ ***Because why?*** Questions

◆ What would make that true?

◆ What would the world need to be like if that were true?

◆ ***How do you know?*** Questions

◆ What evidence could we use?

◆ What, specifically, does this evidence tell us?

The Why/How Method

◇ *Because why?* Questions

- Some avalanches travel faster than 180 mph.
- All ravens are black.
- Granite doesn't float.
- Gryffindor's sword destroyed the horcrux in Gaunt's ring.

◇ *How do you know?* Questions

The Why/How Method

- ◇ ***Because why?*** Questions
- ◇ ***How do you know?*** Questions

How do I use these questions?

- **To teach how to construct a (testable) hypothesis.**
- **To demonstrate the strengths and weaknesses of different types of evidence.**
- **To facilitate thinking by sidestepping the “belief” question.**

Catherine Elgin

“It is not the brute reliability or unreliability of a belief that supplies the justification, but an understanding of that reliability or unreliability.

“Even if my forebodings are accurate, so long as we have no reason to trust them, they bear little weight.” p. 163.



“Can Beliefs Be Justified through Coherence Alone?” 2005:163

II. Tools for helping students think well

Principles of Good Reason

1. The Principle of Reason

2. The Principle of Charity

II. Tools for helping students think well

1. The Principle of Reason

- ◆ Reason is the most fundamental and reliable means of answering questions and resolving disagreements.
- ◆ The foundation of democracy.
- ◆ It's why we use courts instead of fist-fights and science instead of superstition.

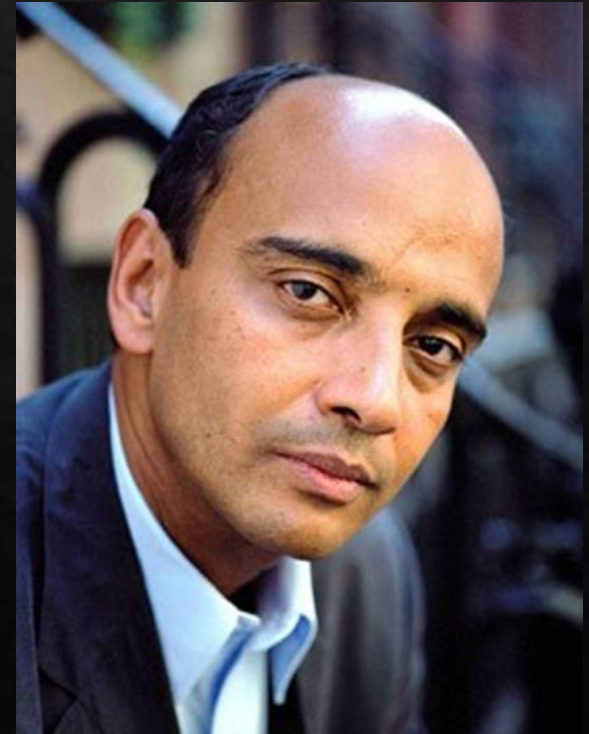
1. The Principle of Reason

Sir Edward Evans-Pritchard attempted to explain the theory of witchcraft implicit in the practices of the Azande people of south Sudan.

He discovered: if you followed the Azande's beliefs about how witchcraft is inherited, it turns out that everyone is a witch.

But the Azande rejected the idea that everyone was a witch.

Evans-Pritchard tried to convince them that they should be consistent, but they weren't interested.



**Kwame Anthony Appiah
(2003: 343-344)**

1. The Principle of Reason

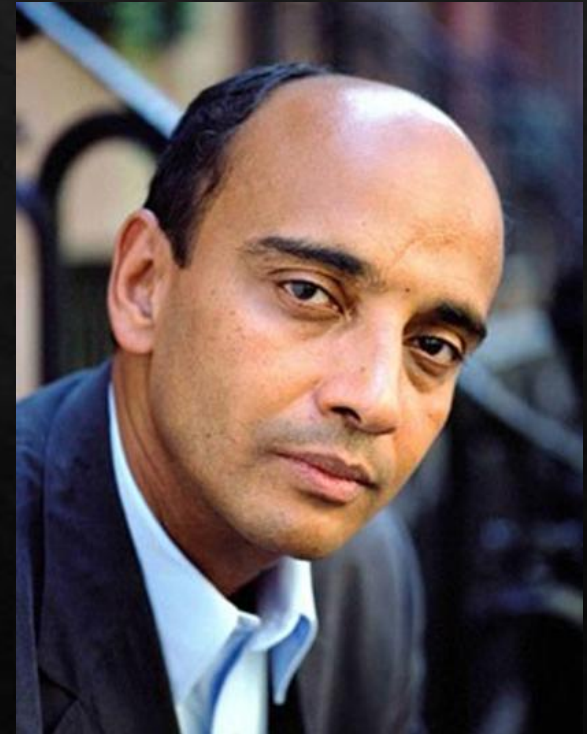
Their reason for not thinking about witchcraft the way Evans-Pritchard did?

Their lives made sense to them.

They recognized no reason to think they were wrong.

Nothing hung on their beliefs about witchcraft.

“[N]ot everyone who is treated with spiritual medicine gets better; but then the lights don’t always go on when you flip the switch!”



**Kwame Anthony Appiah
(2003: 343-344)**

II. Tools for helping students think well

1. The Principle of Reason

◇ **Reason is often blocked for one of two reasons:**

Filter Bubbles or Echo Chambers

Eli Pariser

C. Thi Nguyen

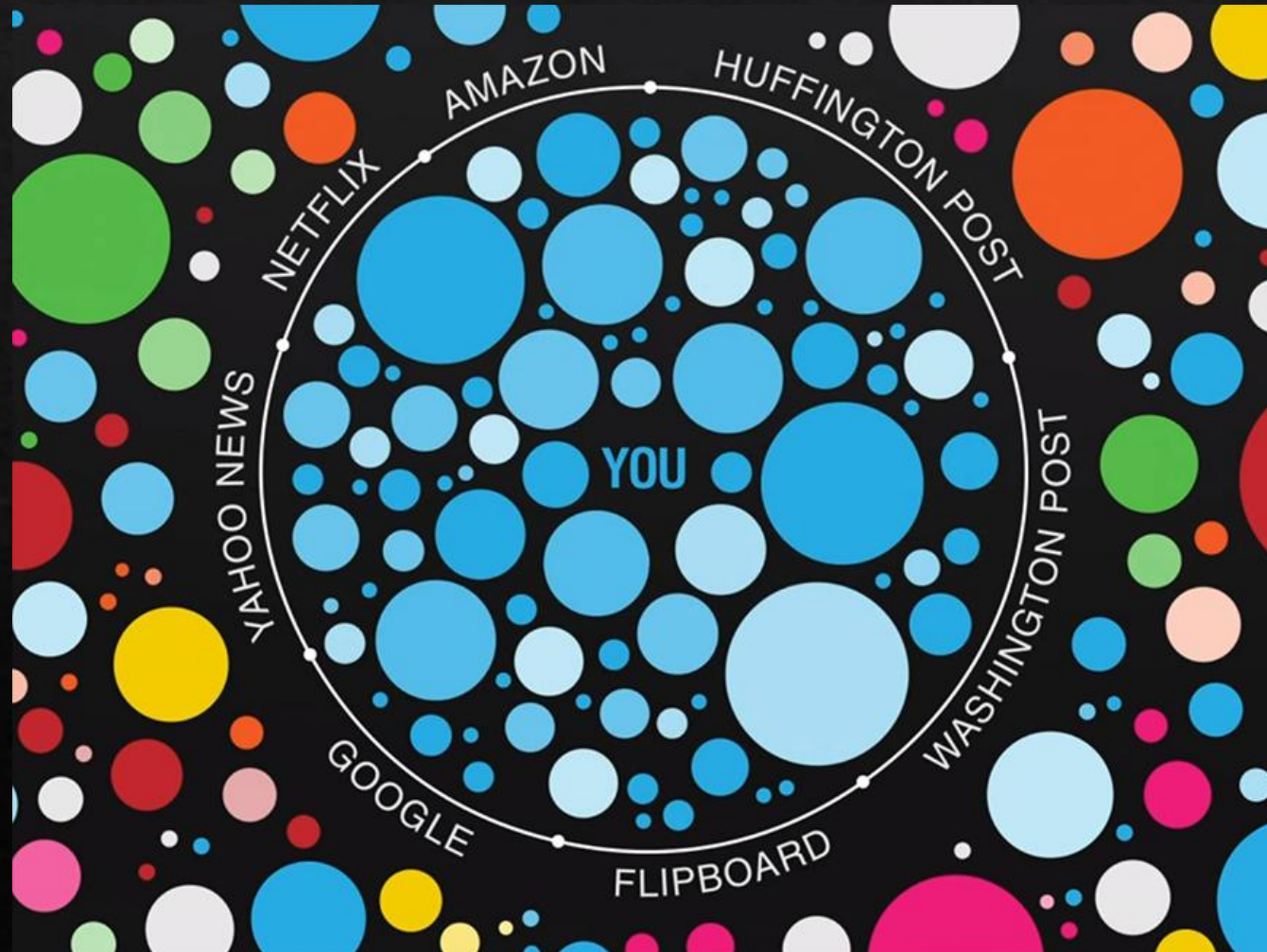
II. Tools for helping students think well

Filter Bubbles



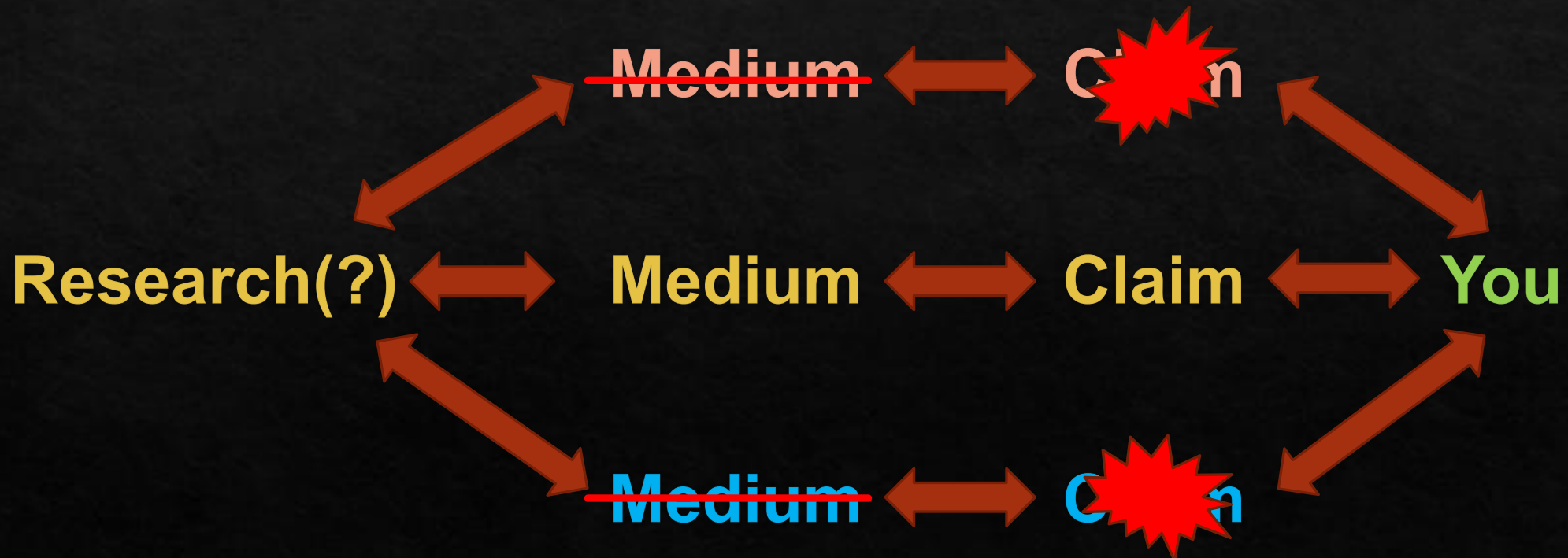
II. Tools for helping students think well

Filter Bubbles



II. Tools for helping students think well

Echo Chambers



II. Tools for helping students think well

How can I reinforce the principle of reason?

Assignment Idea:

◆ Have students evaluate sources using the CRAAP test:

Currency

Relevance

Authority

Accuracy

Purpose

II. Tools for helping students think well

How can I reinforce the principle of reason?

Assignment Ideas:

- ◆ Have students make a list of ways to reduce filter bubbles and then demonstrate its effect on a topic in your course.
- ◆ Set up a VPN on a campus computer and break students into groups. Compare searches on a topic in your course on VPN and non-VPN computers.

II. Tools for helping students think well

2. The Principle of Charity

- ◆ Give those who disagree with you the benefit of the doubt.
- ◆ Respond to the strongest version of their argument.
- ◆ The people who disagree with you (probably) aren't stupid.



II. Tools for helping students think well

2. The Principle of Charity

Why Do We Disagree?

- **One of us is wrong.**
- Sometimes one of us has bad information.
- Sometimes one of us has incomplete information.
- Sometimes one of us is lazy or (unconsciously) prejudiced (and maybe both!).
- Sometimes one of us is (unconsciously) biased (and probably both!).
- Sometimes we weigh evidence differently.
- Sometimes we don't see any reason to think we're wrong.
- Sometimes we're talking about different things.

Do you know it's not you? Do you know when it's them?

II. Tools for helping students think well

2. The Principle of Charity

The Danger:

We assume that disagreement means there is no good answer!

“I conclude...

...people will always disagree about this topic.”

...there are good reasons on both sides of this question.”

...that there is no way to resolve this debate.”

II. Tools for helping students think well

A Dilemma



II. Tools for helping students think well

How Can I reinforce the principle of charity?

Assignment Ideas:

- ◇ Create assignments that require students to make a decision where the outcome matters, then hold them accountable for the sorts of evidence they use:
legal cases; medical cases; political cases; business cases
- ◇ Create assignments that require students to explain the reason for a disagreement.
- ◇ Instead of a position paper, have students write a paper evaluating the evidence used in two sides of a debate (e.g., have them use the CRAAP test).

Other Principles of Good Reason

3. The Principle of Internal Consistency

- ◇ Don't apply a rule or method arbitrarily (differently to different cases).
- ◇ Don't apply a meaning arbitrarily (equivocation).

4. The Principle of Non-Self-Reference

- ◇ Don't use the rule or method you're trying to prove.

5. The Principle of Non-fuzziness

- ◇ It either is x or it isn't, in the same context (law of excluded middle).
- ◇ It is sometimes x and sometimes not- x , so it doesn't matter.

6. The Principle of (Epistemic) Justice

- ◇ Don't exclude voices for arbitrary reasons.
- ◇ Don't presume to speak for voices that can speak for themselves.

II. Tools for helping students think well

Fallacies and Biases

◇ **Fallacy:** An error in reasoning (intentional or unintentional)

◇ **Structural fallacies**

◇ Hasty generalization; base rate neglect; begging the question; false dilemma

◇ **Fallacies of irrelevance**

◇ Appeal to the people; red herring; ad hominem; appeal to pity

And many more...



INFORMAL LOGICAL FALLACIES

A BRIEF GUIDE

Jacob E. Van Vleet

THE AMAZING DR. RANSOM'S BESTIARY OF ADORABLE FALLACIES

A FIELD GUIDE
for
CLEAR THINKERS

DOUGLAS WILSON &
N.D. WILSON
ILLUSTRATED BY
FORREST DICKISON

Edited by
Robert Arp, Steven Barbone and Michael Bruce

BAD ARGUMENTS

100
of the Most
Important
Fallacies
in Western
Philosophy

WILEY Blackwell

II. Tools for helping students think well

Fallacies and Biases

◆ Cognitive Heuristics and Biases

◆ Representativeness Heuristic

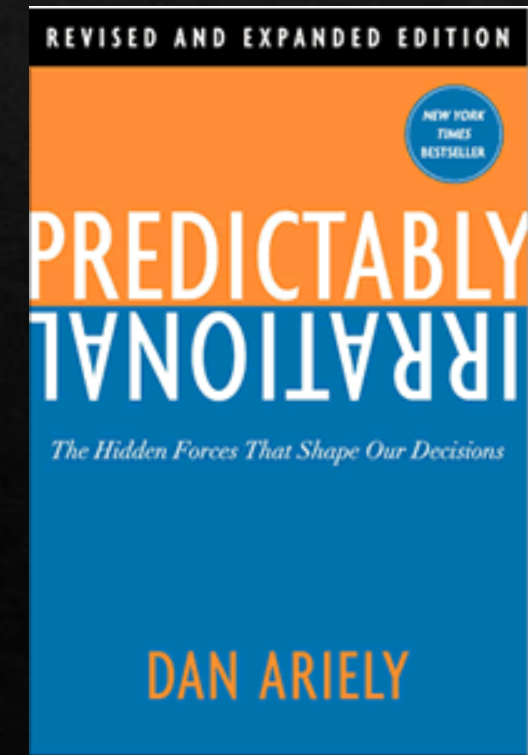
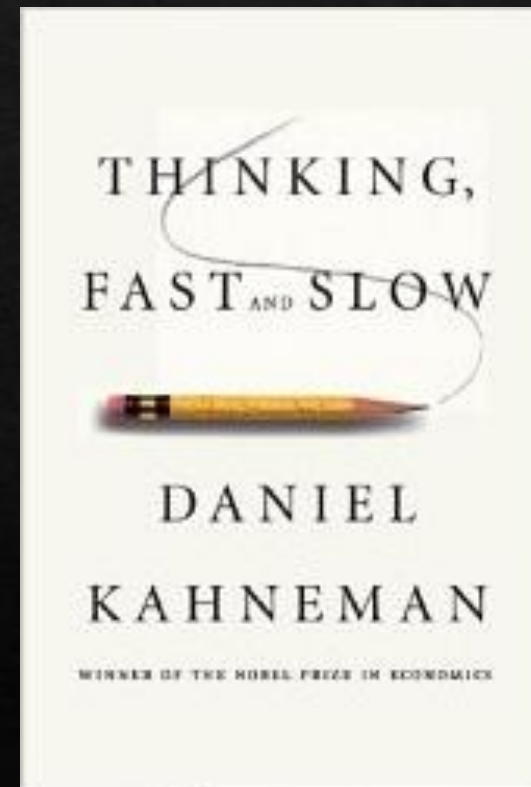
◆ Availability Bias

◆ Confirmation Bias

◆ Anchoring Bias

◆ Framing effects

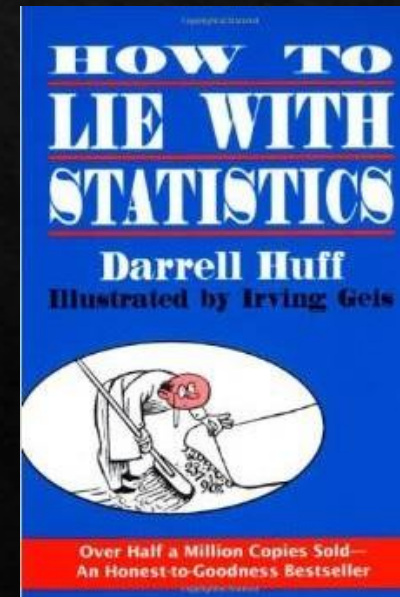
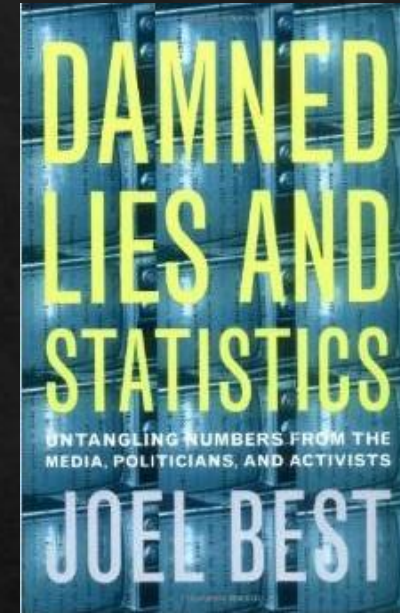
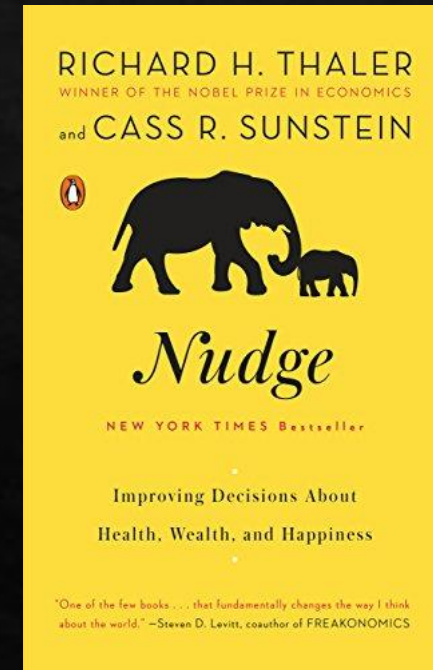
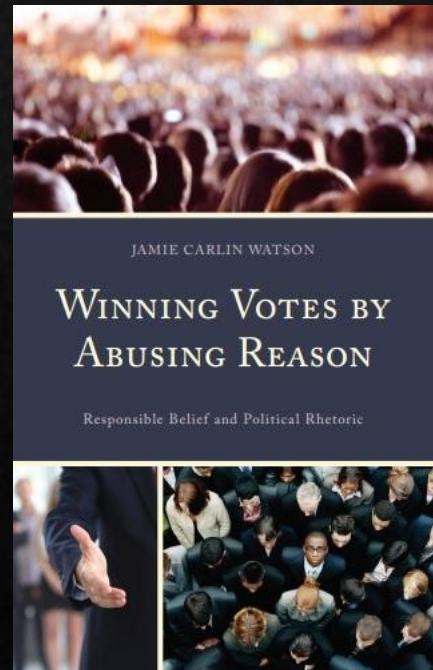
◆ Hedonic asymmetries



Debiasing Ourselves and Others

◆ **Nudges – choice structures that preserve freedom while producing outcomes that make the chooser better off in their own estimation**

- ◆ Reason-promoting nudges
- ◆ Reason-avoiding nudges
- ◆ Autonomy-promoting
- ◆ Autonomy-undermining



Nudging Examples



beeping, to get you out of bed.

Can't wake up? You're not alone. Stats show that 40% of people 'abuse' the snooze. Typical alarm clocks just don't work very well. Ours never lets you oversleep again. If you snooze, Clocky will jump off of your nightstand, and run around beeping, absolutely determined to get you out of bed on time. Clocky's hip, innovative, and charming. Patent 7355928

BENEFITS

Security! Never oversleep again!

COLORS



Almond: CLKYaw

Aqua: CLKYa

Raspberry: CLKYr

Chrome: CLKYc

- * Runs away beeping c
- * Durable! Jumps from
- * Loud R2D2-like robot
- * Option to snooze on
- * Option to turn off w/ conventional alarm c
- * Flashing backlight in
- * Demonstrable with 'demo' mode
- * Strong battery life up to a year
- * Perfect nightstand size 5.25"x3.5"x3.5"



Debiasing Ourselves and Others

Business

Economics

Finance

Education

Engineering

Information Systems Design

Activity idea:

Use cases and have students problem-solve by constructing decision-strategies. Work individually or in groups. Get feedback in groups.

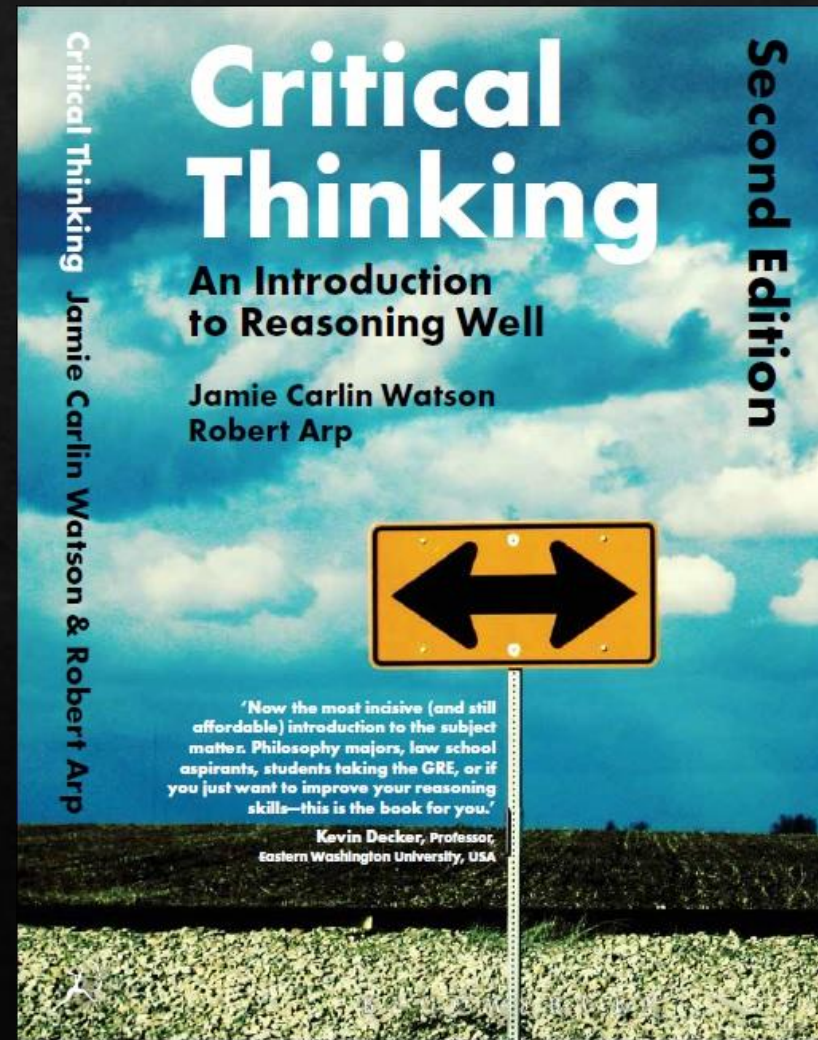
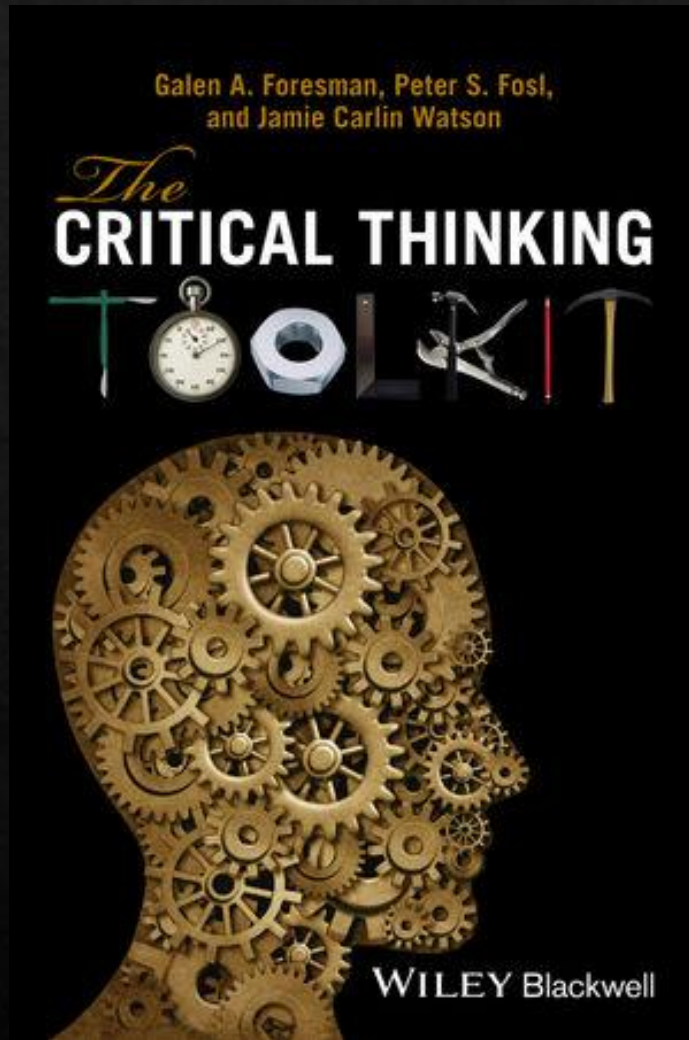
Construct Nudges

- Checklists
- Timelines
- Feedback mechanisms

Enhance Behavioral Strategy Skills

- Planning vs. action meetings
- Map decisions over time
- Establish “stretch targets”

Other Resources



III. Core Practices

- 1. Build it into your course up front.**
- 2. Intentionally connect your assignments to specific learning outcomes.**
- 3. Tell them you're doing it.**
- 4. Tell them what they're supposed to learn.**

III. Core Practices

5. Tailor assignments to the specific critical thinking skill you want students to hone. (And use that language in learning outcomes.)

Tailoring Assignments

Bloom's Language

Analyze

Useful Verbs	Sample Question Stems
analyze	Which events could have happened ...?
classify	Compare your ... with that presented in ...
distinguish	What were some of the motives behind ...?
identify	What was the underlying theme of ...?
separate	Distinguish between ...?

Evaluate

Useful Verbs	Sample Question Stems
assess	Devise a different solution to ...?
debate	How effective are ...?
decide	Defend your position about ...?
rate	How well does this solution resolve the problem of ...?
recommend	What changes to ... would you recommend?

Tailoring Assignments

Paul/Elder Language

Clarity	Could you elaborate further? Could you give me an example?
Accuracy	How could we check on that? How could we find out if that is true?
Precision	Could you be more specific? Could you give me more details?
Relevance	How does that relate to the problem? How does that bear on the question?
Depth	What factors make this a difficult problem? What are some of the complexities of this question?
Breadth	Do we need to look at this from another perspective? Do we need to consider another point of view?
Logic	Does all this make sense together? Does what you say follow from the evidence?
Significance	Is this the most important problem to consider? Is this the central idea to focus on?
Fairness	Do I have any vested interest in this issue?

Tailoring Assignments

Toulmin Language

Fact	What is your research question? What are you trying to explain?
Claim/Hypothesis	What would explain the fact? What would you say caused the fact?
Warrant	Why should anyone believe your hypothesis? What reasons can you give in support of your claim?
Backing	What evidence supports your warrant? Is there research that supports your warrant?
Rebuttal	Is your conclusion the only way to explain the fact? Are there reasons to doubt your warrant?
Qualifier (In light of the rebuttal...)	Could you make your claim more precise/accurate? Would adding nuance make your claim true?

III. Core Practices

5. Tailor assignments to the specific critical thinking skill you want students to hone. (And use that language in learning outcomes.)

6. Use Plain Language best practices.

- ◆ Purpose
- ◆ Font / size
- ◆ Avoid technical terms unless (a) defining or (b) it's expected.
- ◆ Avoid colloquialisms in instructions.

7. Make assignments meaningful: feedback, feedback, feedback.

IV. Assessment



◆ Strategies for Documentable Improvement

— **1. Inter-instructor assessment** – Have some instructors enhance some assignments with new CT strategies. Compare CT-enhanced courses to non-CT-enhanced courses.

✓ — **2. Inter-class assessment** – Enhance multiple assignments with new CT strategies. Compare the grades of *an instructor's* CT-enhanced courses to *that instructor's* previously non-CT-enhanced courses.

✓ **3. Intra-class assessment** – Enhance multiple assignments with new CT strategies. Compare initial evaluation with later evaluation.

IV. Assessment



◆ One way to approach it...

- 1. Choose an improvement measure (rubric; grade).**
- 2. For the first year, choose 1-2 courses per department.**
- 3. Appoint someone to collect improvement data from all participating faculty.**
- 4. For the second year, increase number of participating faculty/courses.**
- 5. After 2 years, set a 5-year goal for improvement.**

IV. Assessment



◆ Another way to approach it...

- 1. For the first year, choose 1-2 courses per department.**
- 2. Faculty in each department decide on an improvement measure (rubric; grade).**
- 3. Appoint someone in the department to collect the data and submit a report (in a standardized format).**
- 4. For the second year, increase number of participating faculty/courses.**
- 5. After 2 years, set a 5-year goal for improvement.**

Part 4

Enhancing Your Classroom With Critical Thinking

Enhancing Your Assignments – Part I

- ◇ **5 Minutes:** Categorize your questions/instructions in light of Bloom's Taxonomy.
 - ◇ At the end, note which you are asking students to demonstrate most often.
- ◇ **5 Minutes:** Assess your questions/instructions in light of the Paul/Elder categories: elements; standards; attitudes.
 - ◇ At the end, note which you are asking students to demonstrate most often.
- ◇ **20 Minutes:** At your tables, discuss which you might want to emphasize more and how you might.

Enhancing Your Assignments – Part I

- ◆ **5 Minutes: Categorize your questions/instructions in light of Bloom's Taxonomy.**
 - ◆ **At the end, note which you are asking students to demonstrate most often.**

5:00

Stop

Enhancing Your Assignments – Part I

- ◆ **5 Minutes: Assess your questions/instructions in light of the Paul/Elder categories: elements; standards; attitudes.**
 - ◆ **At the end, note which you are asking students to demonstrate most often.**
 - ◆ **Would adding Toulmin language make it clearer to students what you want them to do?**

5:00

Stop

Enhancing Your Assignments – Part I

- ◆ **20 Minutes:** At your tables, discuss which you might want to emphasize more and how you might.

20:00

Enhancing Your Assignments – Part II

- ◆ **5 Minutes:** Jot down ways you could revise your course objectives and assignments so they are more explicitly aimed at a critical thinking skill.
- ◆ **20 Minutes:** Break up into groups of 4. In turn, each of you present your ideas and receive feedback from others for no more than 5 minutes each.

5 Minutes: Jot down ways you could revise your course objectives and assignments so they are more explicitly aimed at thinking critically.

- ◆ **Consider different aspects of critical thinking:**
 - ◆ **Attitudes, reasoning strategies, principles, debiasing**
- ◆ **Consider how to connect your assignments to your learning outcomes.**
- ◆ **Think about the content and structure of your instructions.**
- ◆ **Consider how to tell them what they're supposed to learn.**
- ◆ **Consider how to structure your feedback.**

5:00

Stop

20 Minutes: Break up into groups of 4. In turn, each of you present your ideas and receive feedback from others for no more than 5 minutes each.

20:00

Other Resources

- ◇ Catharine Hundleby's blog: "Thought in Progress": chundleby.com
- ◇ Rail: A blog about Reasoning, Argumentation, and Informal Logic: railct.com
- ◇ The Foundation for Critical Thinking: criticalthinking.org
- ◇ Argument Mapping Software: philmaps.com/home
- ◇ Reasoning For the Digital Age: reasoningforthedigitalage.com/
- ◇ The Illusions Index: Investigate Your Senses: illusionsindex.org/
- ◇ Health News Review: <https://www.healthnewsreview.org/>