Integrating Critical Thinking to Produce Successful Student Civic Engagement Using the CAT Framework

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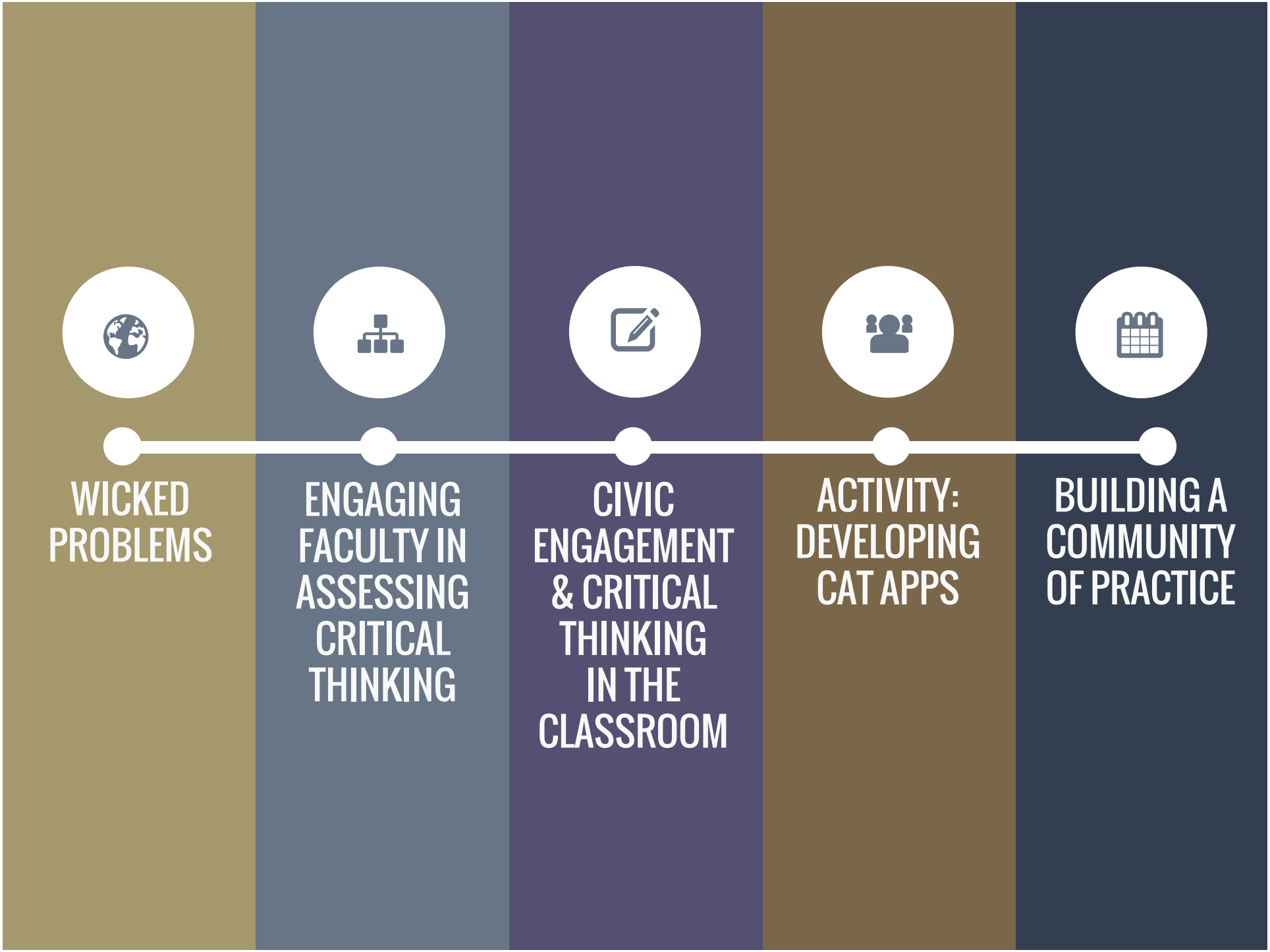
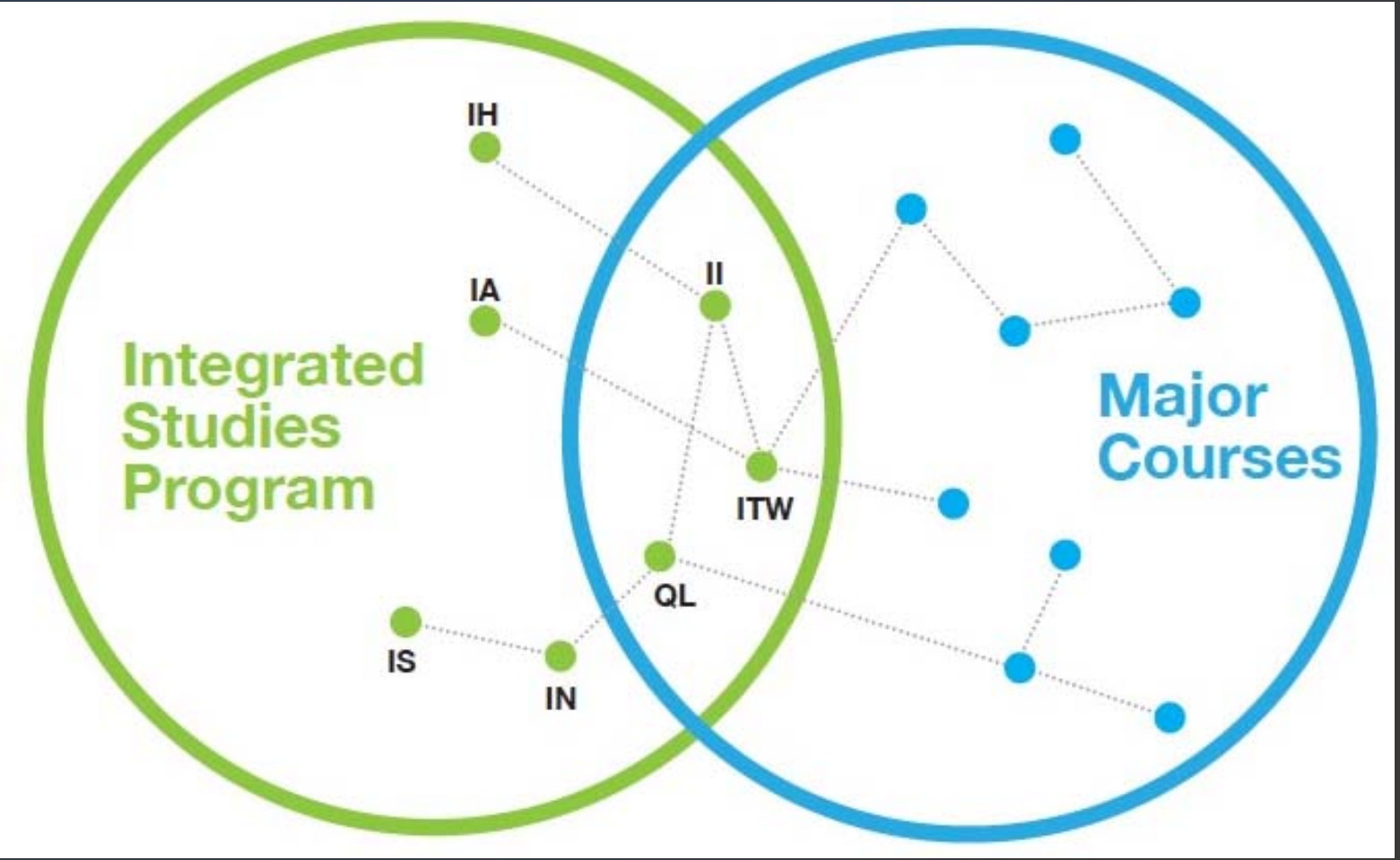
National Science Foundation's IUSE Program under grant 1022789.


WICKED PROBLEMS
ENGAGING FACULTY IN ASSESSING CRITICAL THINKING
CIVIC ENGAGEMENT & CRITICAL THINKING IN THE CLASSROOM
ACTIVITY: DEVELOPING CAT APPS
BUILDING A COMMUNITY OF PRACTICE

Integrative Studies Program



Integrative Learning

identify and discuss ways that their learning in one course informs and deepens their learning in one or more other courses, and the ways that their learning in one or more courses is connected to their out-of-class experiences.

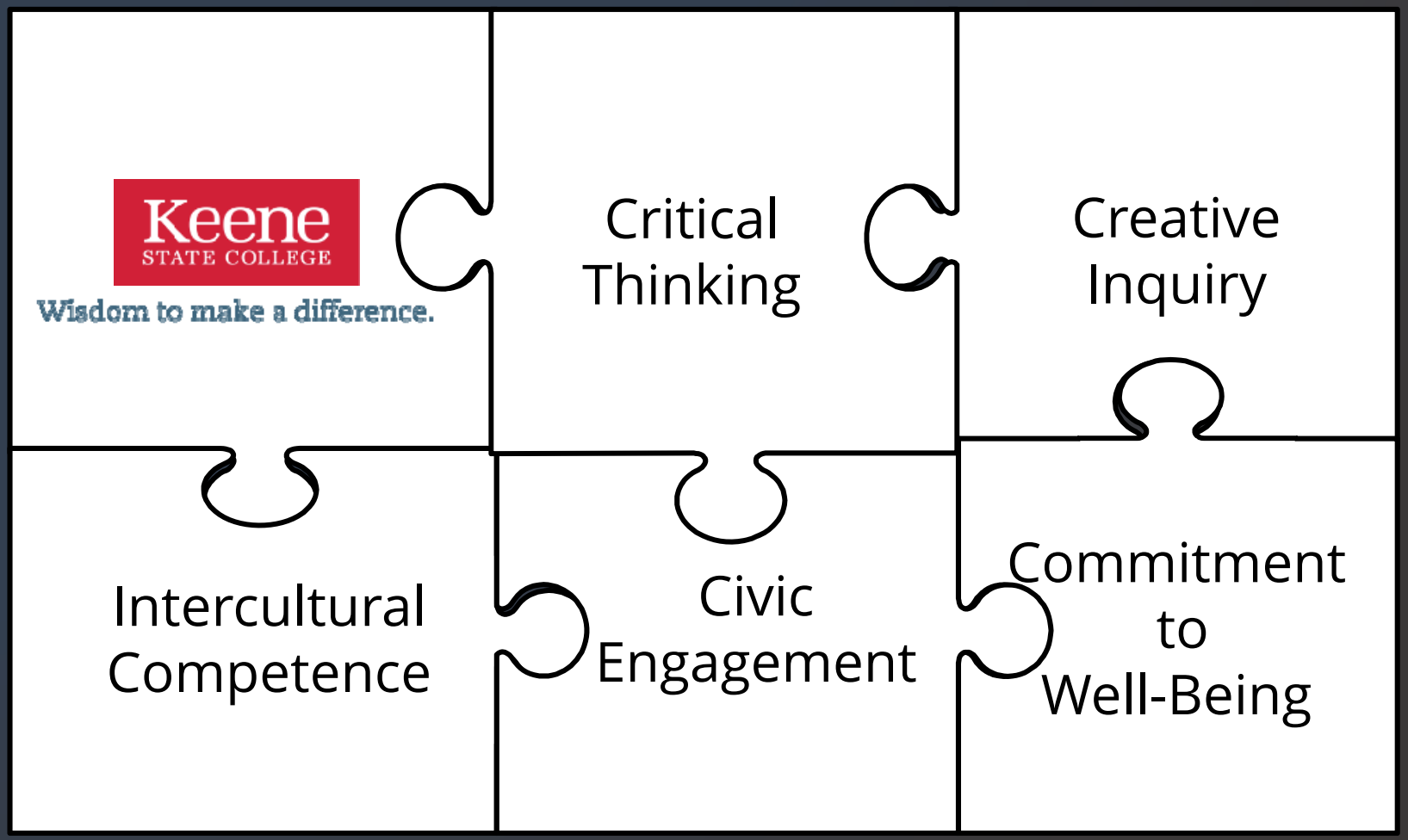
Critical Thinking

evaluate evidence, consider multiple perspectives, choose and defend a position from several alternatives, and analyze complex problems.

Quantitative Literacy

read and interpret quantitative information critically and apply quantitative methods and concepts to solve a problem or support an argument.

College-Wide Learning Outcomes

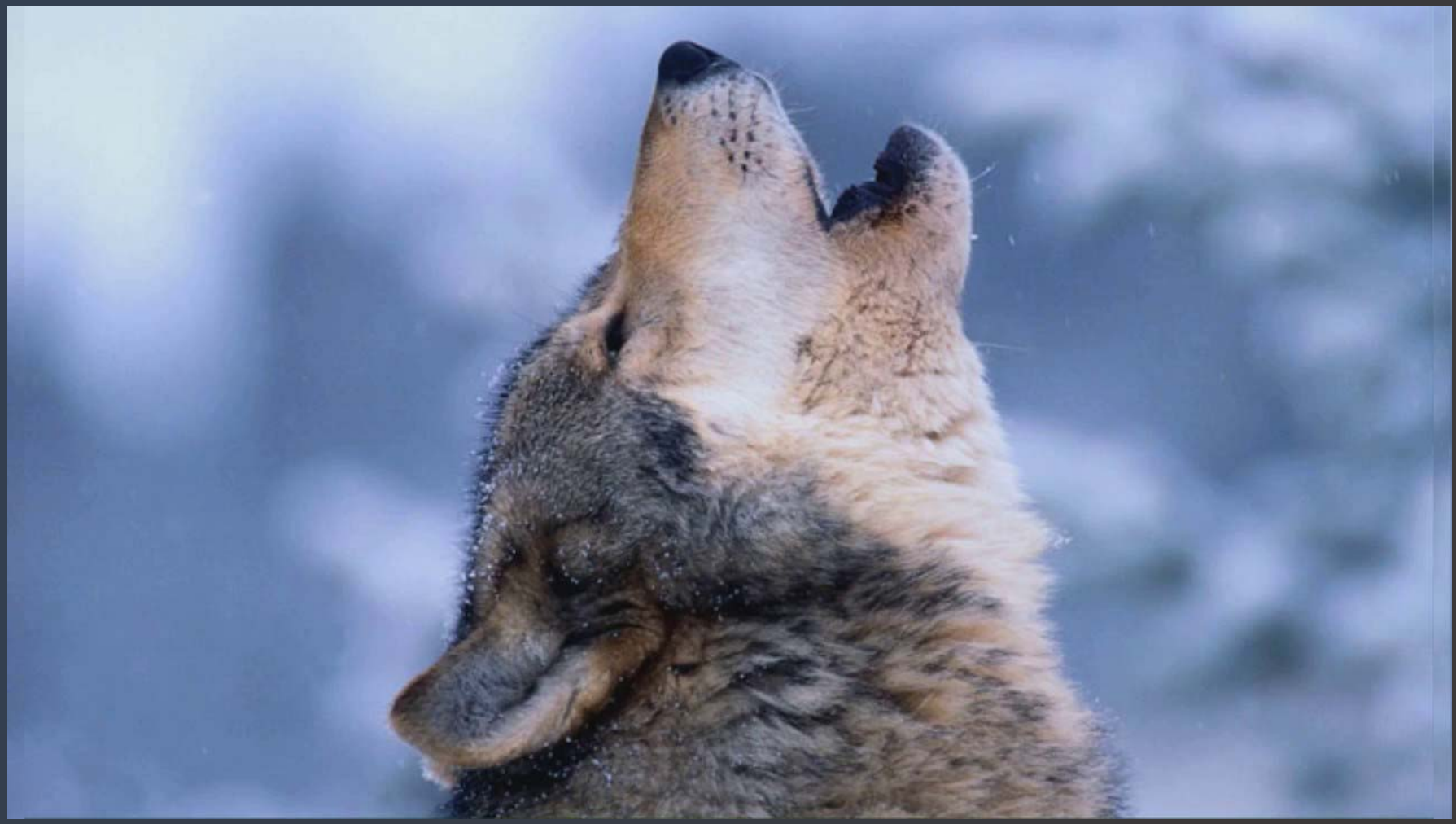


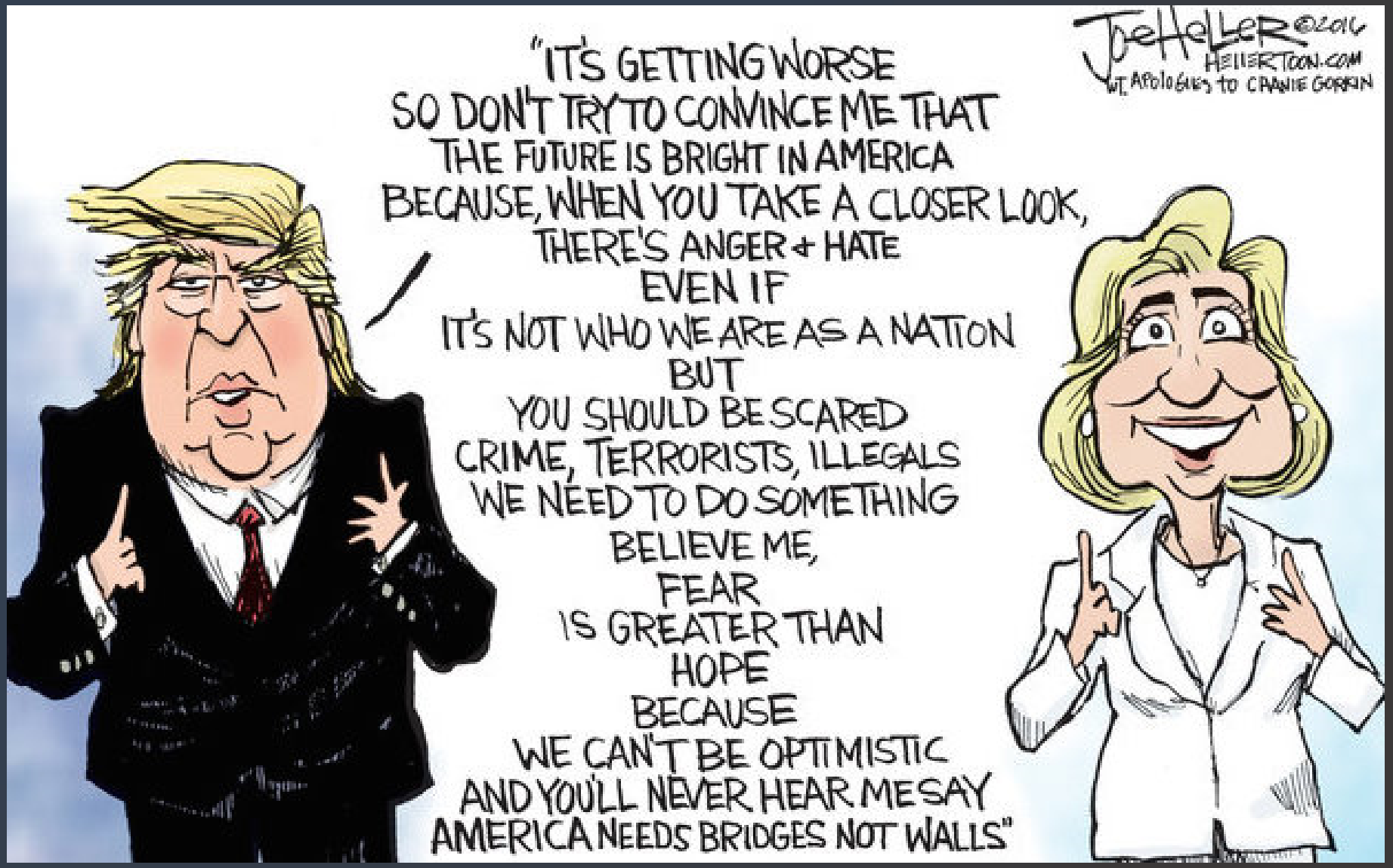
Civic Engagement

"Wicked Problems"

Critical Thinking

"Out of the Box"




JoeHeller ©2016
HELLERTOON.COM
W/ APOLOGIES TO CRANIE GORBIN
"IT'S GETTING WORSE
SO DON'T TRY TO CONVINCE ME THAT
THE FUTURE IS BRIGHT IN AMERICA
BECAUSE, WHEN YOU TAKE A CLOSER LOOK,
THERE'S ANGER & HATE
EVEN IF
IT'S NOT WHO WE ARE AS A NATION
BUT
YOU SHOULD BE SCARED
CRIME, TERRORISTS, ILLEGALS
WE NEED TO DO SOMETHING
BELIEVE ME,
FEAR
IS GREATER THAN
HOPE
BECAUSE
WE CAN'T BE OPTIMISTIC
AND YOU'LL NEVER HEAR ME SAY
AMERICA NEEDS BRIDGES NOT WALLS"

JoeHeller
"IT'S GETTING WORSE
SO DON'T TRY TO CONVINCE ME THAT
THE FUTURE IS BRIGHT IN AMERICA
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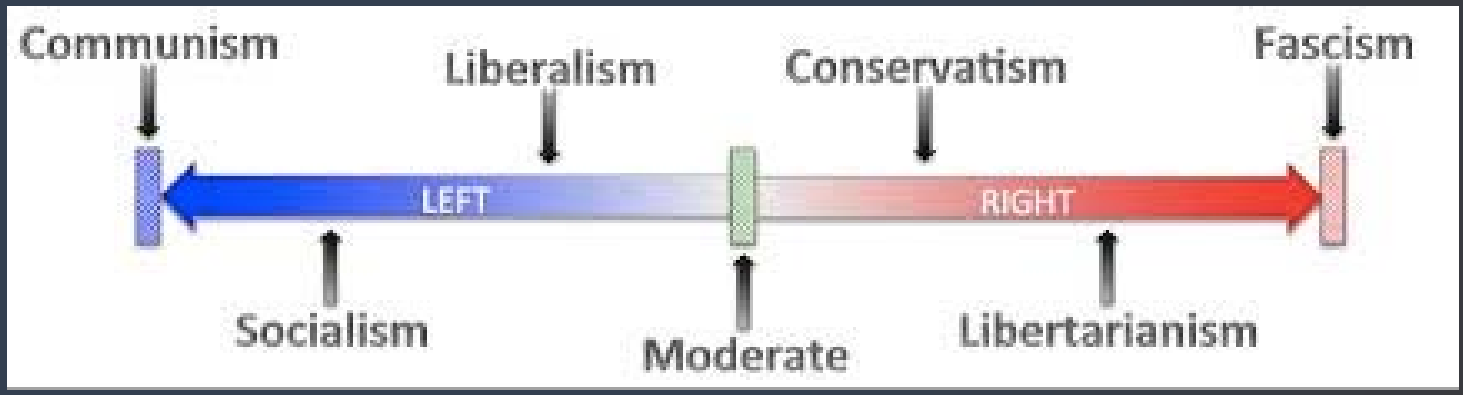
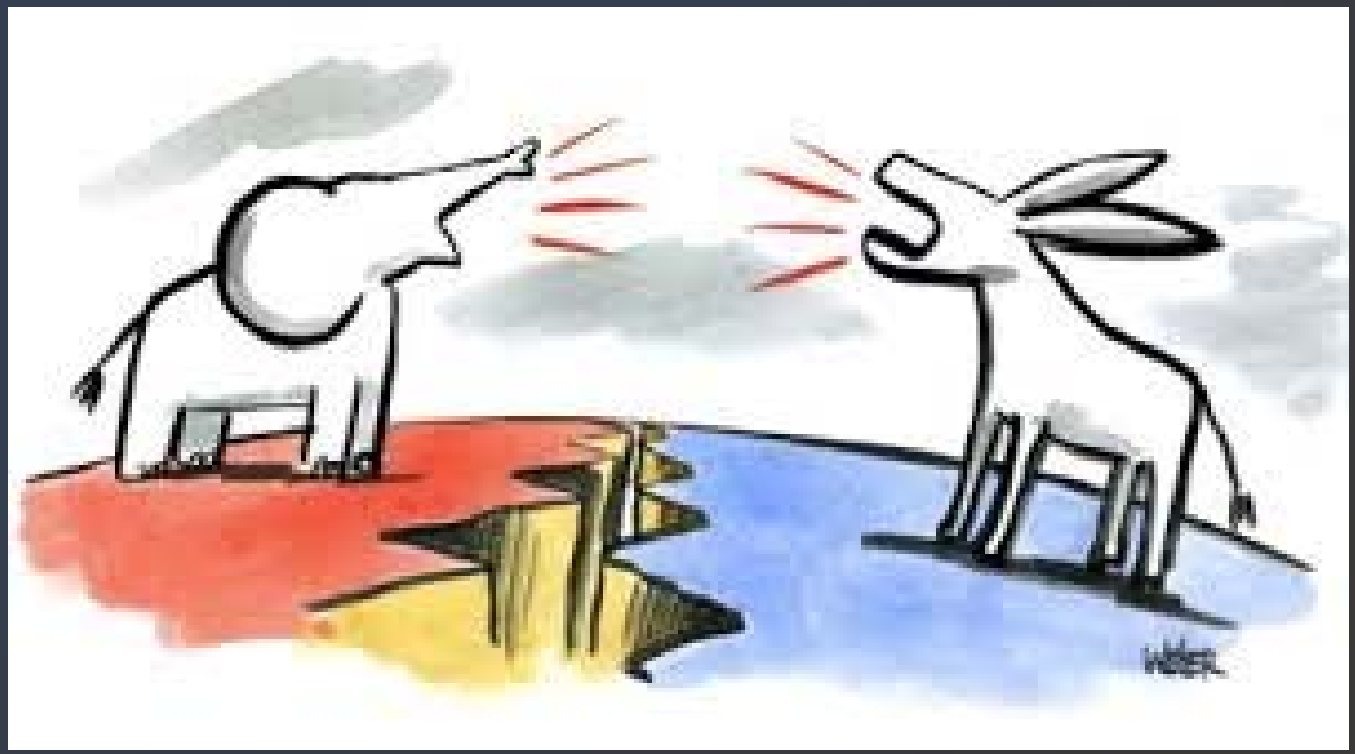
(FOR HILLARY, READ IT FROM BOTTOM TO TOP)


Communism
Liberalism
Conservatism
Fascism
LEFT
RIGHT
Socialism
Moderate
Libertarianism



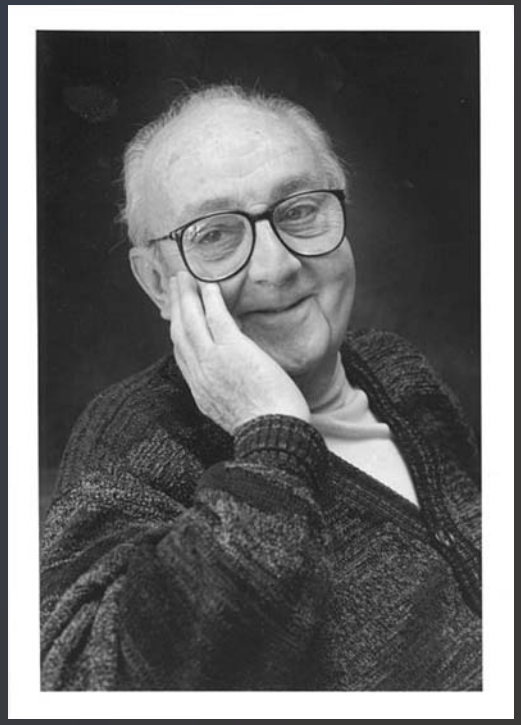
Models

Simplifications of reality

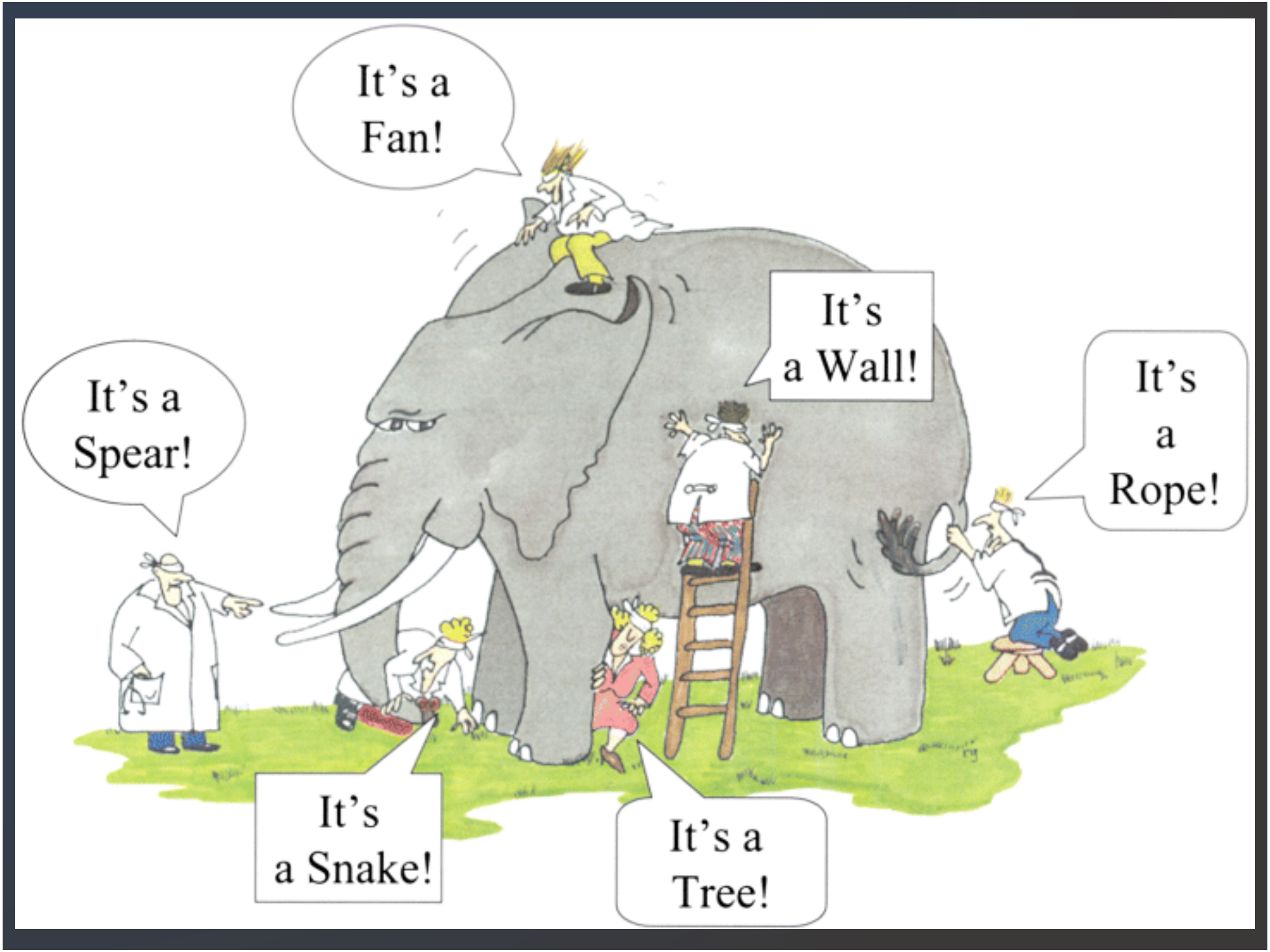
Include essential elements

Exclude non-essential elements

“... all models are wrong, but some are useful.”



George E. P. Box


It's a Fan!
It's a Spear!
It's a Wall!
It's a Rope!
It's a Snake!
It's a Tree!

Dissonance
fosters
critical thinking

Adapted from: B. Clark. (2016). *Political Economy: A Comparative Approach.* (3rd edition). Connecticut: Praeger.

2. When I think about the environmental policy, I tend to believe that...

Read each "belief" and the statements that follow carefully. Select the statement that most closely reflects your personal "belief."

- (●) Government regulation in the name of "protecting the environment" has gotten out of hand and we should scale back how much government intervention we are subjected to. States and local communities are best equipped to make decisions about their natural resources and the federal government should surrender power accordingly.
- ( ) Most profit-making activity relies on the exploitation of nature. This exploitation, along with the desperate need for capitalism to "grow or die" suggests that confronting the environmental crises that threaten our planet requires confronting capitalism.
- ( ) Profit-making activity sometimes generate "costs" on individuals and communities even when they do not participate in the private transactions. As a result, market failures (such as pollution) are likely to emerge and to persist; therefore, government policy that regulates business to protect the environment is worth pursuing.
- ( ) To appropriately manage the environment we need to develop more comprehensive private property rights around topics such as the "carbon rights" so that markets can effectively address environmental concerns such as climate change and so that governments do not need to get involved.

< > HISTORY

Adapted from: B. Clark. (2016). *Political Economy: A Comparative Approach.* (3rd edition). Connecticut: Praeger.

2. You chose...

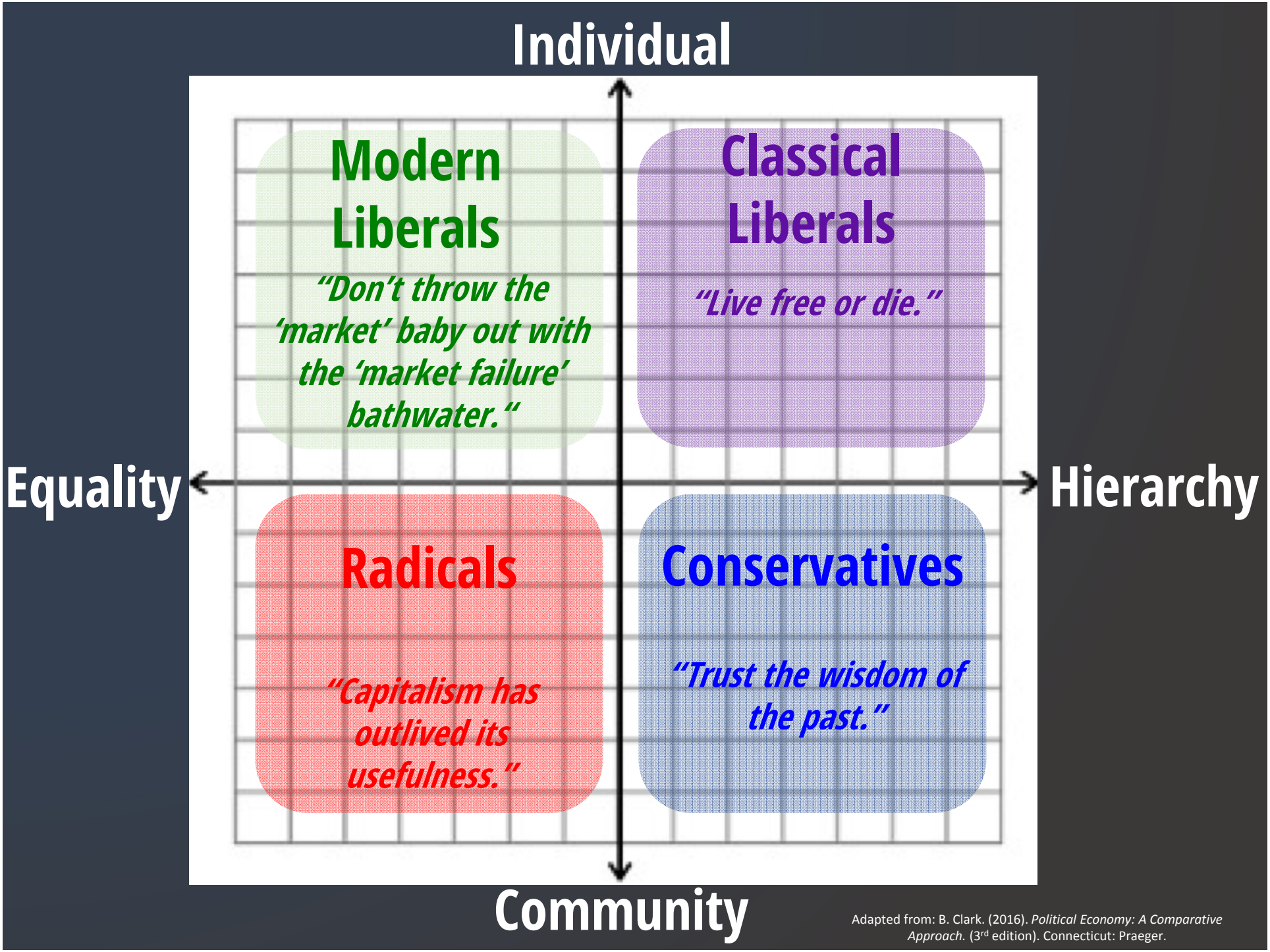
Government regulation in the name of "protecting the environment" has gotten out of hand and we should scale back how much government intervention we are subjected to. States and local communities are best equipped to make decisions about their natural resources and the federal government should surrender power accordingly.

Below, move the slider thumb to the number that most closely reflects how strongly you hold this "belief," with 0 reflecting a very weak "belief" and 5 reflecting a very strongly held "belief."

2

HISTORY

Adapted from: B. Clark. (2016). *Political Economy: A Comparative Approach.* (3rd edition). Connecticut: Praeger.



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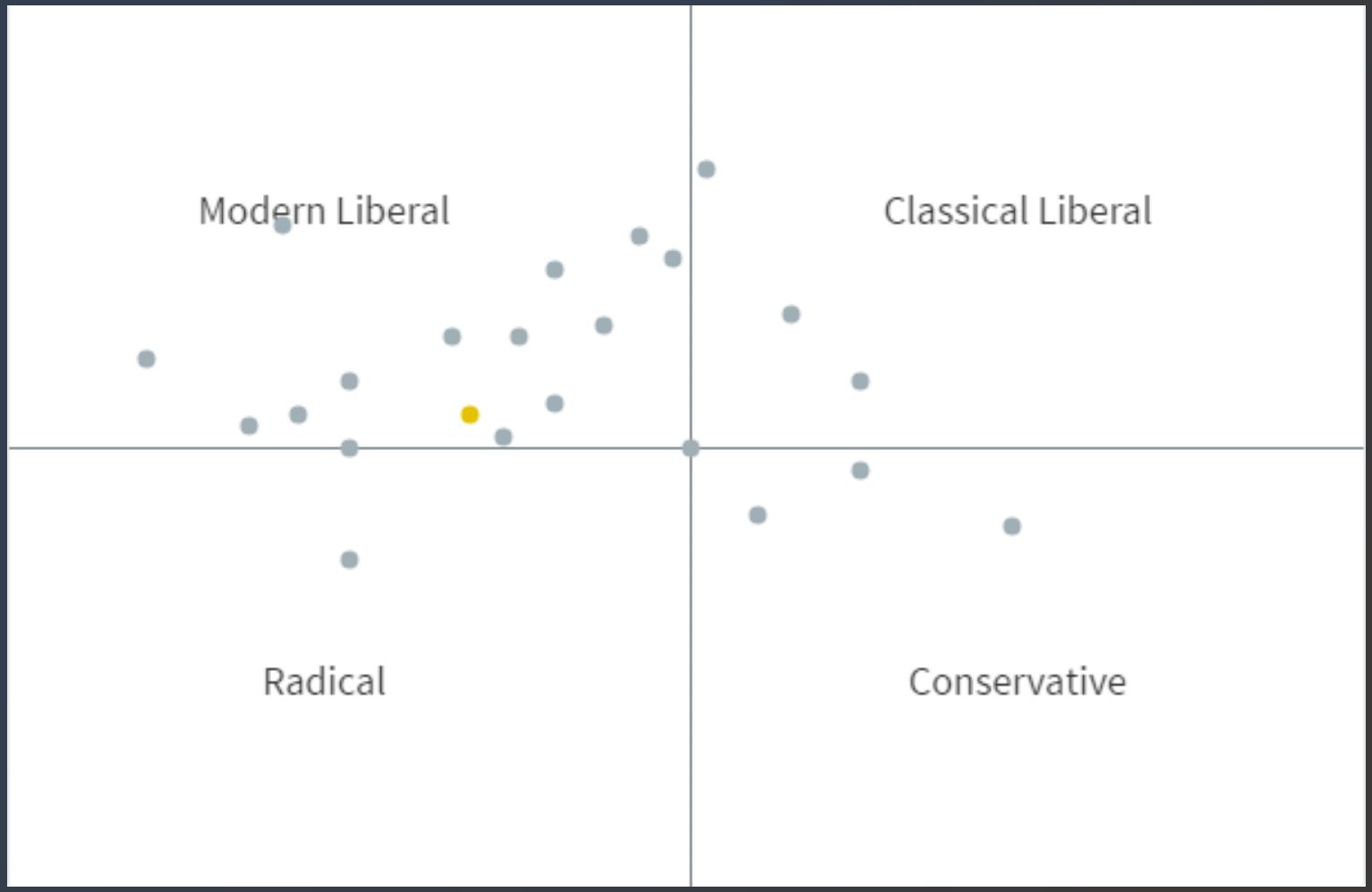
IQL Political Ideologies Results



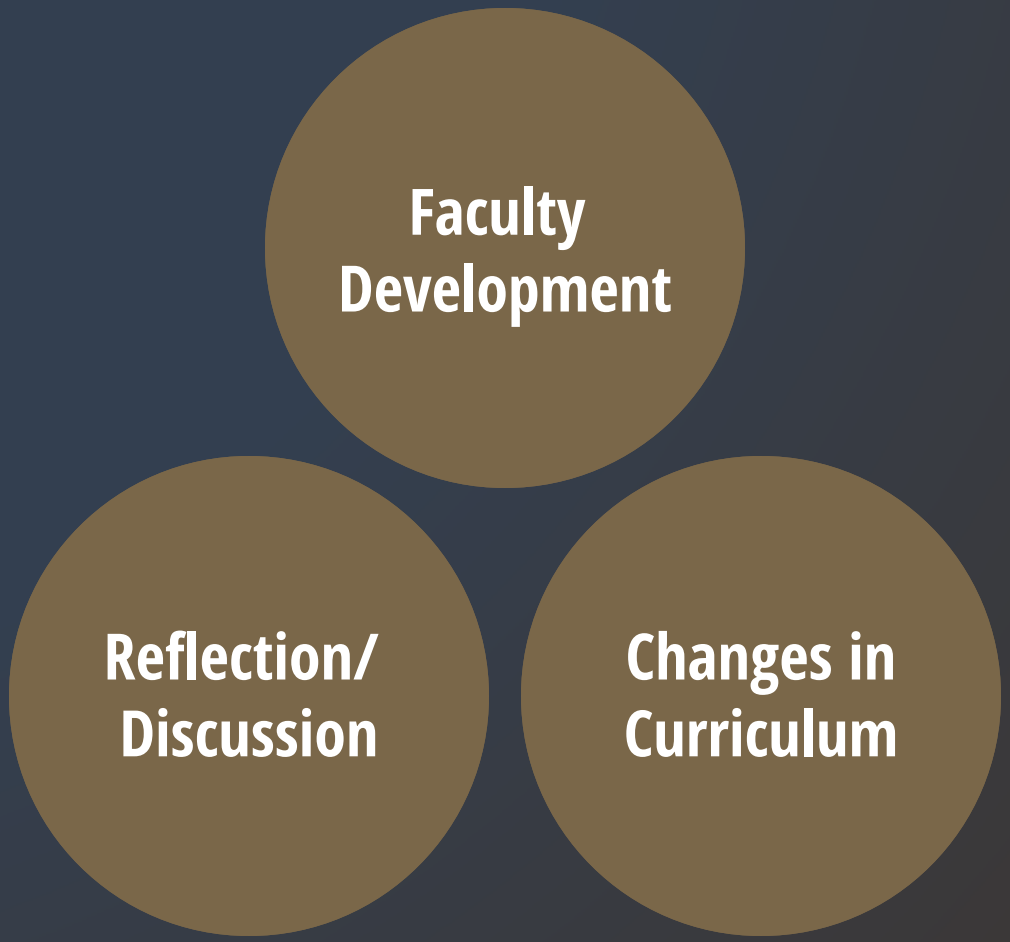
Policy Implications: Living Wages

Expense	Thrifty	Moderate	Liberal
Food	Thrifty: $1.51	Moderate: $2.42	Liberal: $3.04
Rental housing	Studio: $2.08	1 BR: $2.64	2BR: $3.19
Utilities (heat and electricity)	Studio: $0.36	1BR: $0.49	2BR: $0.69
Health insurance and out of pocket medical expenses	$2.59	$2.59	$2.59
Childcare	Low: $0.83	Mid: $1.25	High: $1.74
Transportation (includes auto insurance)	Low: $0.73	Mid: $1.41	High:$1.63
Taxes (federal)	$1.57	$1.57	$1.57
Clothing	$0.85	$0.85	$0.85
Household goods (includes personal hygiene products)	$0.60	$0.60	$0.60
Telephone	$0.14	$0.14	$0.14
Savings	$0.49	$0.73	$0.98
Dental insurance	$0.25	$0.25	$0.25
Retirement	$2.56	$2.56	$2.56
Internet connectivity	$0.27	$0.27	$0.27
Education (student loan debt)	$0.59	$0.59	$0.59
Eye care	$0.10	$0.15	$0.20
Life insurance	$0.17	$0.17	$0.17
Recreation	Low: $1.27	Mid: $1.40	High: $1.75

Policy Implications: Living Wages

Modern	Radical	Classical	Conserv	Expense
2.42	$2.42	$2.42	1.51	Food
2.64	$2.08	$2.08	2.08	Rental housing
.49	$.36	$0.36	.36	Utilities
2.59	$2.59	$2.59		Health insurance and out of pocket medical expenses
1.41	$.73			Transportation (includes auto insurance)
1.57	$1.57	$1.57	1.57	Taxes (federal)
.85	$.85	$0.85	.85	Clothing
.60	$.60	$0.60	.60	Household goods (includes personal hygiene)
.14				Telephone
.73				Savings
.59	$.25			Dental insurance
	$2.56			Retirement
				Internet connectivity
	$.59			Education (student loan debt)
	$.15			Eye care
				Life insurance
				Recreation
14.03	$15.58	$10.47	6.97	Total

Selecting the CAT



CAT Features

One hour exam

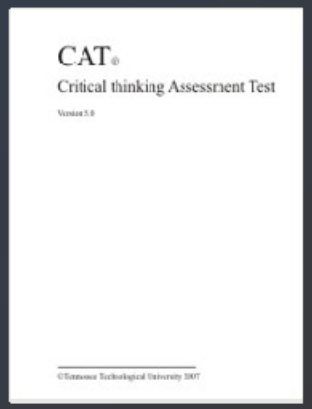
Mostly short answer essay

Faculty scored in workshops

Detailed scoring guide

Reliable

Valid



Test Booklet

Additional Information Packets

Skills Evaluated by CAT Instrument

Evaluating Information

- Separate factual information from inferences.
- Interpret numerical relationships in graphs.
- Understand the limitations of correlational data.
- Evaluate evidence and identify inappropriate conclusions.

Learning & Problem Solving

- Separate relevant from irrelevant information.
- Integrate information to solve problems.
- Learn & apply new information.
- Use mathematical skills to solve real-world problems.

Creative Thinking

- Identify alternative interpretations for data or observations.
- Identify new information that might support or contradict a hypothesis.
- Explain how new information can change a problem.

Communication

- Communicate ideas effectively.

Sample Disclosed Question

A scientist working at a government agency believes that an ingredient commonly used in bread causes criminal behavior. To support the hypothesis the scientist notes the following evidence.

- 99.9% of the people who committed crimes consumed bread prior to committing crimes.
- Crimes rates are extremely low in areas where bread is not consumed.

Do the data described above strongly support the scientist's hypothesis? Yes____ No____

Are there other explanations from the data besides the scientist's hypothesis? If so, describe.

_____

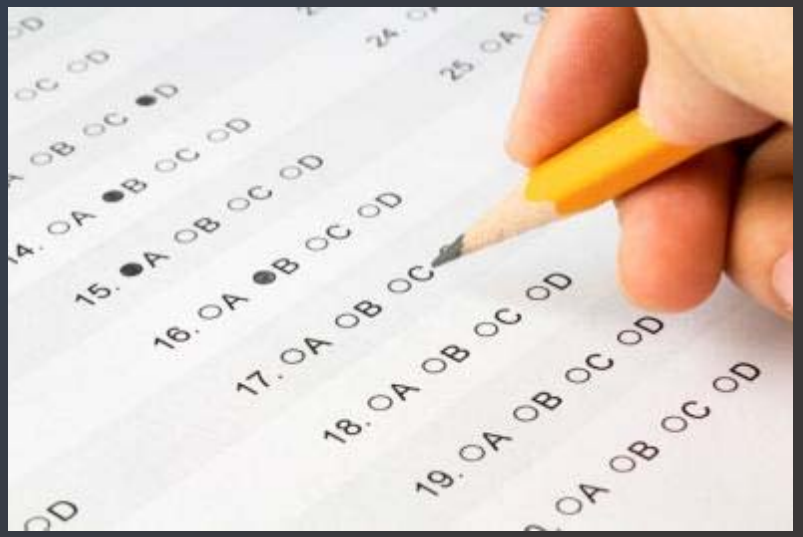
What kind of additional information or evidence would help support the scientist's hypothesis?

_____

Teaching Critical Thinking

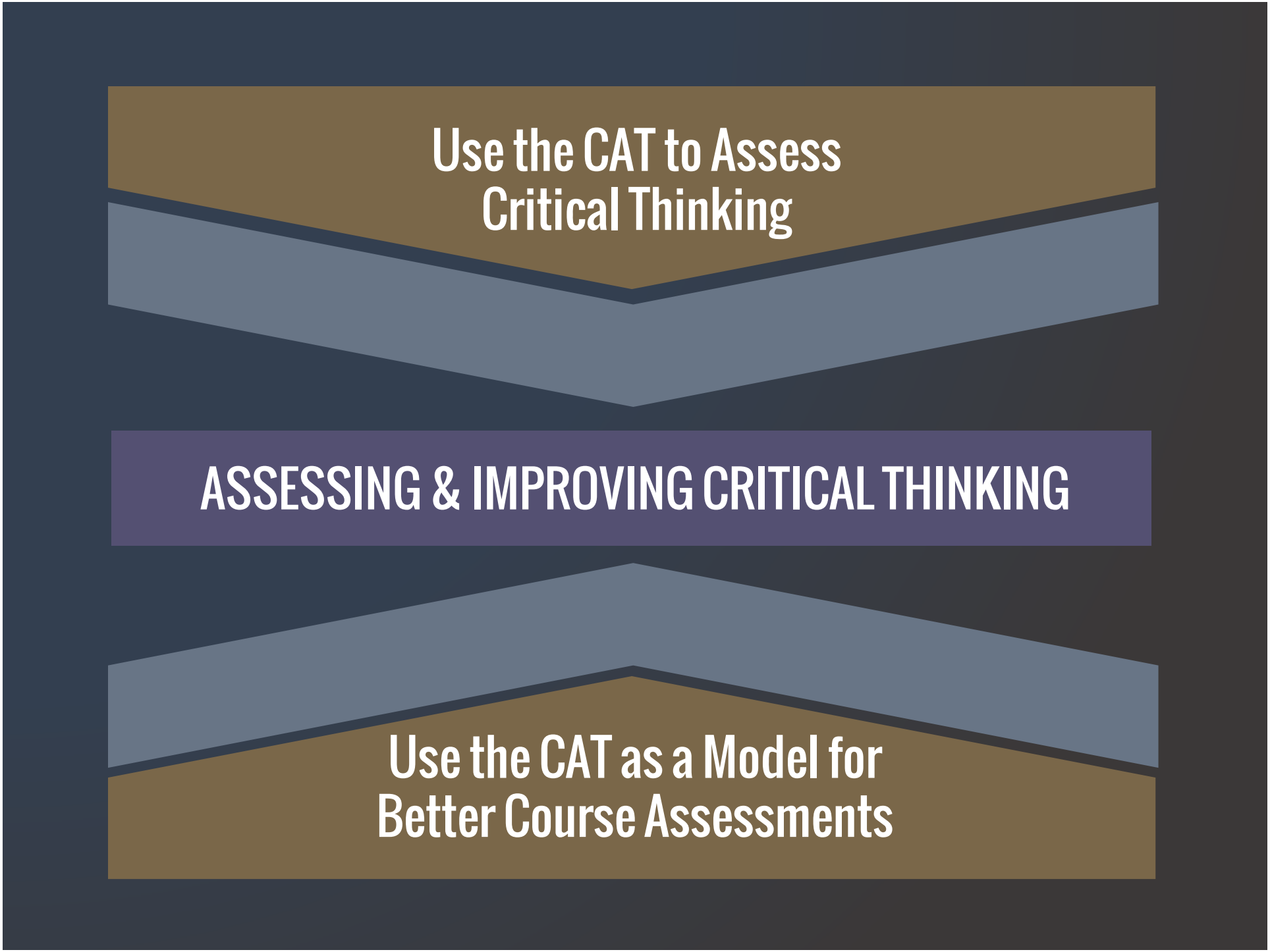
Understanding the Disconnect

Teaching Critical Thinking



Assessing Factual Knowledge

How We Assess - Determines What Students Learn


Use the CAT to Assess
Critical Thinking
ASSESSING & IMPROVING CRITICAL THINKING
Use the CAT as a Model for
Better Course Assessments

The KSC CAT App Project

- Eight 100 level classes (four app & four non), 250 students
- Developed by an interdisciplinary team (Economics, Education, Math)
- Flexible design

CAT Applications (Apps)

- Designed to complement high impact educational practices.
- Encourage students to develop critical thinking skills while learning discipline content.

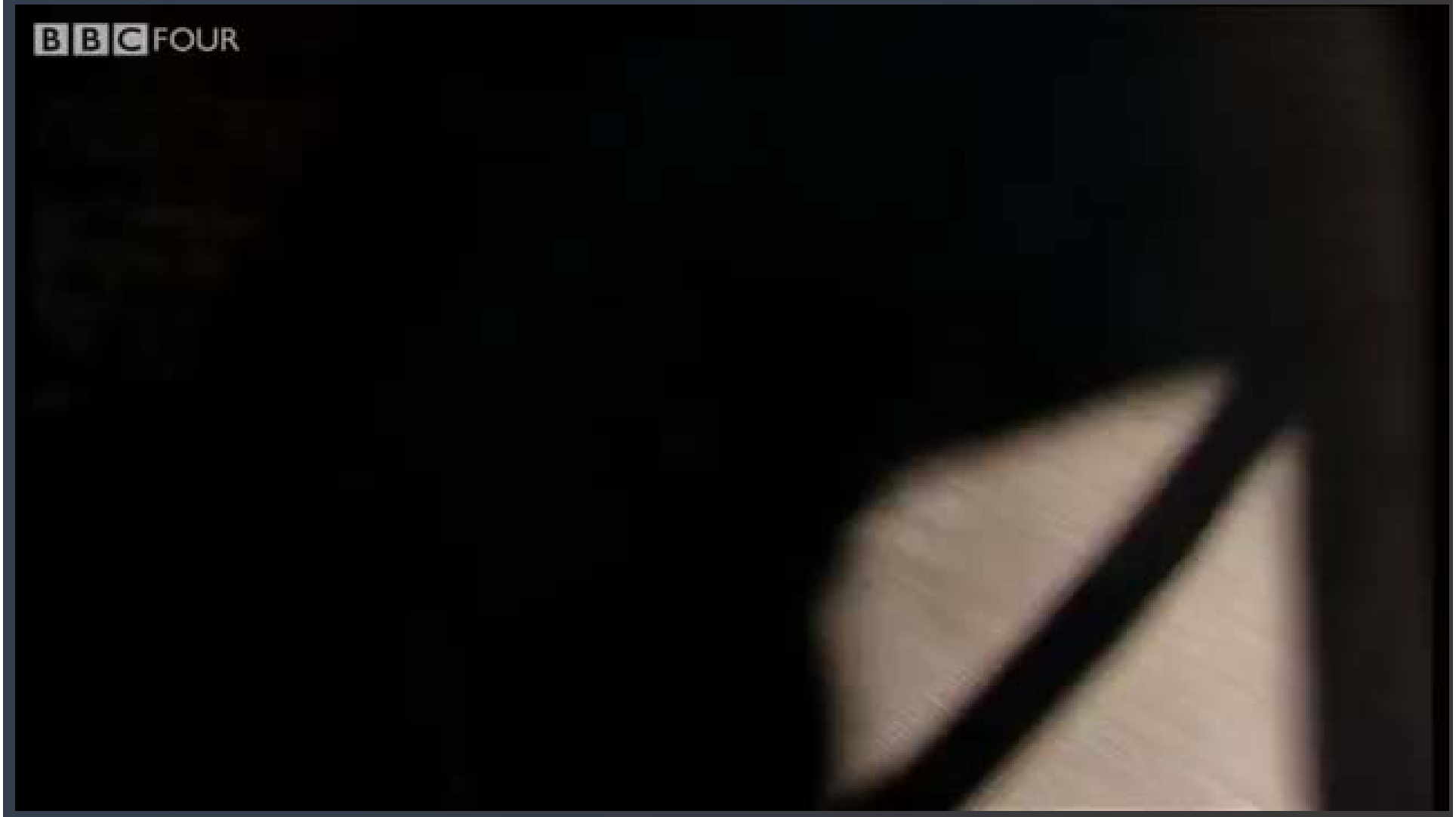
Critical Thinking Skill Set 1

How strongly does information support an idea.

Provide alternative interpretations for information or observations that have several possible interpretations.

Identify additional information or evidence needed to evaluate the alternative interpretations.

Patterns of Data | Historical Events | Literature


BBC FOUR

Strength of Support

Some social scientists contend that raising average income levels within a country will result in longer lives for its citizens. To support this claim the scientists use data from the previous video.

How strongly does the data in the video support the idea that raising average income will increase life span?

Alternative Interpretations

Some social scientists contend that raising average income levels within a country will result in longer lives for its citizens. To support this claim the scientists use data from the previous video.

Provide three reasons why some economists might disagree that average income is a good predictor of life expectancy.

Additional Information

Some social scientists contend that raising average income levels within a country will result in longer lives for its citizens. To support this claim the scientists use data from the previous video.

What specific additional data would help to clarify competing perspectives between social scientists and economists? Identify three measures that could be added to the conversation.

Using Headlines to Develop CAT Apps

Is Comfort Food Causing Your Depression?

EVIDENCE: **"A recently published study in the Journal of Public Health Nutrition showed that people who ate hot dogs, hamburgers, and pizza were 51% more likely to suffer from depression than those who rarely or never ate the stuff."**

CONCLUSION: **Eating fast food causes depression.**

http://psychcentral.com/blog/archives/2012/05/15/is-comfort-food-causing-your-depression/

Is Comfort Food Causing Your Depression?

3a. Are there other interpretations for the finding of the study other than Natasha's interpretation? If so, try to provide three alternative interpretations for the finding.

4a. What additional information would help Natasha better understand the connection between fast food and depression? Identify three pieces of additional information.

CAT App: Literature

"If We Must Die" is a poem about having valor on the battlefield. The speaker is a military commander rallying his troops before a big battle. This is evident by looking at the war-like language McKay uses throughout the poem, such as "let us nobly die," "we must meet the common foe," "our precious blood," and "dying, but fighting back."

1. To what extent do the quotations provide support the student's interpretation of the poem?
2. Provide an alternative interpretation of McKay's use of war-like language.
3. Identify 3 types of additional information that would help you investigate McKay's intent in writing the poem and explain why each source would be helpful.

J. Todd, Xavier University

CAT App: History

Abraham Lincoln is commonly known by many Americans as the 'Great Emancipator'. This nickname derives from Lincoln's signing of the Emancipation Proclamation. The text of this document declared on September 22, 1862 that slaves were "forever free." In signing this document, Abraham Lincoln single-handedly freed all slaves.

1. How strongly does the text of the Emancipation Proclamation support the conclusions that all slaves were freed?
2. Are there alternative interpretations for the intent of the Emancipation Proclamation? Provide an alternative interpretation.
3. Identify 3 types of additional information that would help you investigate the intent of the Emancipation Proclamation and explain why each source would be helpful.

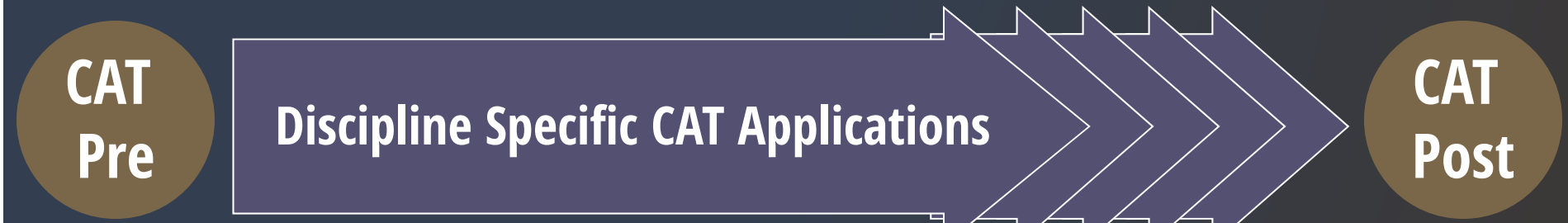
CAT App: Chemistry

Michelle recently moved to Milwaukee, WI from Tallahassee, FL. Before moving, she bought a brand new Toyota Camry. On her way to work, Michelle noticed her tire pressure sensor light had come on. Michelle mentioned her tire problem to her co-worker Joe, who suggested that Michelle probably has a tire puncture. Joe recommends that Michelle get her tires patched as soon as possible to address the issue.

1. How strongly does the information provided support Joe's idea that Michelle's tires have leaks due to punctures?
2. List two alternative explanations.
3. What additional information is needed to evaluate these explanations?

M. Edington, Florida A&M University

Using CAT Apps with the CAT



Health and Wealth
Charts and Graphs

Contraceptive Use and Population Growth Rate
Correlation

Social Mobility
Probability

Female Literacy and Access to Drinking Water
Hypothesis Testing

CAT Results

On average six (6) point gain on the CAT from Fresh to Senior

Honors 290: Economic Inequality (So, Jr, Sr)

- **No statistical significance on any individual marker**
- **Significant gain of 2.42 points overall in one semester $p < .05$**

IQL 101: Quantitative Literacy (Fr)

- **Significant gain on individual markers:**
  - **Extent spurious information supports a hypothesis**
  - **Use & apply relevant information to evaluate a problem gain**
- **Significant gain of 2.25 overall in one semester $p < .01$**

NSSE Results

At entry KSC students lack confidence…

- **For civic engagement work**
- **In their ability to lead a group of people from different backgrounds**
- **To help people resolve disagreements**
- **To contribute to the well-being of their community**

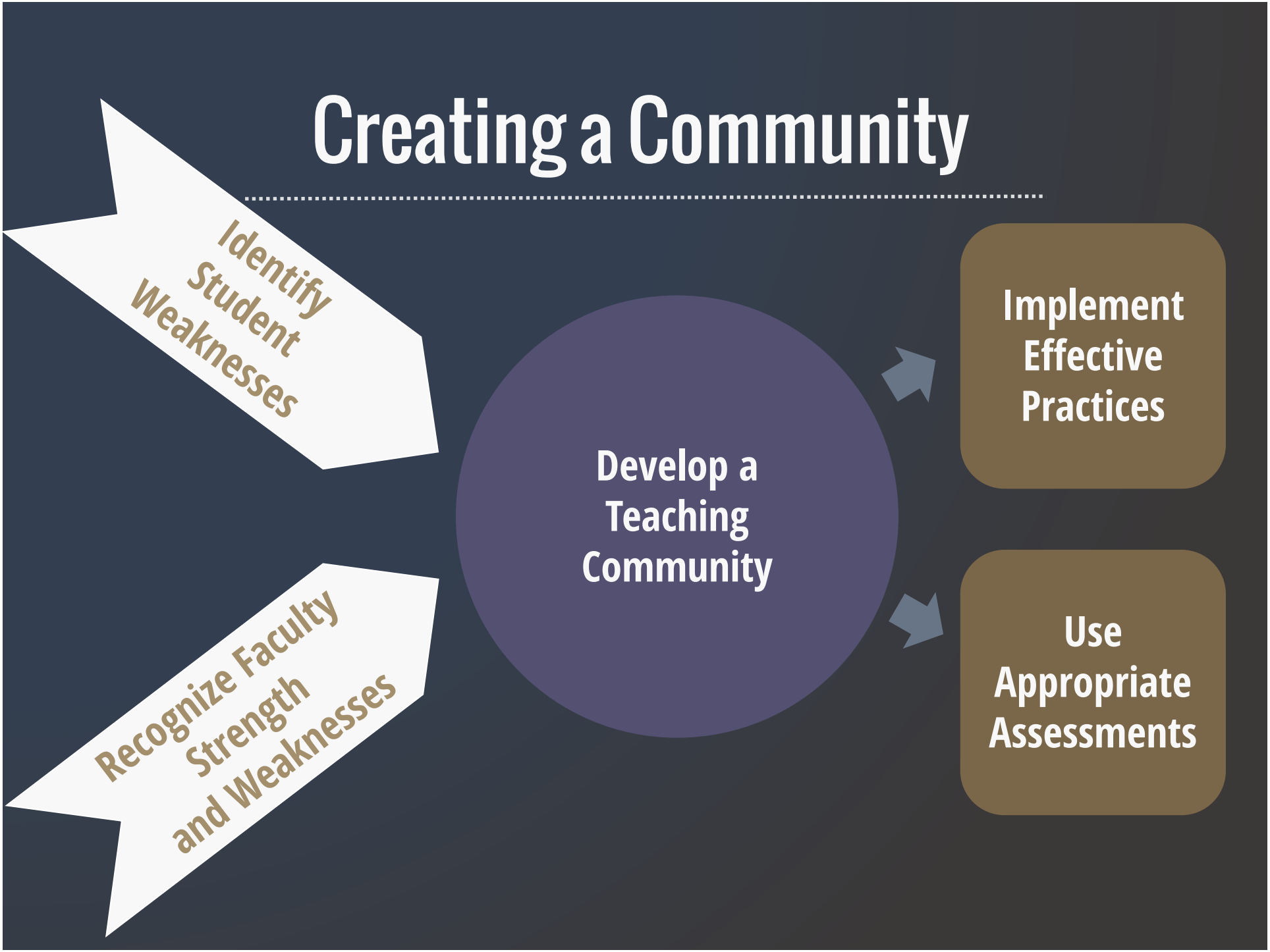
After their first year, KSC students are more likely than their national peers to have…

- **Raised awareness about issues**
- **Asked others to address issues**
- **Organized others to work on issues at all levels**

KSC seniors are more likely than national peers to say they …

- **Helped people resolve disagreements**
- **Contributed to the well-being of their community**
- **Have engaged with civic issues, especially at the local level**

Creating a Community



Thank You

www.CriticalThinkingTest.org

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Using Headlines to Develop CAT Apps

Girls Who Play Soccer Have More Success in STEM Fields

Eating Fast Food Leads to Depression