

"I can't believe that," said Alice.



"Can't you?" the Queen said in a pitying tone. "Try again: draw a long breath and shut your eyes."

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dr. caleb lack's

A presentation slide with a light background. At the top left is the text 'dr. caleb lack's'. The main title is 'PSY 4960/5960 Science vs. Pseudoscience'. Below the title is the question 'What are pseudoscience and antiscience?'. The slide features two circular portraits: the left one is labeled 'EMPIRICISM' and shows a man with a beard; the right one is labeled 'CONJECTURE' and shows a man with a top hat. Between the portraits is a 'Vs' symbol. At the bottom right, there is a small text box that says 'science versus pseudoscience'.

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dr. caleb lack's

A presentation slide with a light background. At the top left is the text 'dr. caleb lack's'. The main title is 'Science and Culture'. Below the title are three bullet points: 'Internalist approach – workings of science are progressive and independent of culture', 'Externalist approach – religion, politics, economics and other cultural factors impact science', and 'More balanced view is to see science as both a product of and contributor to culture'. The slide features the same two circular portraits as the previous slide, labeled 'EMPIRICISM' and 'CONJECTURE', with a 'Vs' symbol between them. At the bottom right, there is a small text box that says 'science versus pseudoscience'.

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dr. caleb lack's

### Science and Mythology

- **Myth** – a story told to help understand why something is the way it is  
E.g., Pandora's box, Genesis
- **Science** – naturalistic theories to help understand why the world is the way it is  
E.g., operant conditioning, the Big Bang

Is science the new mythology?

EMPIRICISM - CONJECTURE -

science versus pseudoscience

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### Progression

- Science is *objectively* cumulative and progressive

Scientific laws are descriptions of repeating, natural phenomena open to confirmation or rejection



science versus pseudoscience

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### Pseudoscience

- "... claims presented in a way so that they appear scientific even if they lack supporting evidence and plausibility."



VS.

Shermer (2002)

science versus pseudoscience

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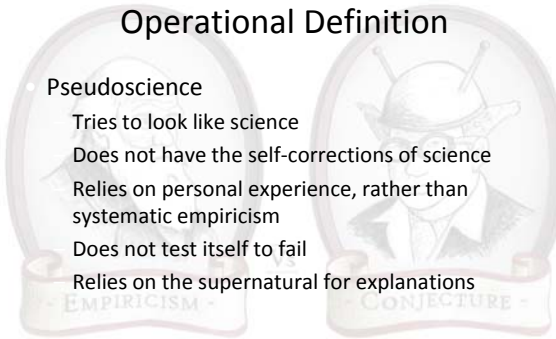
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### Operational Definition

- Pseudoscience
  - Tries to look like science
  - Does not have the self-corrections of science
  - Relies on personal experience, rather than systematic empiricism
  - Does not test itself to fail
  - Relies on the supernatural for explanations



Ruscio (2006)  
| science versus pseudoscience

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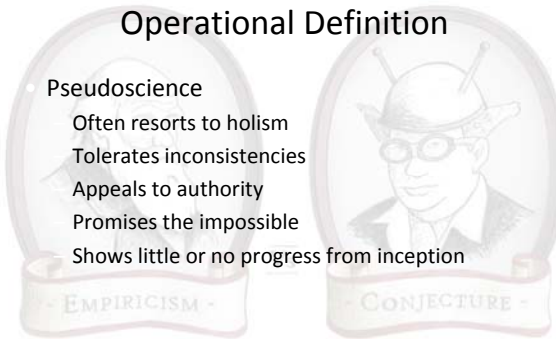
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### Operational Definition

- Pseudoscience
  - Often resorts to holism
  - Tolerates inconsistencies
  - Appeals to authority
  - Promises the impossible
  - Shows little or no progress from inception



Ruscio (2006)  
| science versus pseudoscience

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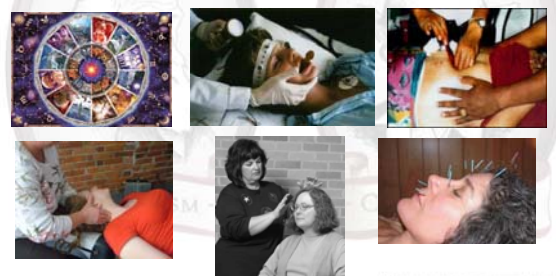
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### Quick Quiz

Science or Pseudoscience?



Ruscio (2006)  
| science versus pseudoscience

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### Exercise #2

#### Pseudoscience in the Media

Your assignment is to go home tonight and write down all the examples of pseudoscience (or things you think might be pseudoscience) that you see on TV or the Web, hear on the radio, read in magazines, or come across in other forms of media. These will be discussed in class tomorrow.

science versus pseudoscience

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### Ways of Changing

Kuhn's **paradigm shift** happens when the "normal science" of the time is overthrown and replaced with a new "normal"



Kuhn (1962)

science versus pseudoscience

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"Creating a new theory is not like destroying an old barn and erecting a skyscraper in its place. It is rather like climbing a mountain, gaining new and wider views, discovering unexpected connections between our starting point and its rich environment. But the point from which we started out still exists and can be seen, although it appears smaller and forms a tiny part of our broad view gained by mastery of the obstacles on our adventurous way up."

- Albert Einstein

science versus pseudoscience

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## Antiscience

- Sees science as “too subjective” or even wholly subjective
- Sees science as arbitrary, or on equal terms with other forms of “knowledge”
- E.g., personal revelation, mystic experiences

Why are these poor arguments?

Sagan (1995)  
| science versus pseudoscience

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## Is Science Flawed?

- Scientists are humans.
- Humans make mistakes.
- Therefore, scientists make mistakes.
- Do the mistakes of any person invalidate all of his or her other actions?

Sagan (1995)  
| science versus pseudoscience

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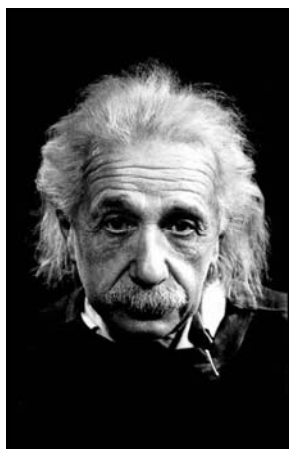
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“One thing I have learned in a long life: that all our science, measured against reality, is primitive and childlike – and yet it is the most precious thing we have.”

Albert Einstein

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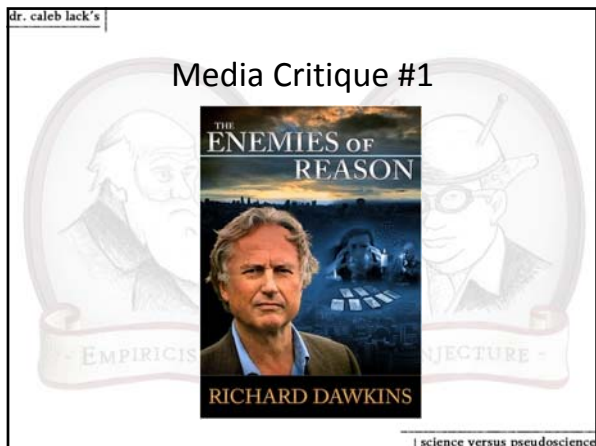
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