WELCOME

SPRING 2023 SERIES

MASTER CLASS

USC ROSSIER SCHOOL OF EDUCATION

Master Class Series on
Science Denial and Racism Denial

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University Professor, Provost Professor of Education and Business, Clifford and Betty Allen Chair in Urban Leadership, USC Race and Equity Center Founder and Executive Director

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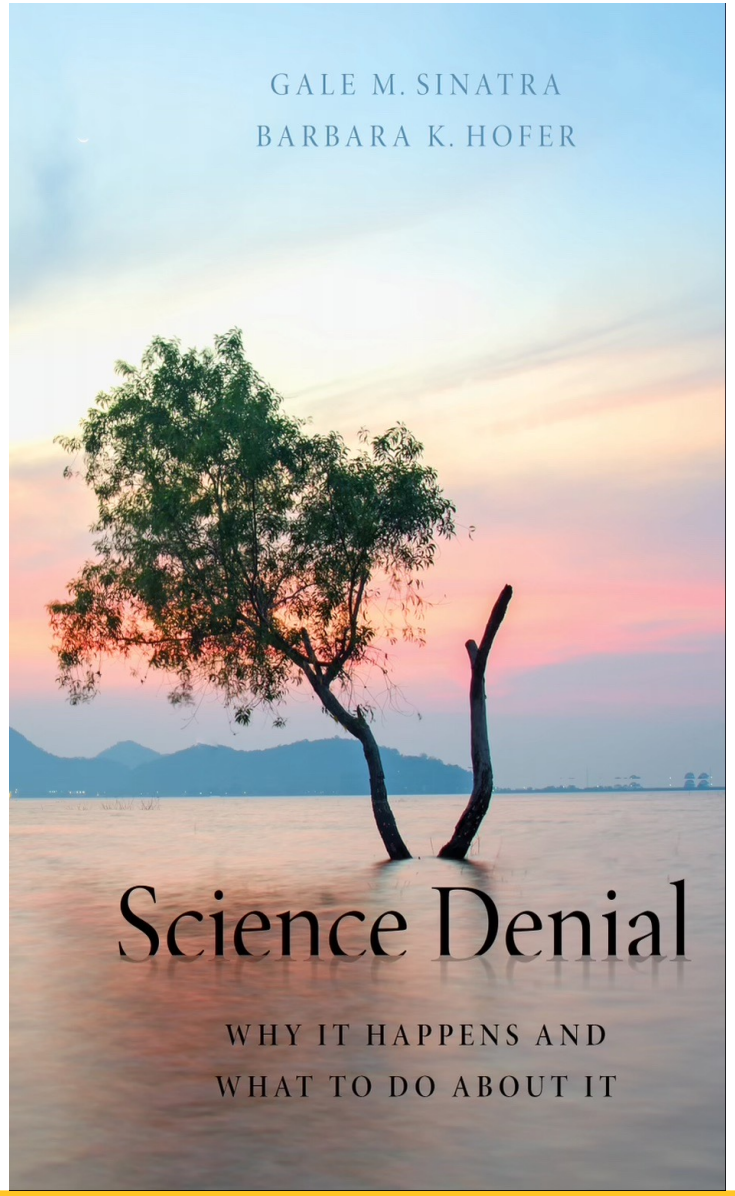
Master class spring 2023
Science And Racism Denial

January 25, 2023
BCI Cammilleri Hall – Gale Sinatra
February 8, 2023
University Club – Shaun Harper
February 22, 2023
University Club – Gale Sinatra, Shaun Harper, Dean Noguera
March 8, 2023
University Club – Gale Sinatra
March 22, 2023
University Club – Shaun Harper



Science Denial: Why it happens and what to do about it

Oxford University Press (2021)

Enacting science understanding

Beach "border" between two counties in Florida
with different stay at home policies
(photo: April, 2020)


We all need to make informed
decisions about scientific issues.

Science denial, doubt, and resistance

Science Denial **Doubt** **Resistance**

NOTE: **We are all susceptible.**

Not an "*us and them*" issue.

Science denial, doubt, and resistance

- **Denial** (**rare**) is a belief-based stance and a rejection of evidence.

Science denial, doubt, and resistance

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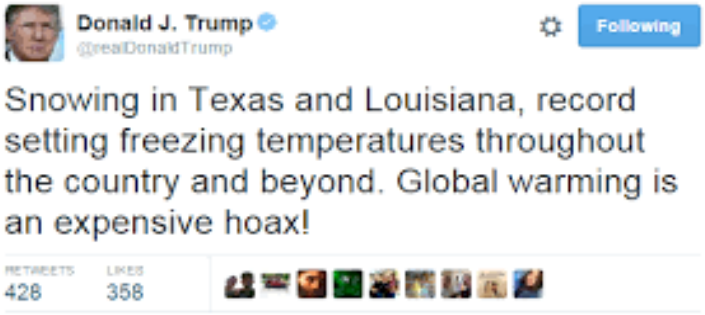


Science denial, doubt, and resistance

- **Denial** (**rare**) is a belief-based stance and a rejection of evidence. Ex: Climate change is a hoax, the earth is flat, vaccinations cause autism

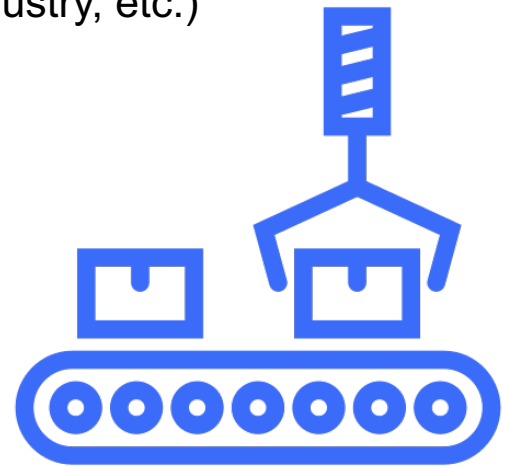
- **"Cafeteria denial"** (**more common**) is choosing what to believe or deny

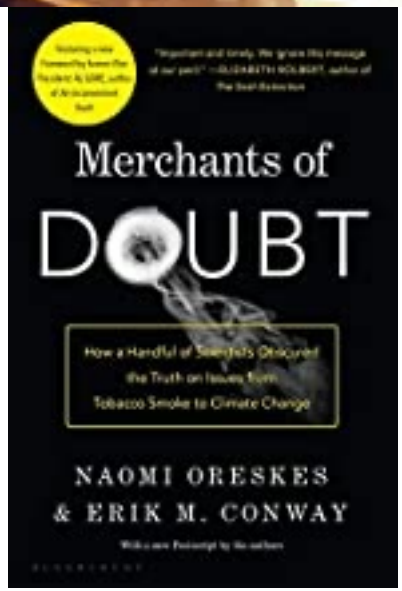
Science denial, doubt, and resistance

- **Doubt and resistance (most common)** especially when findings don't fit with personal beliefs, conflict with social identity, require deeper analysis, etc.

Science denial, doubt, and resistance

- **Doubt and resistance (most common)** especially when findings don't fit with personal beliefs, conflict with social identity, require deeper analysis, etc.
  - **Doubt can be "manufactured"** by vested interests (tobacco industry, petroleum industry, etc.)

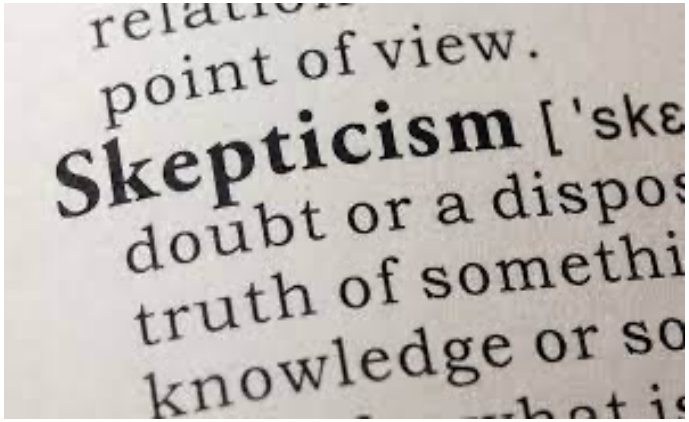




SCIENCE DENIAL, DOUBT, AND RESISTANCE

- **Doubt and resistance (most common)** especially when findings don't fit with personal beliefs, conflict with social identity, require deeper analysis, etc.

- **Skepticism**, is a healthy part of the scientific process



WHY TRUST SCIENCE? (ORESKES, 2019)

- Science relies on empirical evidence, carefully collected and analyzed
- Science builds on prior findings, accumulating evidence over time
- Science is a collective enterprise, relying on peer review, and the expert vetting of ideas, theories, results
- Science is not infallible, yet science is self-correcting

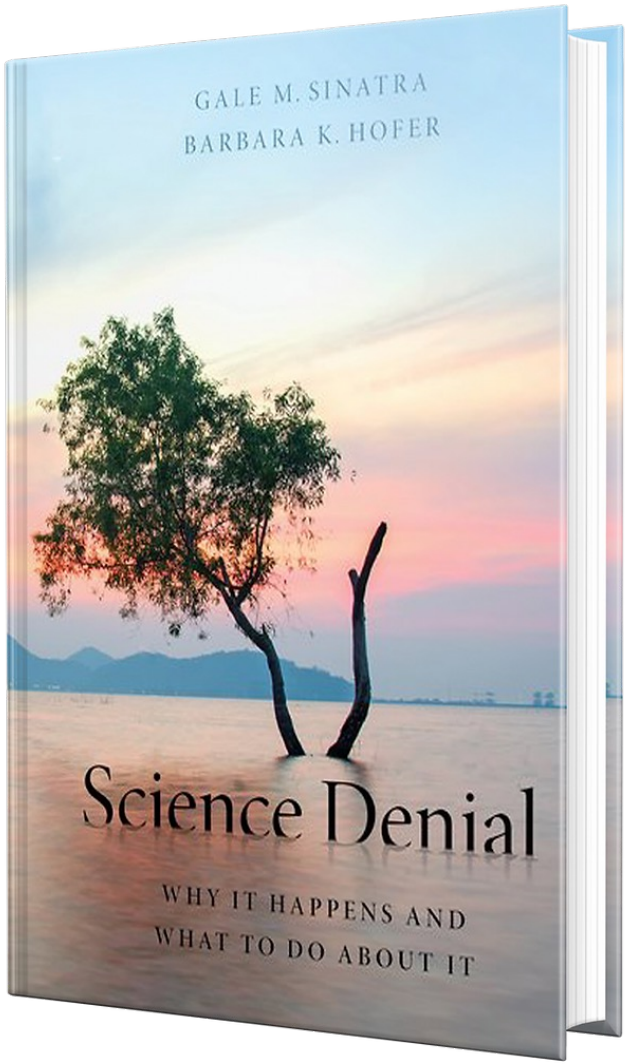
The value of a **scientific attitude**: *an openness to seek new evidence and a willingness to change one's mind in light of new evidence* (McIntyre, 2019)

SCIENCE DENIAL, DOUBT AND RESISTANCE:

PSYCHOLOGICAL EXPLANATIONS

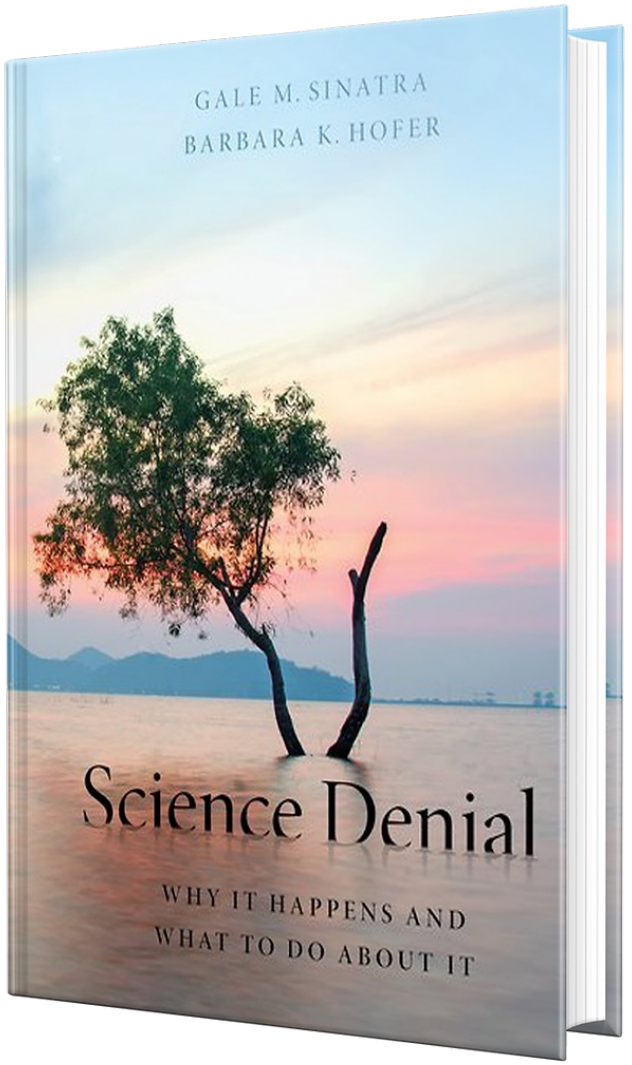
KEY FACTORS

1. Social Identity
2. Mental Shortcuts
3. Epistemic Cognition
4. Motivated Reasoning
5. Emotions & Attitudes



KEY FACTORS

1. Social Identity



Social identity

- **Kim, Sinatra, & Seyranian (2018)**
- Group membership influences views of science
  - Individuals conform to attitudes of their group
  - In-group messages are more persuasive
  - Sense of self is tied up with social identity

For example: Identifying with a group that questions the vaccinations, or mask wearing during a pandemic

Social Identity Framing Communications about water conservation

- **Seyranian, Sinatra, & Polikoff, (2015)**
  - In-group messages are more persuasive, so change the ingroup.
  - Compared communication strategies based on knowledge deficit view to identity frames
    - Social identity framing (We Southern Californians, we conserve water.)

For high water consumers, knowledge deficit view backfired

Making sense of science Claims in a digital world

Netflix Film: Don't Look Up

- Science denial isn't new, but is amplified through social media
  - Information, misinformation, and disinformation

Making sense of science Claims in a digital world

- How do individuals decide what knowledge to accept as valid?
  - More likely to believe science articles posted by friends on Facebook than from expert sources
  - Social media bubbles
  - Erosion of trust in expertise

Making sense of science Claims in a digital world

- Online sources can be difficult to assess for validity, accuracy, and bias (Sinatra & Lombardi, 2020)
  - Evaluating evidence and judging plausibility

Need to teach sourcing

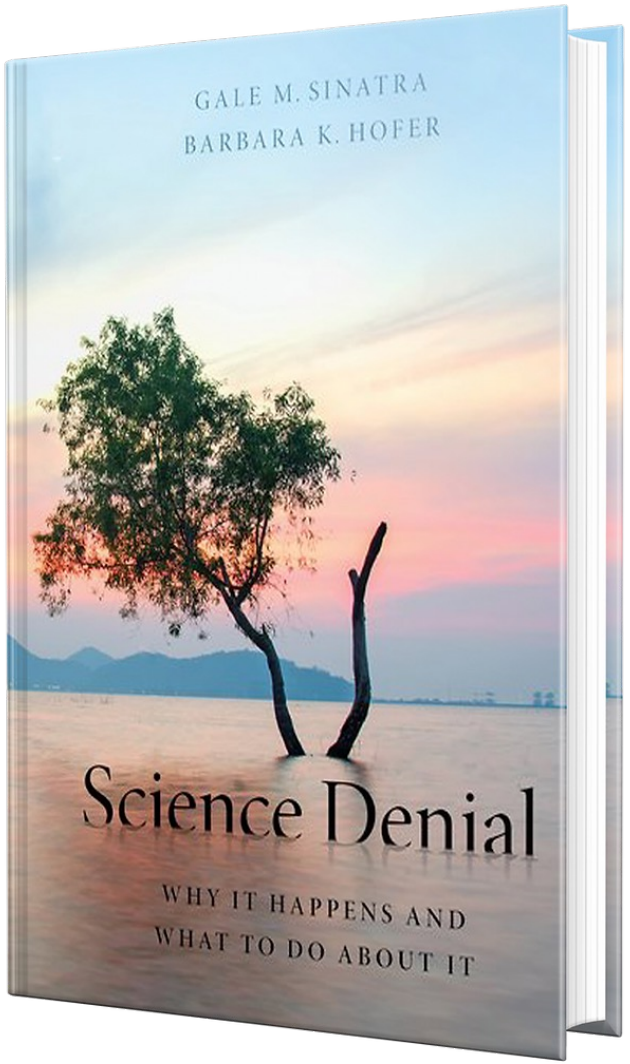
6 STEPS to sourcing Science

(Herrick, Sinatra & Lombardi, 2023)

KEY FACTORS

1. Social Identity

2. Mental Shortcuts



THINKING AND REASONING BIASES (AND WE ALL HAVE THEM)

Senator "Snowball"

- **Reliance on System 1** (quick, intuitive) thinking versus System 2 (analytical, deliberative)
- **Confirmation Bias** – seeking, interpreting, recalling information that aligns with pre-existing beliefs
- **Availability Heuristic** – believing the information we have available to us (false balance makes misinformation available)

Sinatra et al. (2022) Words Matter: Public Perceptions of Climate Change Terminology

- Exploring whether **climate terms** change trigger reactions to climate messaging
- Nationally representative sample of 6 thousand USA participants
- Climate change, climate emergency, climate crisis, climate justice

KEY FACTORS

1. Social Identity
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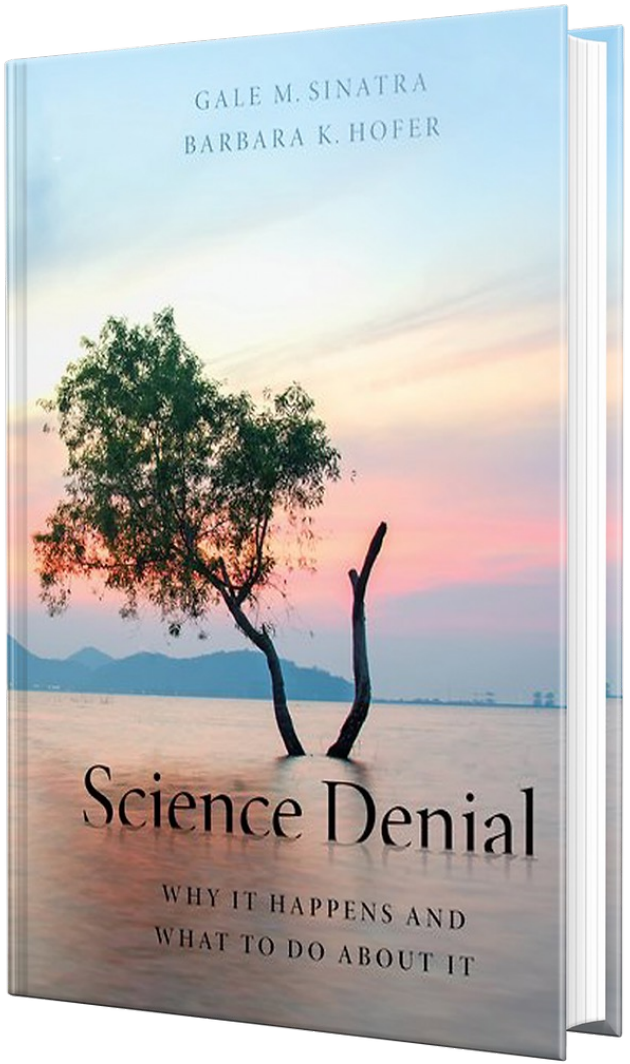
3. Epistemic Cognition



Epistemic cognition Influences science understanding (Sinatra & Hofer, 2016)

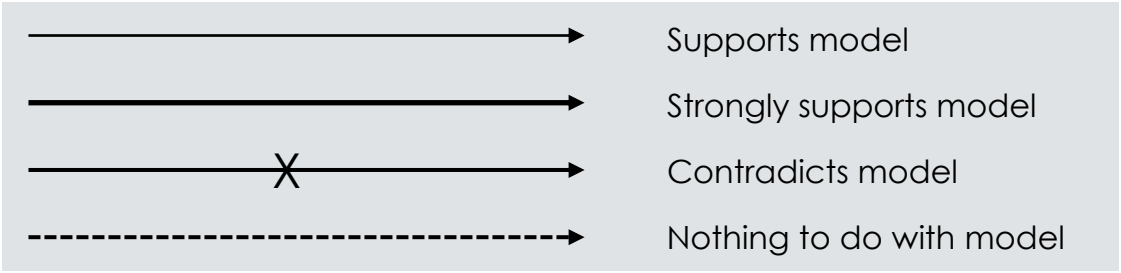
- **Epistemic cognition –** how individuals think and reason about knowledge and knowing (Hofer, 2016)
  - What is knowledge? How do we know what we know?
  - What are our sources of knowledge and why?
  - Influences science understanding (Sinatra & Hofer, 2016)

Critical when individuals must:

Decide what counts as evidence	Resolve competing knowledge claims	Evaluate information critically	Integrate multiple sources of information	Incorporate new knowledge

Lombard et al. (2013; 2022) Model-Evidence Link (MEL) Diagram

Directions: draw two arrows from each evidence box. One to each model. You will draw a total of 8 arrows.



Evidence #1

Model A

Evidence #3

Evidence #2

Model B

Evidence #4

EPISTEMIC TRUST

- What sources of knowledge do individuals trust?
- Decline in trust of authorities and experts.
- Social identity influence trust (Dr. Fauci hero or villain?).
- Reasons for distrust – especially among communities historically and currently mistreated by science/scientists.

KEY FACTORS

1. Social Identity
2. Mental Shortcuts
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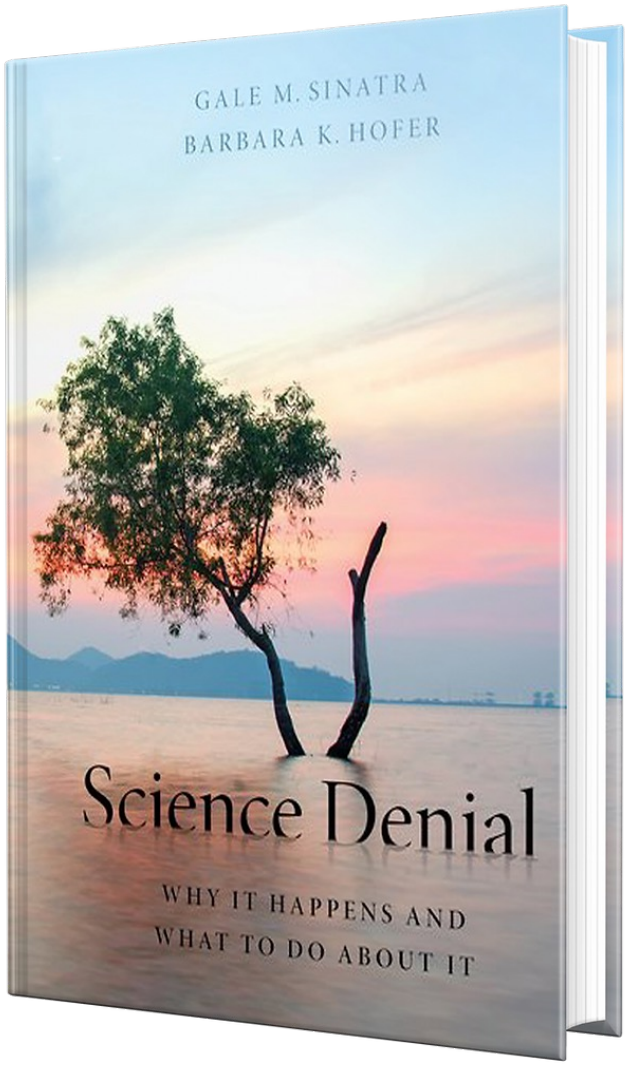
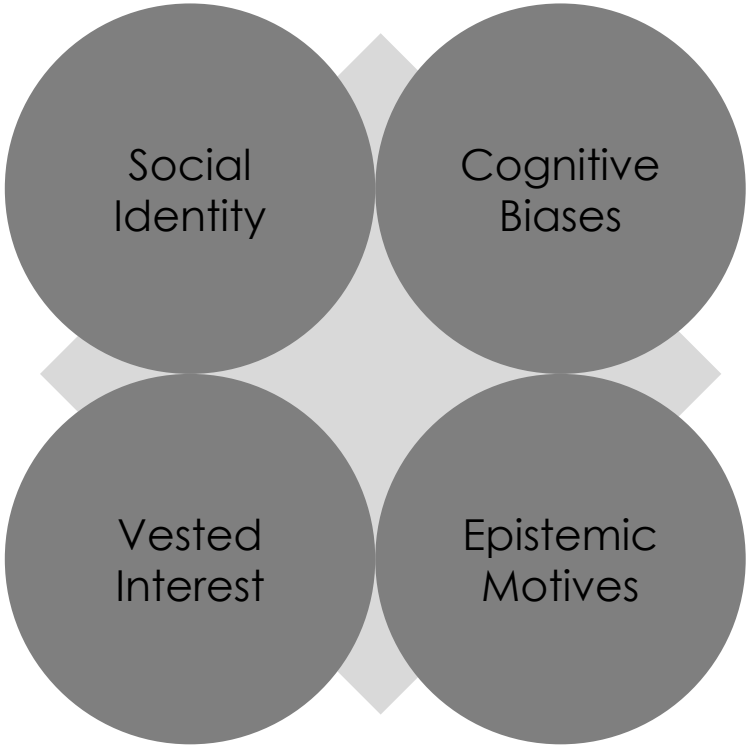
4. Motivated Reasoning



Motivated reasoning

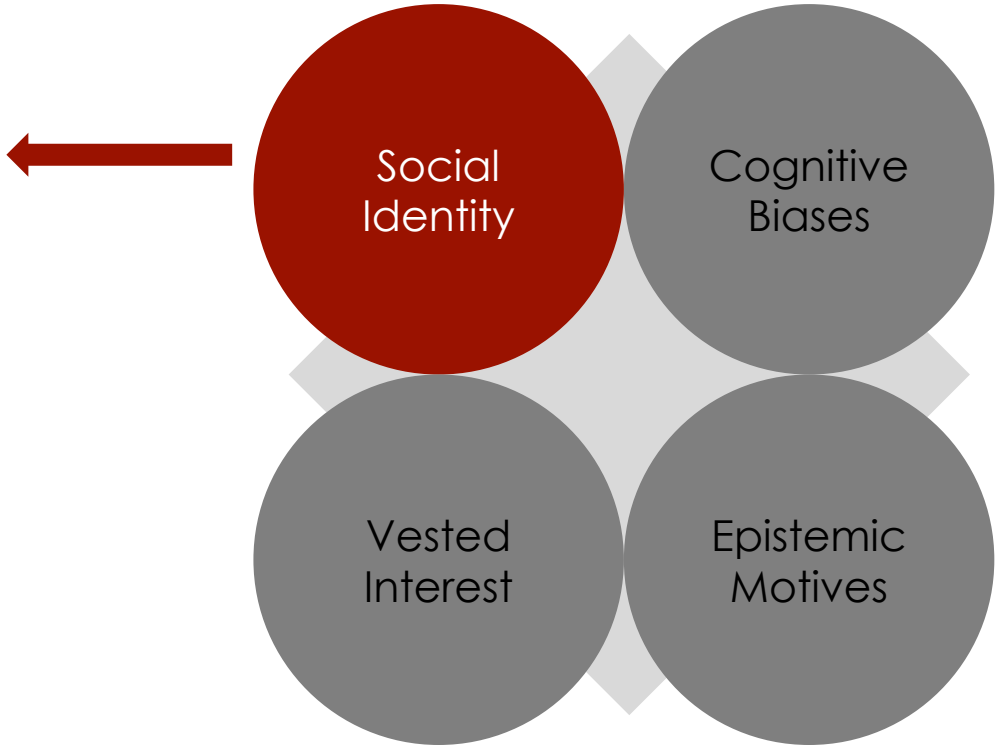
- Motivations can bias understanding - deciding what evidence to accept based on the conclusion one prefers
- E.g., individuals are more critical of the methods of a research study if they don't like the outcomes
- Identity can motivate our reasoning

MOTIVATIONS THAT INFLUENCE REASONING (SINATRA, KIENHUES, & HOFER, 2014)



MOTIVATIONS THAT INFLUENCE REASONING (SINATRA, KIENHUES, & HOFER, 2014)

I'm a Conservative and Conservatives Reject Climate Change



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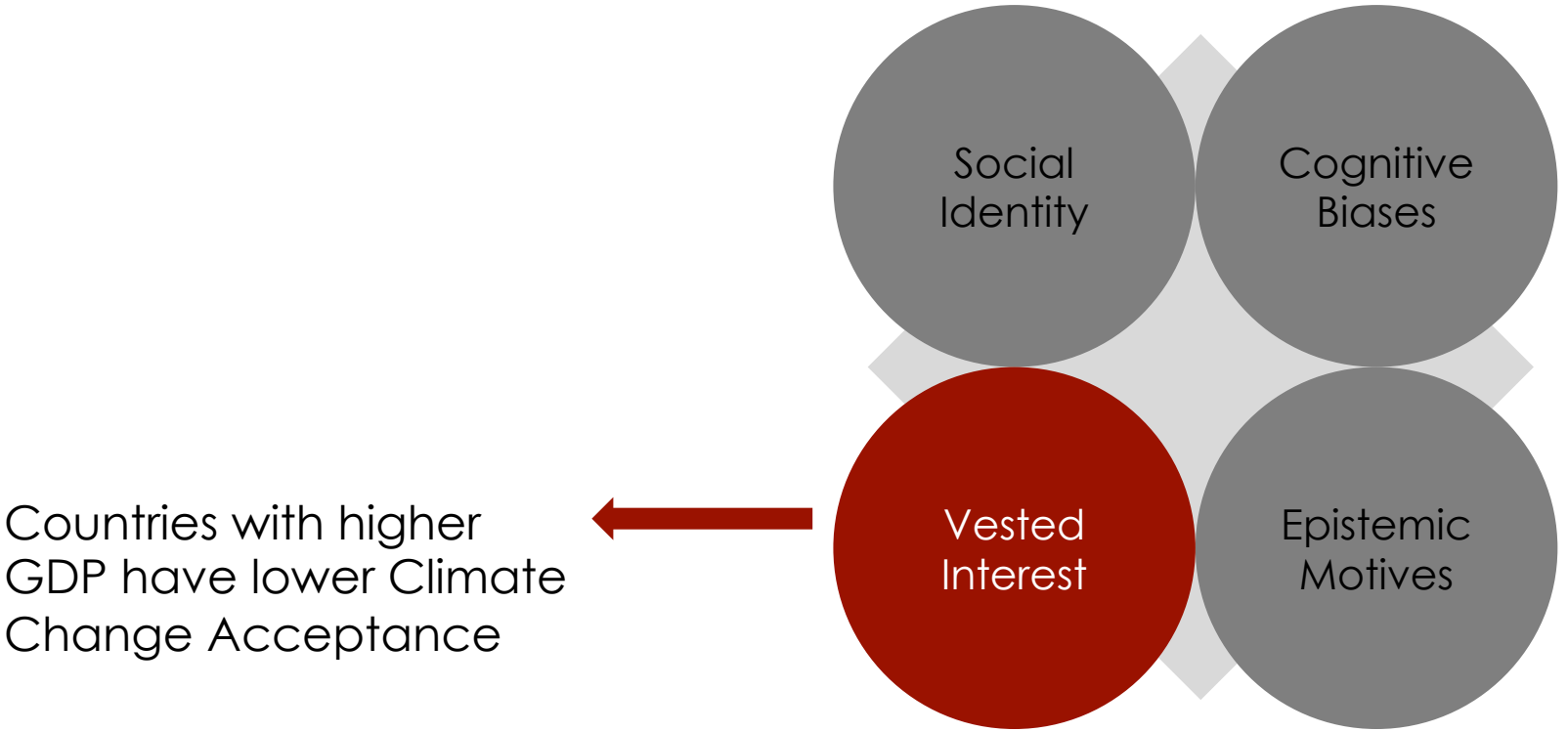

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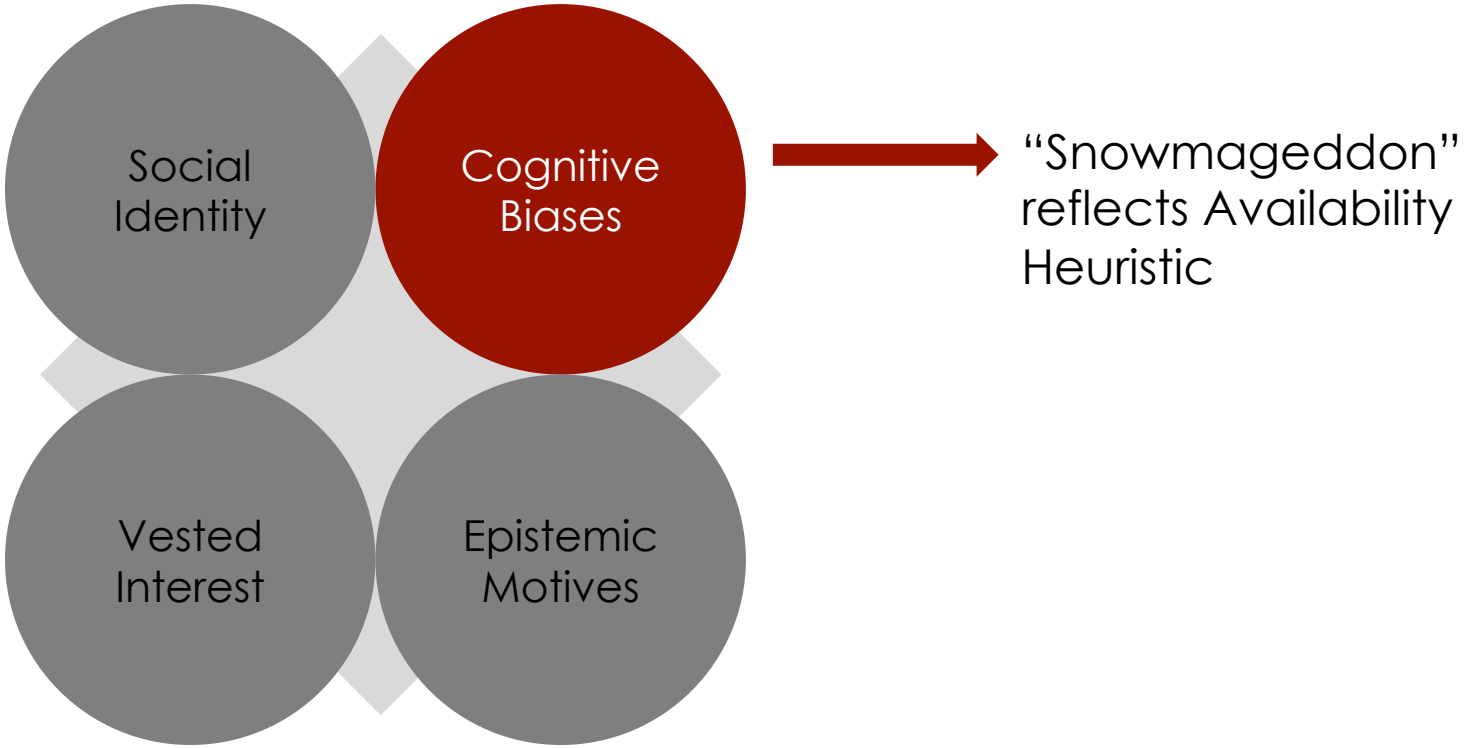

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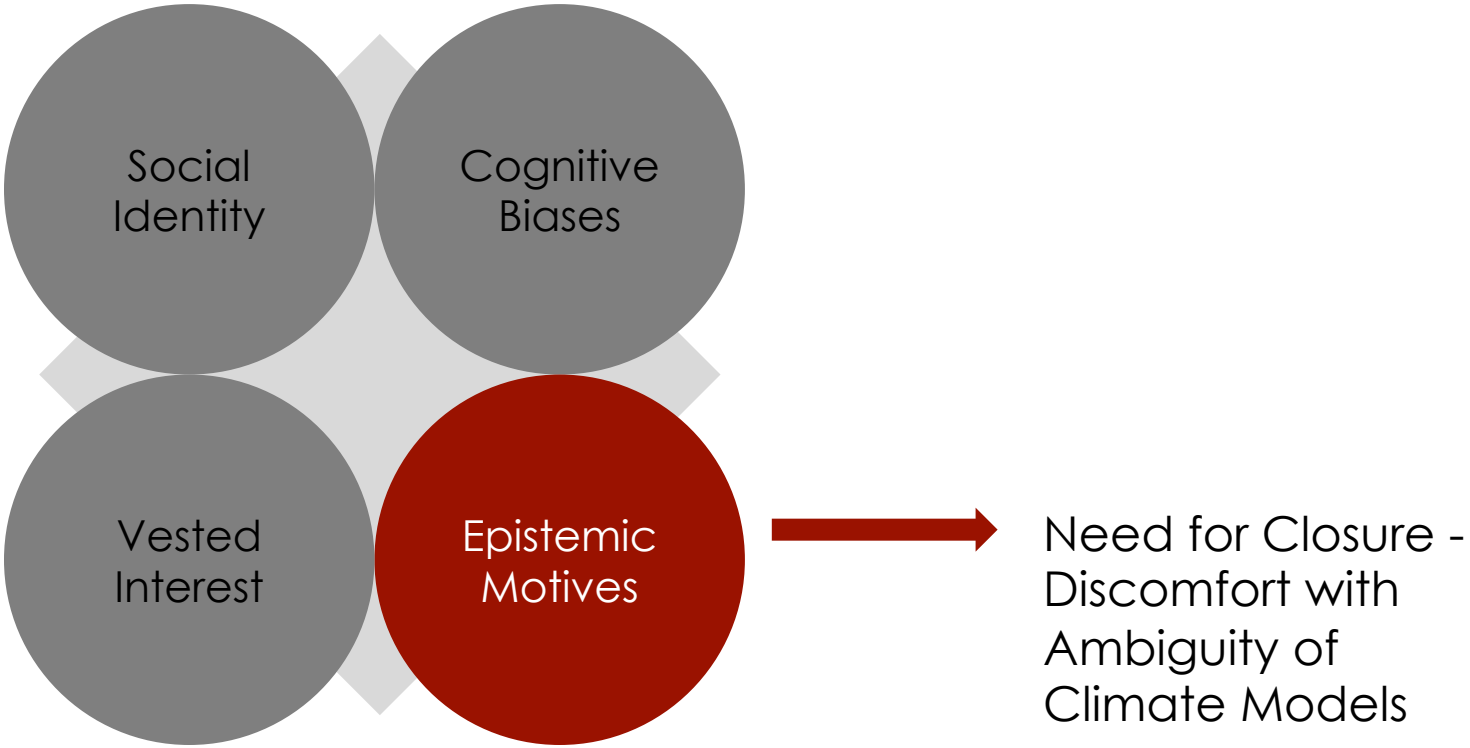

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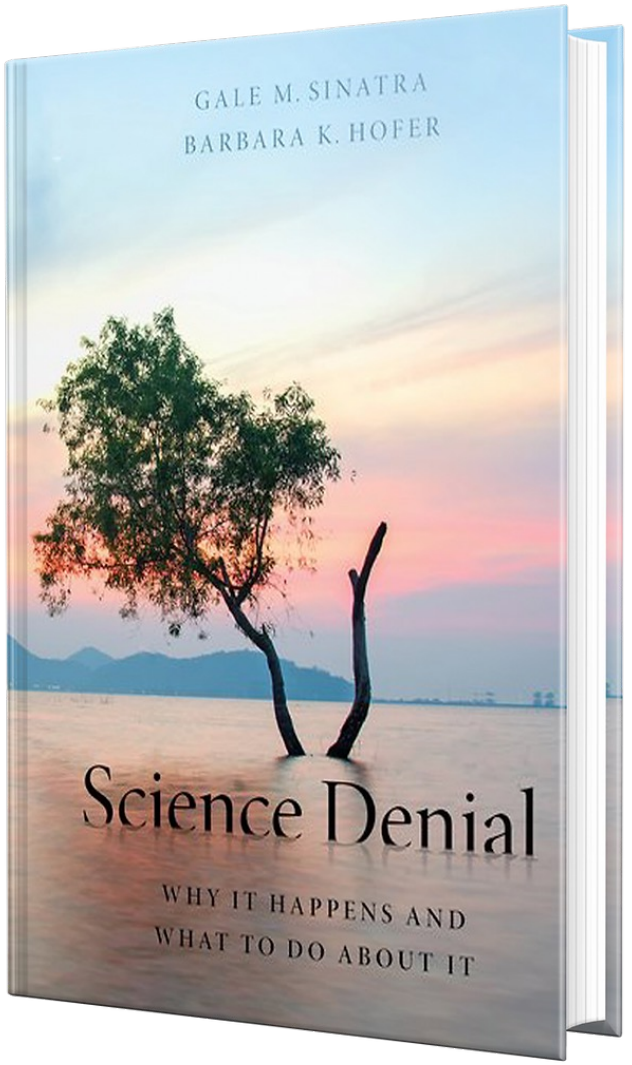
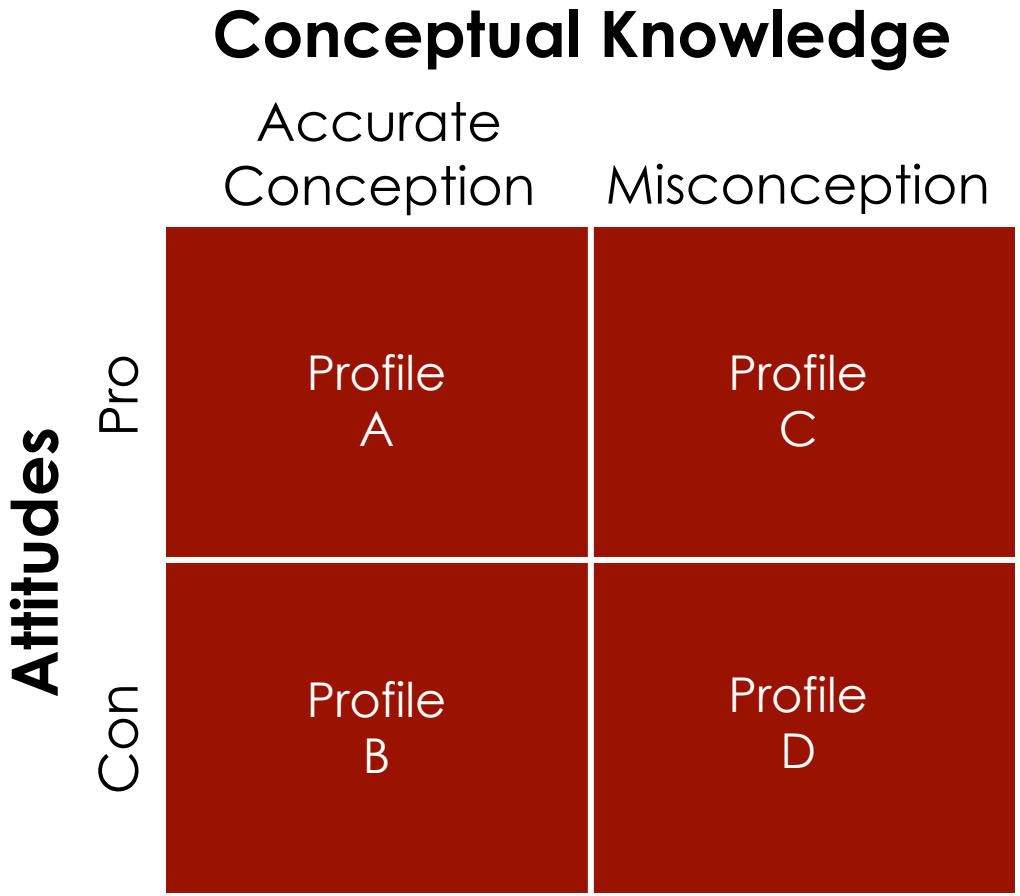


RELATIONSHIP BETWEEN ATTITUDES AND CONCEPTUAL KNOWLEDGE (SINATRA & SEYRANIAN, 2016)



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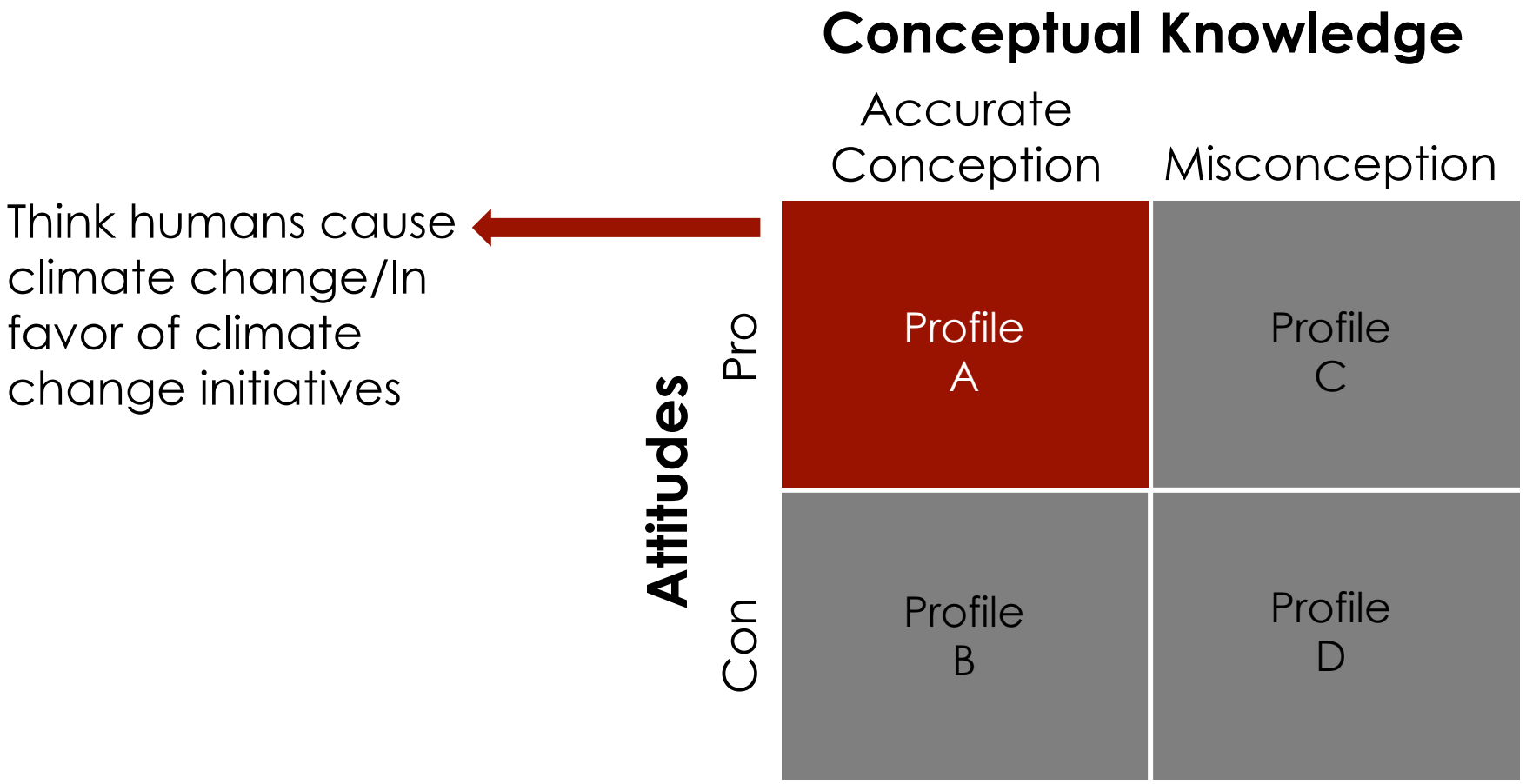

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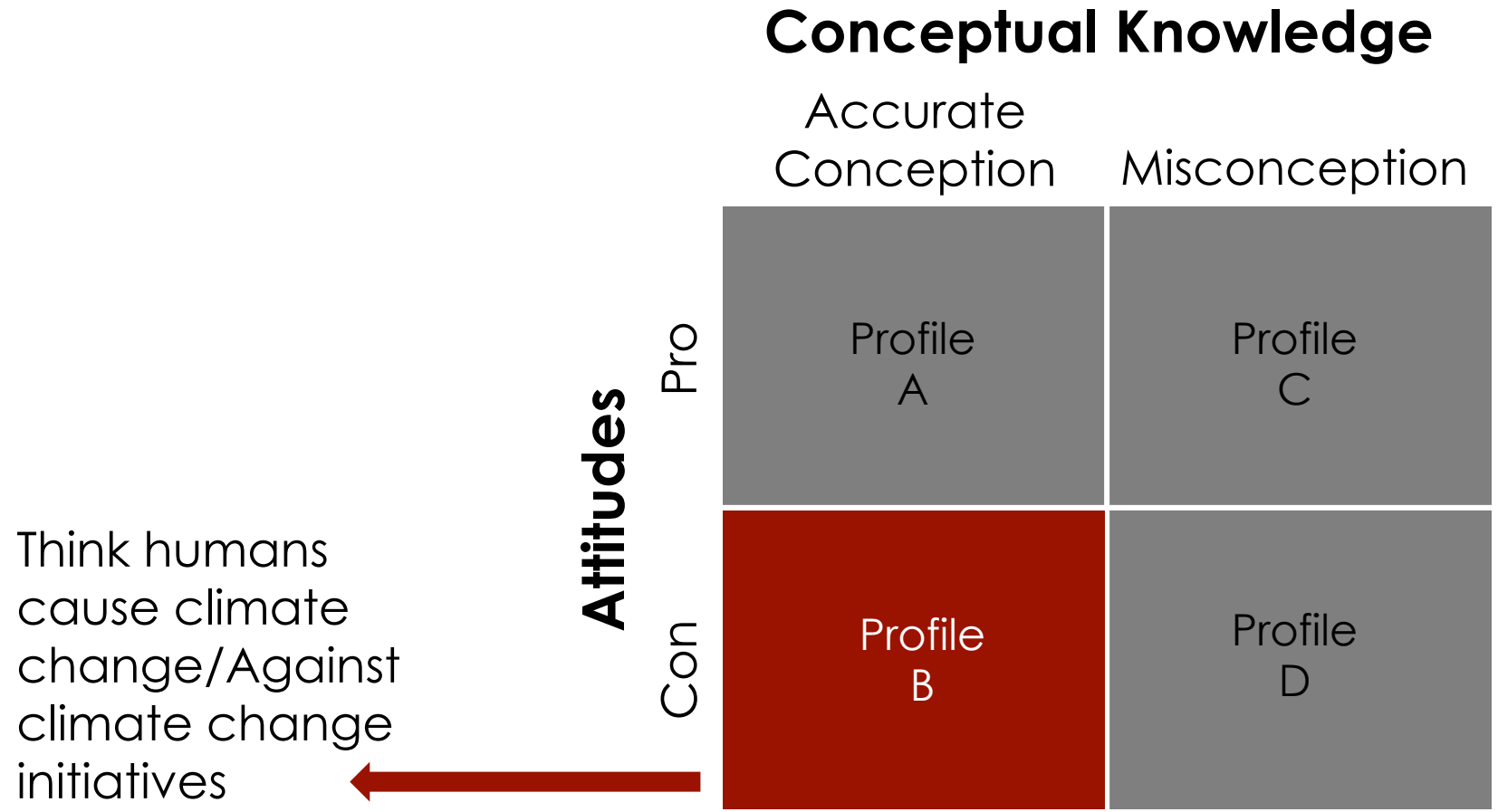

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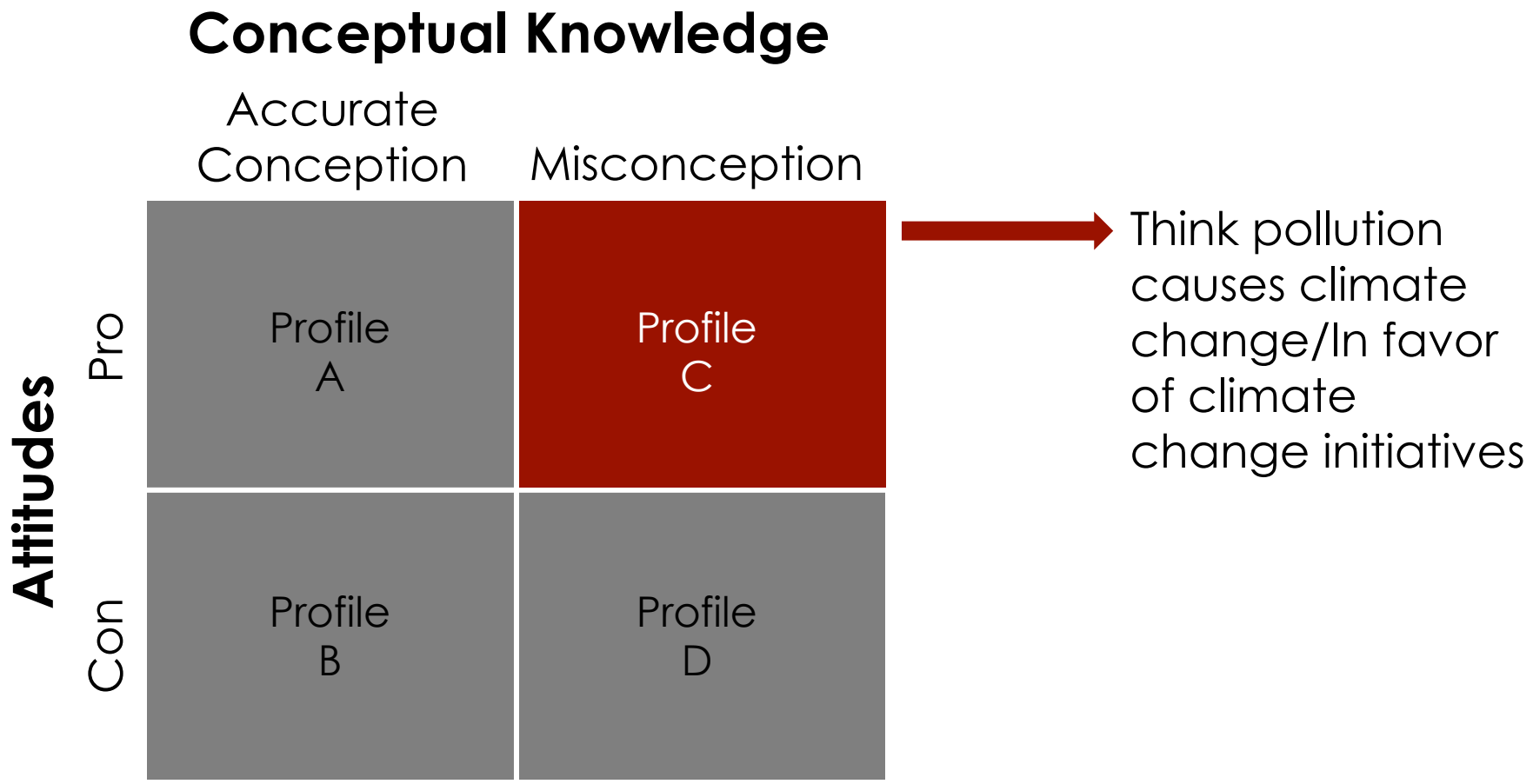

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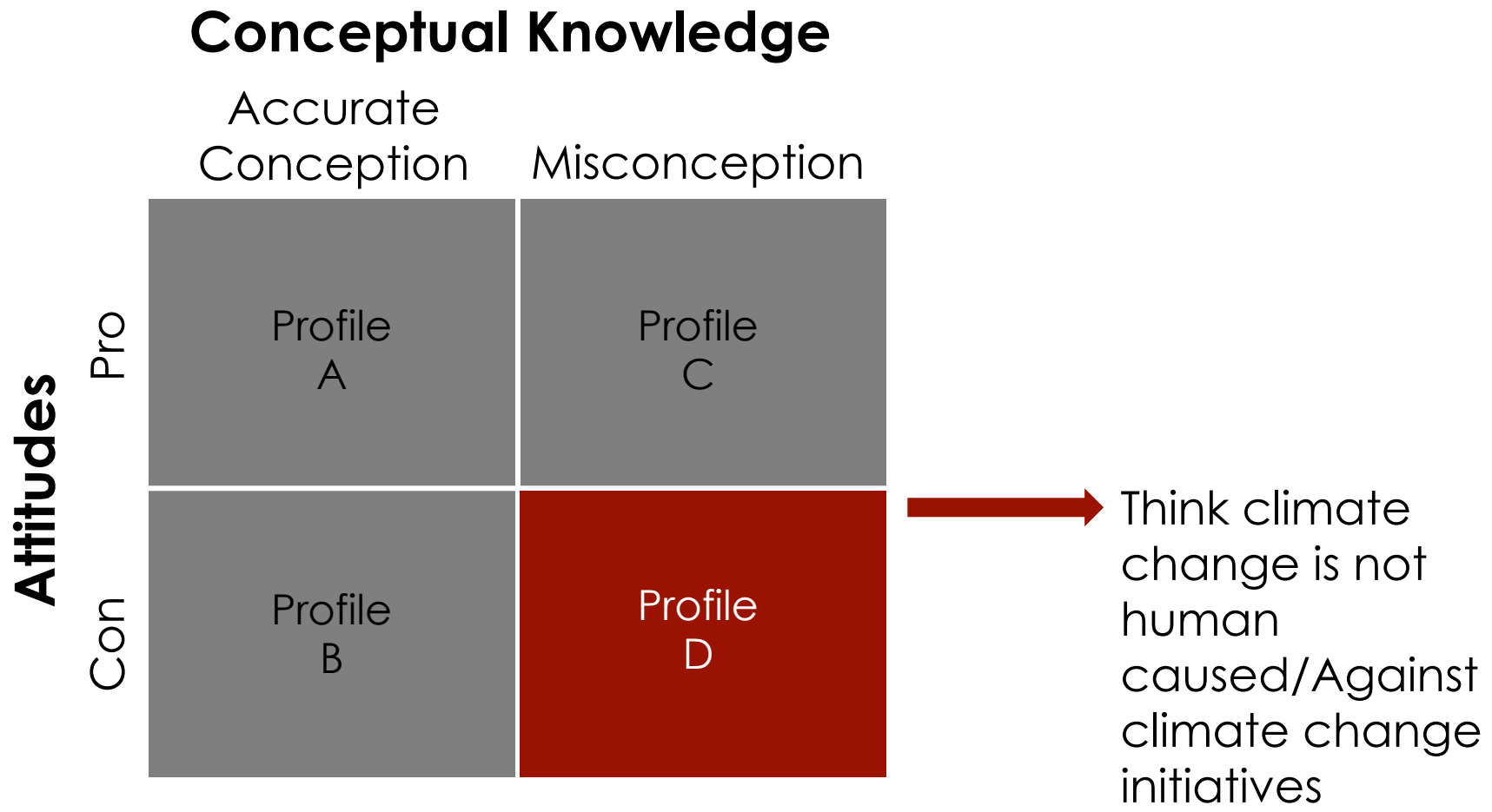


SCIENCE INTEREST AND EMOTIONS

Tar AR: Bringing the past to life in place-based augmented reality science learning

1. Does AR technology facilitate learning of science content?
2. Does AR technology facilitate interest/emotions in science distinguishable from interest/emotions in AR?
3. What surprised participants?
4. Did knowledge shift?

Gale testing out AR at La Brea During Data Collection

Pit 91 Experience

- Participants see a (virtual) bubbling pit of asphalt underneath the plywood platform.
- Participants "discover" fossils in the tar and send them to a lab to be identified.
- Fossils help them to understand the ice environment of LA.

Field Experience

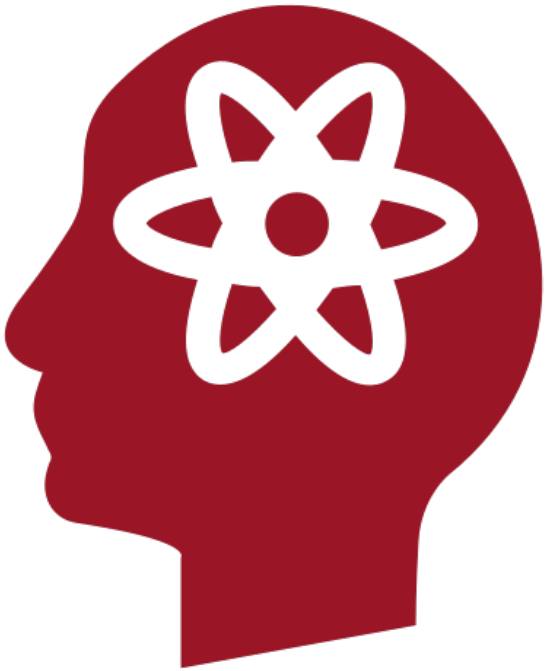
Participants demo our AR experience

- Participants see an entrapment scene
- Life size mammoths, saber-tooth cats, dire wolves walk right past them
- Helps them learn how plants/animals get stuck in the tar

A LITTLE LESS CONVERSATION, A LITTLE MORE ACTION PLEASE

- Conclude the Sinatra & Hofer (2021) volume with action steps for:
- Individuals
- Educators
- Policy Makers
- Science Communicators

What can individuals do?



- **Cultivate a scientific attitude** and nurture science appreciation in others.
- **Improve search skills** and evaluation of scientific claims and sources.
- **Be aware of cognitive biases** and motivations in your own reasoning.
- **Learn to listen** to others with curiosity, compassion, and openness.
- **Vote** for those who value, support, and fund science and who base policy decisions on evidence.

What Can Educators Do?

- Enhance your own science understanding.
- Teach about the nature of science.
- Foster scientific thinking in all students.
- Teach real world applications of science.
- Let students choose areas of inquiry.
- Be aware of strong prior beliefs, attitudes, and identity.
- Recognize students' emotions.
- Foster digital science literacy.

What Can Science Communicators Do?

- Write about science for the general public.
- Write about how scientists know as much as what they know.
- Know your audiences' likely misconceptions, motivations, attitudes, emotions, and identities.
- Provide the evidence for scientific claims.
- "Both sides" is for opinions not science.

What Can Policy Makers Do?

- Hire and listen to science advisors and empirical evidence and use this as a basis for policy
- Support educational standards that emphasize how to think, over what to think.
- Push back on the current trend of ignoring factual basis of claims.
- Demand more rigorous teacher preparation standards.
- Press social media toward responsibility, transparency, accountability

THANK YOU!

CLASS 2 WEDNESDAY, FEBRUARY 8

LOCATION: UNIVERSITY CLUB

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