



— SPRING 2023 SERIES —

MASTER CLASS

USC ROSSIER SCHOOL OF EDUCATION

Master Class Series on Science Denial and Racism Denial

WELCOME



Shaun R. Harper
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

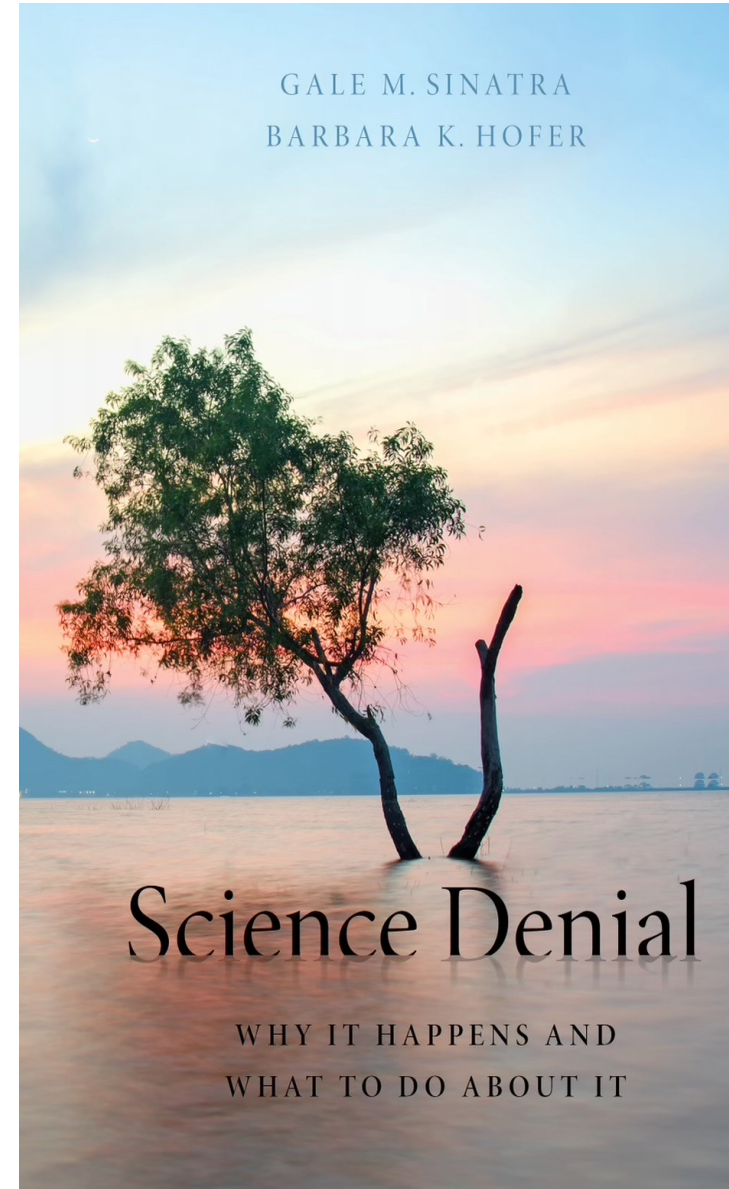


Gale M. Sinatra
Stephen H. Crocker Professor of
Education, Associate Dean for Research



*SCIENCE DENIAL: WHY IT
HAPPENS AND WHAT TO DO
ABOUT IT*

OXFORD UNIVERSITY PRESS (2021)

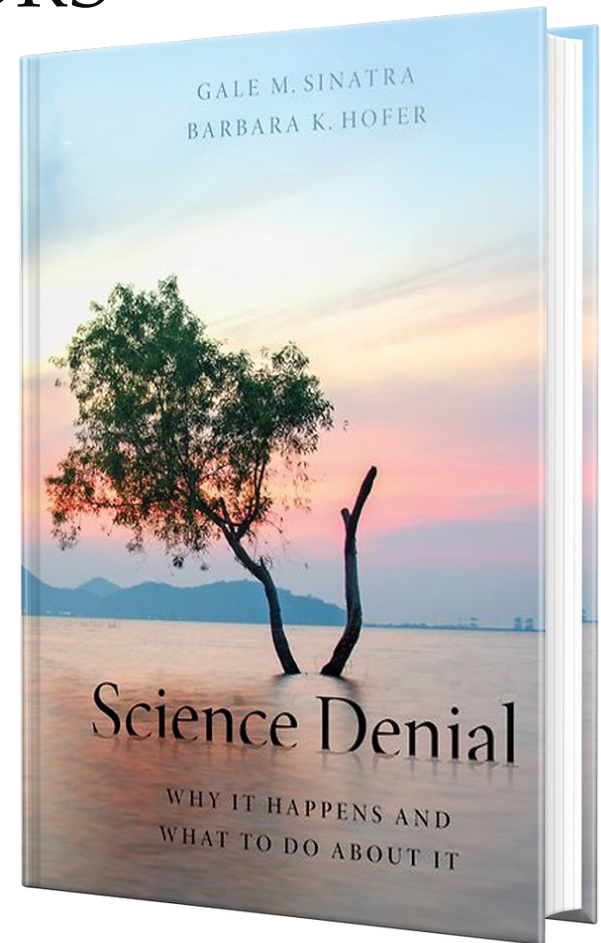


USC University of
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PSYCHOLOGICAL FACTORS

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

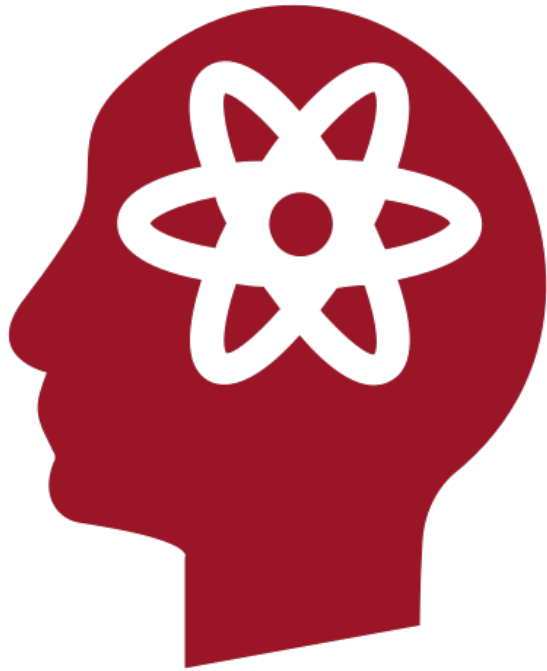


WHAT CAN WE DO ABOUT IT?





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**.





DEBUNKING

1. Download the Debunking Handbook (see QR code)
2. Misinformation is sticky
3. Try to prevent misinformation
4. Can debunk
5. Explain why the misinformation is false



FACT SANDWICH

FACT

Lead with the fact if it's clear, pithy, and sticky—make it simple, concrete, and plausible. It must “fit” with the story.

WARN ABOUT THE MYTH

Warn beforehand that a myth is coming... mention it once only.

EXPLAIN FALLACY

Explain how the myth misleads.

FACT

Finish by reinforcing the fact—multiple times if possible. Make sure it provides an alternative causal explanation.



REFUTING

- **Three-Part Structure**

(Kendeou, Walsh, Smith, & O'Brien, 2014; Tippet, 2010)

1. State misconceptions
2. Refute misconceptions
3. Explain scientifically valid position

- Refutation texts can shift attitudes and knowledge about GMFs. (e.g., Heddy et al., 2017)

- Danielson et al. (in submission) Meta-analysis

“You may think that genetically modifying foods is the same process as cloning. This belief is not correct. Cloning involves making an exact genetic copy of an organism...”



PREBUNKING

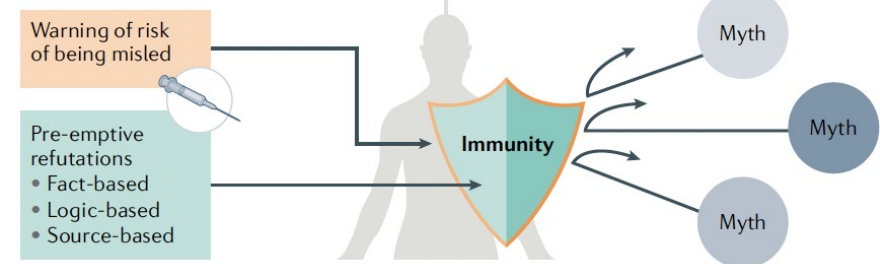
1. Stop misinformation before it starts by exposing people to a severely weakened dose of misinformation
2. Preemptively it by creating “cognitive antibodies” in an attempt to inoculate message recipient
3. Includes a forewarning plus a refutation
4. May also explain a misinfo techniques (cherry picking data)

You may hear in the next few weeks that the masks cause language delays in young children This is not correct. Yes, some delays have been observed, but this is an example of spurious correlation. Delays are expected due to school shutdowns and other pandemic related interruptions. . .

Exposure to a weakened form of misinformation...

- Neutralized misinformation
- Immunity across topics
- Post-inoculation talk

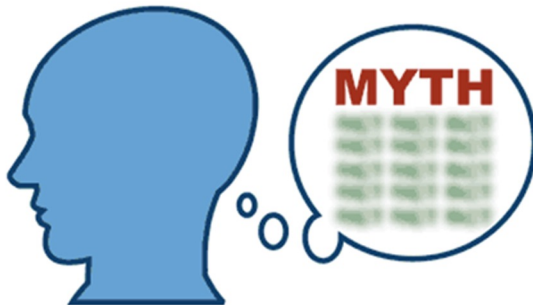
...builds immunity against later misinformation



DON'T BE AFRAID OF BACKFIRE EFFECTS

“The ironic strengthening or intensification of an original belief in misinformation that is the subject of an attempted correction”

-Lewandowsky, Ecker, Seifert, Schwarz & Cook (2012)



“On balance, recent evidence provides no reason to avoid debunking for fear of a backfire effect. Debunking is likely to be at least partially effective, except for some limited circumstances when people’s worldviews are being challenged.”

KEY POINTS FOR CONFRONTING MISINFORMATION

- Prebunk/Debunk/Refute.
- Reduce uncertainty.
- Create personal relevance.
- Connect to current issues.
- Trigger positive/reduce negative emotions.
- Empower action.



ADDRESSING SCIENCE DENIAL

1. Confront
Misconceptions/Misinformatio
2. Teach Sourcing Scientific
Information Online



ONLINE SOURCES
CAN BE **DIFFICULT**
TO EVALUATE IF
THEY ARE:

Valid



ONLINE SOURCES
CAN BE **DIFFICULT**
TO EVALUATE IF
THEY ARE:

Accurate



ONLINE SOURCES
CAN BE DIFFICULT
TO EVALUATE IF
THEY ARE:

Biased





NEED TO TEACH SOURCING

6 STEPS TO SOURCING SCIENCE

(HERRICK, SINATRA &
LOMBARDI, 2023)



<https://www.nsta.org/science-teacher/science-teacher-januaryfebruary-2023/plausible>

IS IT CREDIBLE? IS IT PLAUSIBLE?

HOW TO SCIENTIFICALLY EVALUATE ONLINE EVIDENCE AND CLAIMS

STOP. STEP BACK. READ.



Go past the headline or post claim. Think about the **claims** the person is making and what **explanation** is being used to support those claims.

BECOME YOUR OWN FACT-CHECKER.
EVALUATE SOURCES TO DETERMINE IF THEY ARE CREDIBLE.

Ask yourself, Is this explanation **plausible**, and how do I know?

- Who is the author?
- What is the purpose?
- Where was it posted?
- Where is the science from?



MAKE A JUDGMENT.
IS THE CLAIM PLAUSIBLE?



NO? Don't share because it doesn't seem reliable
YES! Continue to the evaluation stage

**EVALUATE EVIDENCE AND
CONNECTION TO THE CLAIM**

Consider strength of evidence in connection to a claim, but also consider how well the evidence connects to an **alternative** claim.



- What is the **quantity** and **quality** of evidence?
- Does evidence **support** the claim?
- Does it support an **alternative** claim?

REAPPRAISE.



**IS THE CLAIM PLAUSIBLE?
IN LIGHT OF A COMPETING CLAIM?**

MAKE A TENTATIVE JUDGMENT.



Now that you have engaged in purposeful source and claim evaluation, you can come to a tentative judgment about the validity of the scientific information.

**ONLY SHARE SCIENTIFIC INFORMATION ONLINE
THAT YOU HAVE VERIFIED.**

STEP 1:

**STOP.
STEP BACK.
READ.**

Don't just click and share, especially if headline confirms prior belief

**STOP.
STEP BACK.**



ASK YOURSELF.

- Is this information trustworthy?
- How do I know?



SCAN ARTICLE.



**STEP 2:
BECOME
YOUR OWN
FACT
CHECKER.**

CHECK SOURCE.



OPEN NEW WINDOW.



Who is the Author?

- An expert?
- Reputable?
- Trustworthy?
- Objective?
- Politically motivated?
- Trying to sell you something?

**Read Laterally.
Not Vertically.**



LATERAL READING

1. Open up a new window
2. Search for information about the source
3. Pay attention to the domain and URL
4. Read the "About Us" section
5. Search for information about the claim
6. Who else is supporting this claim?
7. Who is supporting the alternative claim?



STEP 3: EVALUATE EVIDENCE AND CONNECTION TO THE CLAIMS



Does evidence support the claim?



Consider alternative claims.



Evaluate both the original claim and the alternative claim.



Which has more support?

MOTIVATED REASONING



Motivations can
BIAS understanding



Motivations can lead
to decisions based on
preference



We are *more critical*
of science when we
don't like the findings

What should we do? Ask yourself.

*What are my motivations for
assuming this is true?*



**STEP 4:
REAPPRAISE
YOUR
PLAUSIBILITY
JUDGMENT
ABOUT THE
CLAIM**

Ask, Is the original claim plausible?

Re-evaluate.

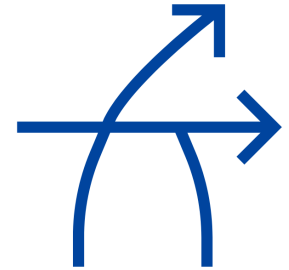
Shift plausibility judgment if necessary.

STEP 5:

MAKE A *TENTATIVE* JUDGMENT

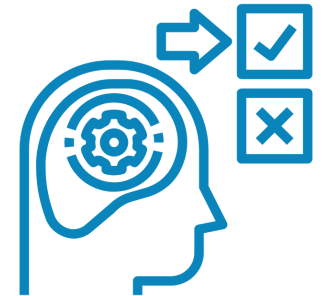
KEEP IN MIND.

- Science changes with new evidence.
- 100% certainty is unlikely.



MAKE A JUDGMENT.

- Based on current evidence.



BE OPEN TO RE-EVALUATING.





Once you have
verified, share.



Share not just what
you know but how
you know.



Contextualize
information.

**STEP 6:
SHARE
ONLY IF
VERIFIED**

MAKE SCIENCE ENGAGING



The advertisement features a dark blue background with the Hot Wheels logo at the top. Below it, the text reads "SPEEDOMETRY MATH AND SCIENCE CURRICULUM STEM Lesson Plans & Activities". To the left, there is an image of a stack of books with a magnifying glass and a Hot Wheels car. To the right, a video player shows a young girl working with a Hot Wheels track. The video player has a play button and the text "Hot Wheels® Speedometry™" below it. At the bottom, there are three buttons: "GRADE 4 LESSONS", "CLASSROOM KIT", and "FOR FAMILIES".

GRADE 4 LESSONS **CLASSROOM KIT** **FOR FAMILIES**

Accelerate STEM Learning Through Play!

Hot Wheels® Speedometry™ encourages inquiry and real-world, problem-based learning through play, hands-on activities and in-depth lesson plans that is mapped to state and national standards including Common Core State Standards (CCSS), Next Generation Science Standards (NGSS) and Texas Essential Knowledge and Skills (TEKS). This education curriculum, co-created with researchers at the University of Southern California Rossier School of Education, combines Hot Wheels® fun, imagination, and action, as well as toys and track to accelerate learning. [Read More](#)



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Southern California



MAKE SCIENCE PLACE BASED



USC University of
Southern California

 **MOTIVATED
CHANGE**
RESEARCH LAB

TAR AR: BRINGING THE PAST TO LIFE IN PLACE-BASED AUGMENTED REALITY SCIENCE LEARNING

USC Rossier
School of Education

LA BREA
**TAR
PITS**
MUSEUM

USC Institute for
Creative Technologies



**Dr. Gale
Sinatra**



**Dr. Emily
Lindsey**



**Dr. William
Swartout**



**Dr. Benjamin
Nye**



USC University of
Southern California

**MOTIVATED
CHANGE**
RESEARCH LAB

AR @ LA BREA



WIRED

SUBSCRIBE

ARIELLE PARDES GEAR 09.21.18 07:00 AM

FOR MUSEUMS, AUGMENTED REALITY IS THE NEXT FRONTIER







USC University of
Southern California



TAR AR: CONDITIONS



	Low interactivity	High interactivity
Handheld Touch		
Headset		



Control/Baseline:
Sign



TAR AR: PIT 91

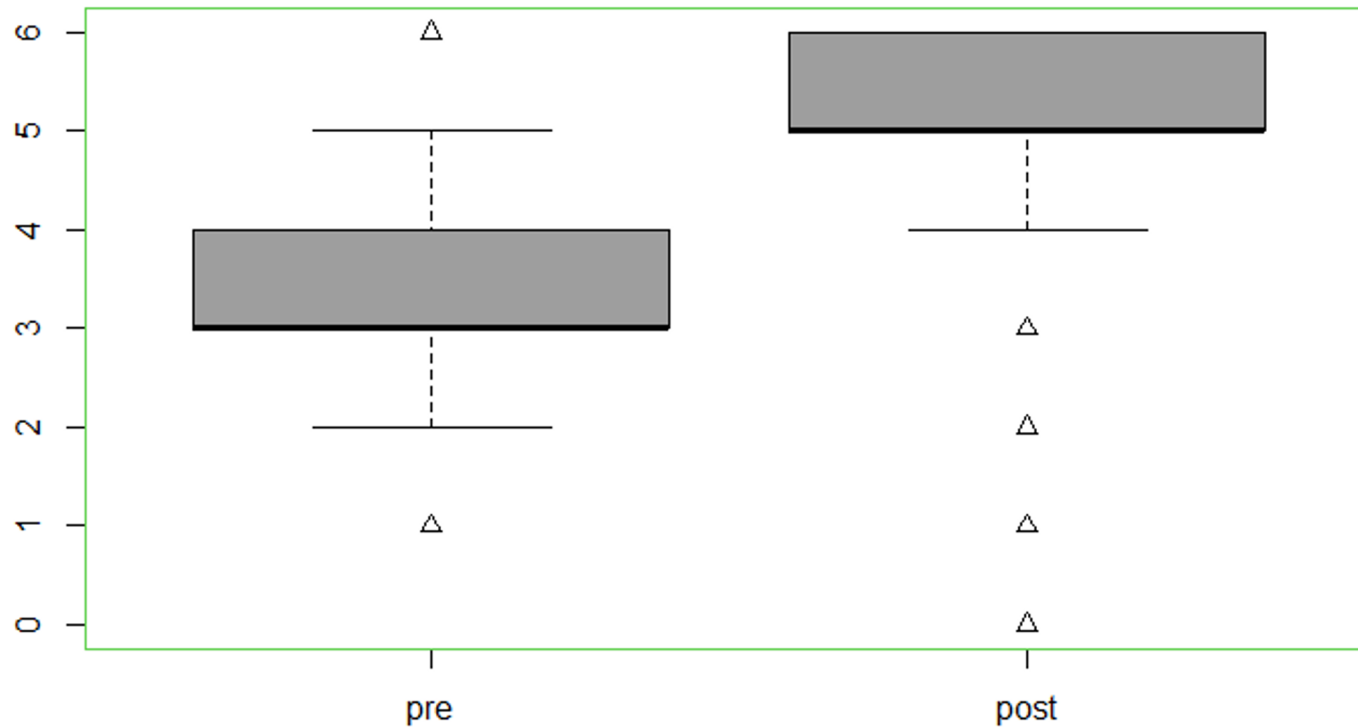


TAR AR: THE FIELD EXPERIENCE

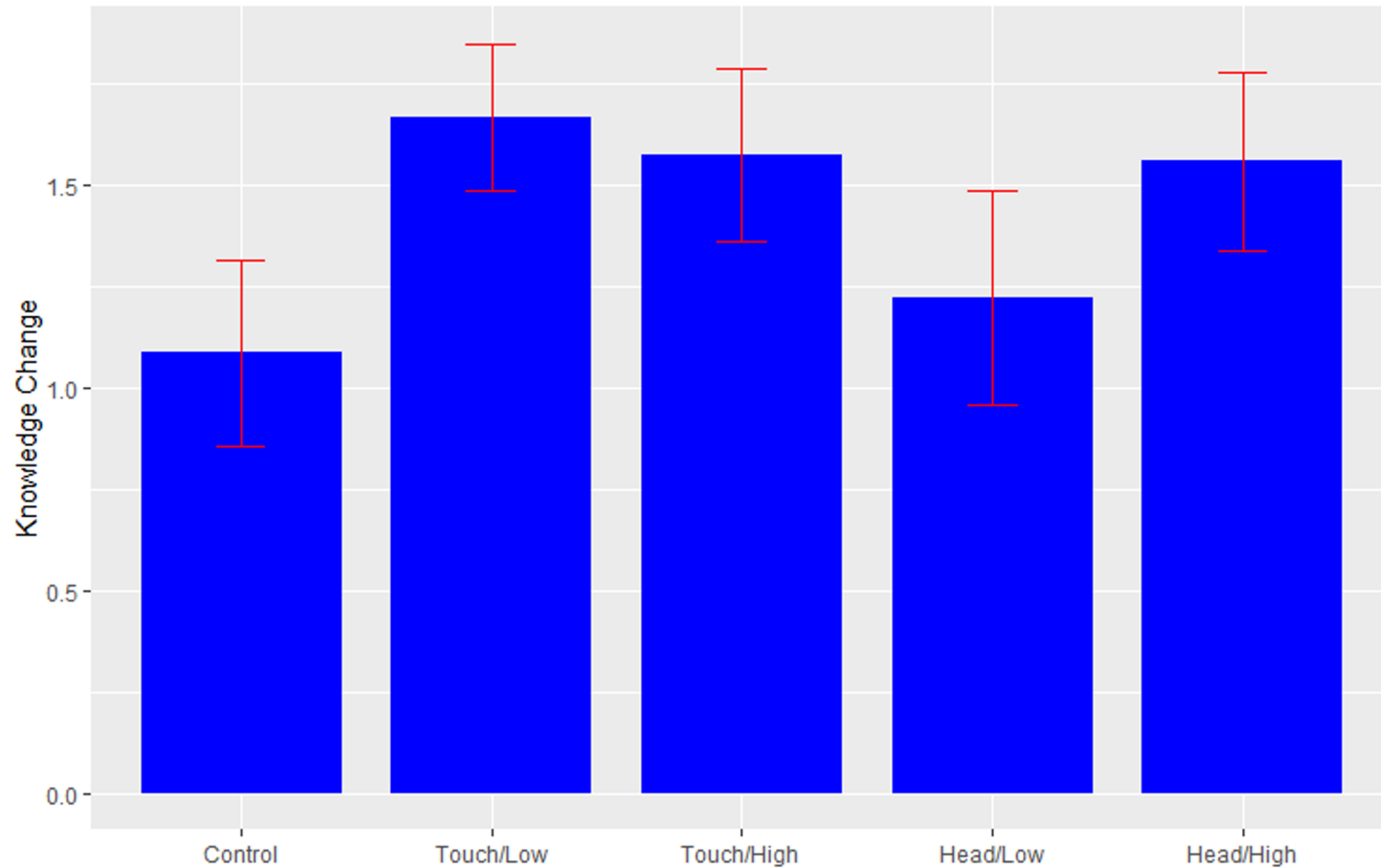


FIELD EXPERIENCE KNOWLEDGE CHANGE

Comparison of knowledge pre/post



FIELD EXPERIENCE KNOWLEDGE CHANGE BY CONDITION



TAR AR: BRINGING THE PAST TO LIFE IN PLACE-BASED AUGMENTED REALITY SCIENCE LEARNING



THANKS!



Snap to unlock 🔒

Ground Sloth

by Nicholas Dominici



Snap to unlock 🔒

Sabertooth

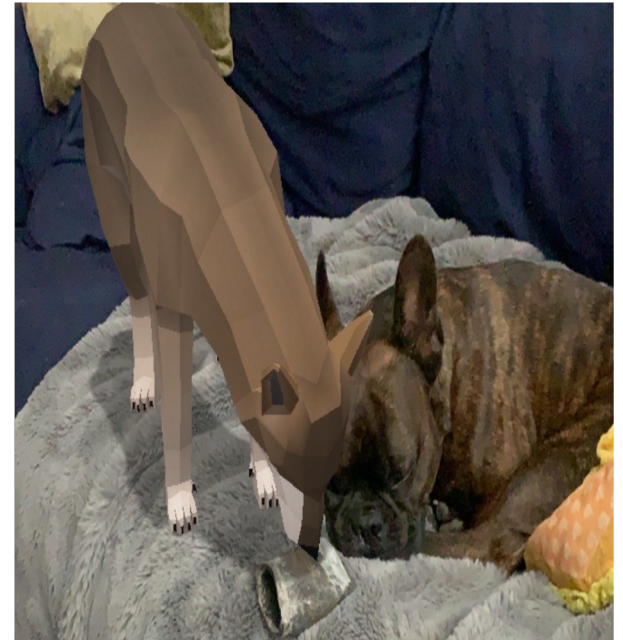
by Nicholas Dominici



Snap to unlock 🔒

Direwolf

by Nicholas Dominici





THANK YOU!

CLASS 5 WEDNESDAY, MARCH 22

LOCATION: UNIVERSITY CLUB

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