

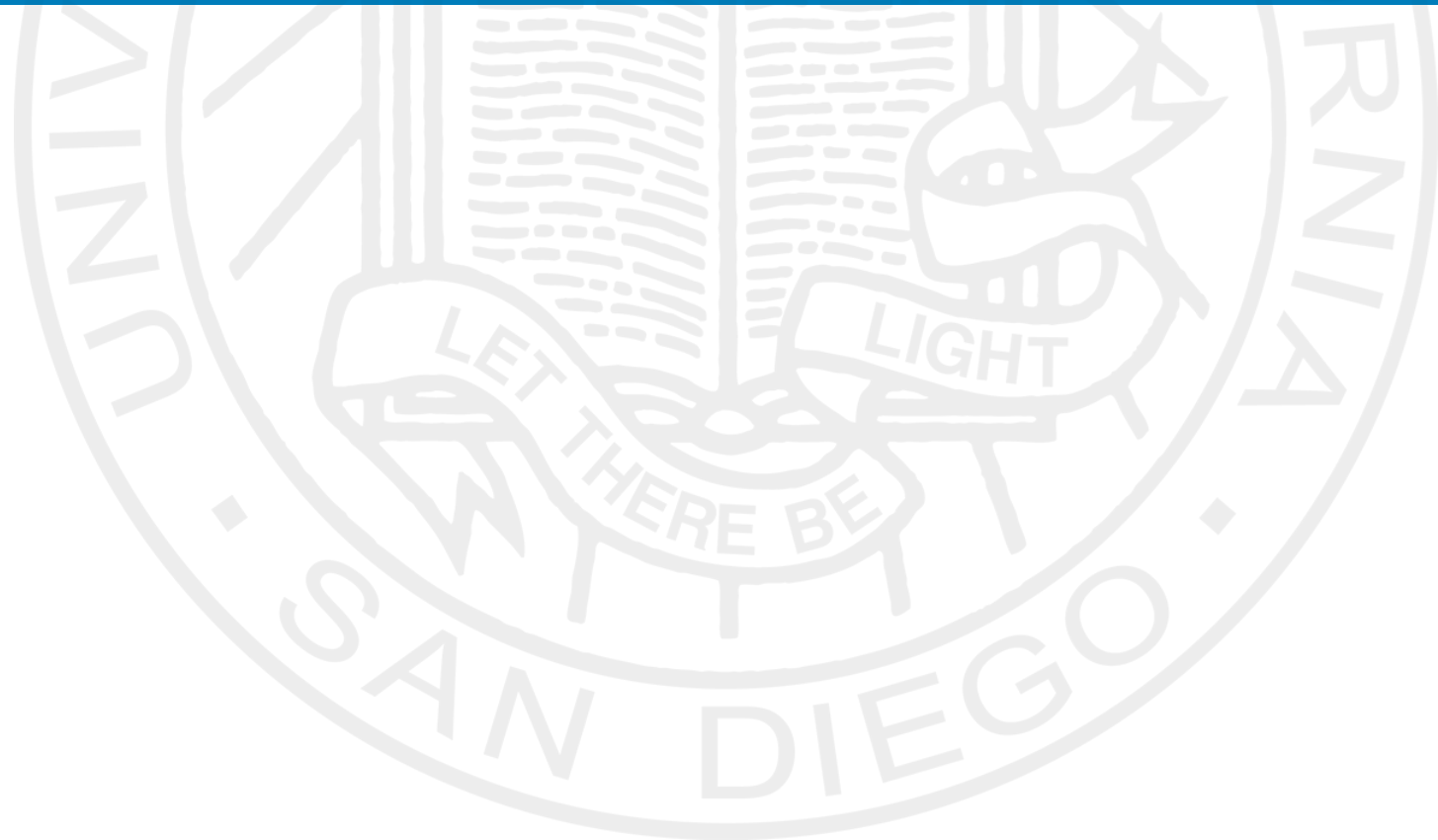
Cognitive biases you may have met before

Todd Pawlicki, PhD

Professor and Vice Chair
Radiation Medicine & Applied Sciences

UC San Diego Health

RETHINKING MEDICAL PHYSICS



Disclosures

Founding Partner

TreatSafely Foundation

Image Owl, LLC

Textbooks

Quality and Safety in Radiotherapy

Hendee's Radiation Therapy Physics (4th Ed)



The Human Condition



Impact of the Human Condition



The New York Times

Radiation Offers New Cures, and Ways to Do Harm

By WALT BOGDANICH JAN. 23, 2010

As Scott Jerome-Parks lay dying, he clung to this wish: that his fatal radiation overdose — which left him deaf, struggling to see, unable to swallow, burned, with his teeth falling out, with [ulcers](#) in his mouth and throat, nauseated, in severe pain and finally unable to breathe — be studied and talked about publicly so that others might not have to live his nightmare.

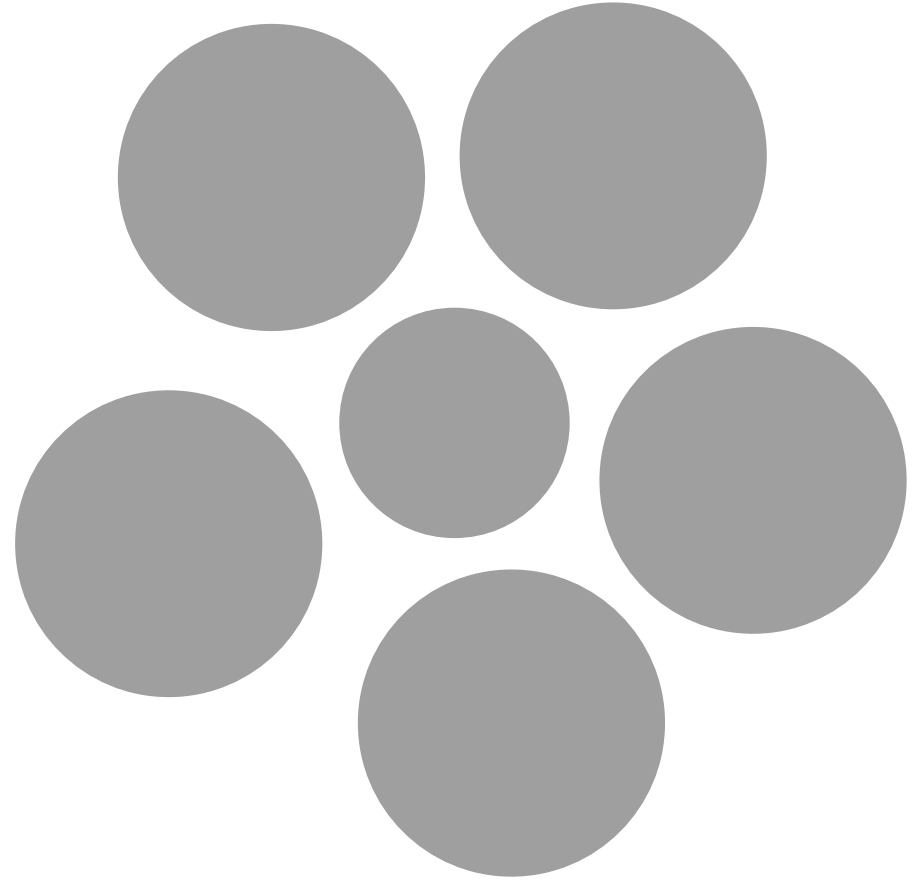
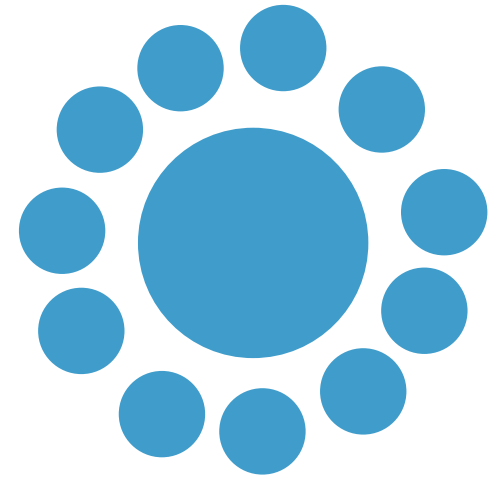


Type 1 Thinking

12 13 14

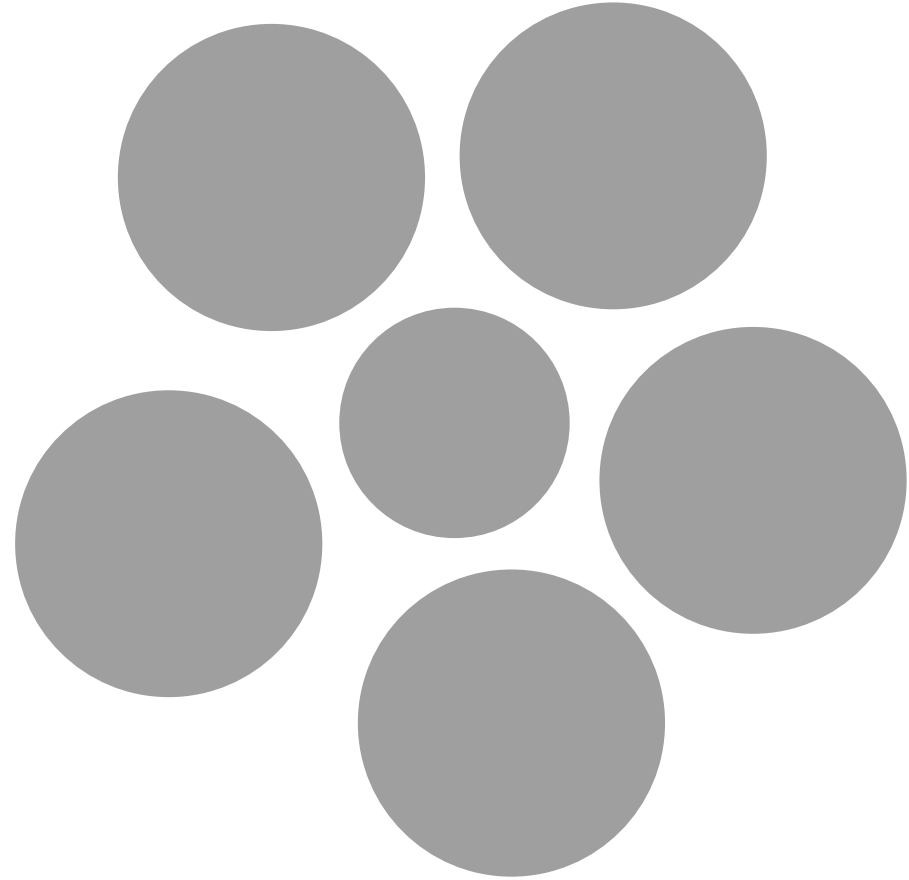
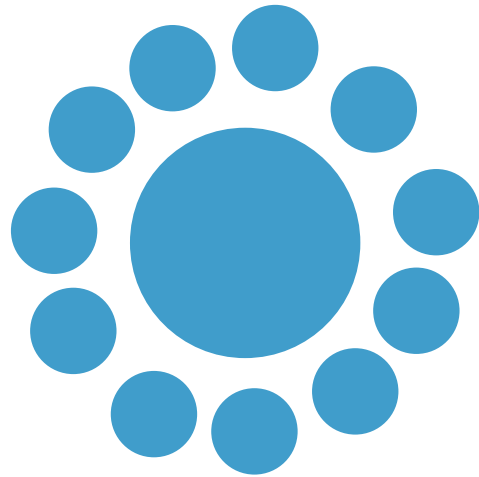


Context is Everything





Our Biases are Implied





Implicit Bias

A characteristic of Type 1 thinking that represents categories as norms and prototypical examples.

Implicit Bias

Research supports a relationship between patient care and MD bias in ways that could perpetuate health care disparities.

PERSPECTIVE



Physicians and Implicit Bias: How Doctors May Unwittingly Perpetuate Health Care Disparities

Elizabeth N. Chapman, MD^{1,5}, Anna Kaatz, MA, MPH, PhD⁴, and Molly Carnes, MD, MS^{1,2,3,4,5}

¹Department of Medicine, University of Wisconsin-Madison, Madison, WI, USA; ²Department of Psychiatry, University of Wisconsin-Madison, Madison, USA; ³Industrial & Systems Engineering, University of Wisconsin-Madison, Madison, USA; ⁴Center for Women's Health Research, University of Wisconsin-Madison, Madison, USA; ⁵ William S. Middleton Memorial Veterans Hospital Geriatric Research Education and Clinical Center, Madison, WI, USA.

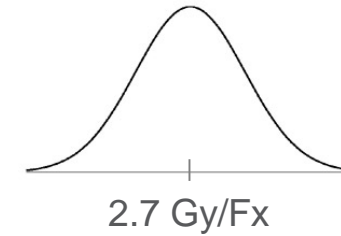
Anchoring Bias

An overemphasis on early information that impacts subsequent decisions.



Forms of Anchoring Bias

Priming effect – Type 1 Thinking



Deliberate process of adjustment – Type 2 Thinking

Anchoring Bias

Related to MD Decisions

Tendency to fixate on specific features of a presentation too early in the diagnostic process, and to base the likelihood of a particular event on information available at the outset.

- [Quantifying Heuristic **Bias: Anchoring**, Availability, and Representativeness.](#)
2 Richie M, Josephson SA.
Teach Learn Med. 2018 Jan-Mar;30(1):67-75. doi: 10.1080/10401334.2017.1332631. Epub 2017 Jul 28. PMID: 28753383
Construct: Authors examined whether a new vignette-based instrument could isolate and quantify heuristic **bias**. BACKGROUND: Heuristics are cognitive shortcuts that may introduce **bias** and contribute to error. ...This study presents validity data to support a vignette- ...
“ Cite ↗ Share

- [Anchoring Bias, Lyme Disease, and the Diagnosis Conundrum.](#)
3 Aguirre LE, Chueng T, Lorio M, Mueller M.
Cureus. 2019 Mar 22;11(3):e4300. doi: 10.7759/cureus.4300. PMID: 31183280 [Free PMC article.](#)
This academic teaching case highlights a full diagnostic workup fueled by **anchoring bias**, resulting in a presumptive diagnosis of early disseminated Lyme meningitis. ...This clinical vignette acknowledges the habitual **anchoring** biases in the daily decision-ma ...
“ Cite ↗ Share

- [Anchoring bias in face-to-face Time-Trade-Off valuations of health states.](#)
4 García-Molina M, Chicaiza-Becerra LA.
Rev Salud Publica (Bogota). 2017 Sep-Oct;19(5):686-690. doi: 10.15446/rsap.v19n5.60924. PMID: 30183818 [Free article.](#) Clinical Trial.
OBJECTIVE: To test whether **anchoring** (a cognitive **bias**) occurs during face-to-face interviews to value health states by Time-Trade-Off. ...The size of the **anchoring** effect was not uniform among health states. CONCLUSION: **Anchoring** effects may **bias** ...
“ Cite ↗ Share

- [Avoiding **anchoring bias** by moving beyond 'mechanical falls' in geriatric emergency medicine.](#)
5 Nagaraj G, Hullick C, Arendts G, Burkett E, Hill KD, Carpenter CR.
Emerg Med Australas. 2018 Dec;30(6):843-850. doi: 10.1111/1742-6723.13129. Epub 2018 Aug 8. PMID: 30091183 No abstract available.
“ Cite ↗ Share

- [Anchoring-and-adjustment **bias** in communication of disease risk.](#)
6 Senay I, Kaphingst KA.
Med Decis Making. 2009 Mar-Apr;29(2):193-201. doi: 10.1177/0272989X08327395. Epub 2009 Mar 11. PMID: 19279297 [Free PMC article.](#) Review.
However, previous research indicates that people may insufficiently adjust their subjective risk to the objective risk value communicated to them by a healthcare provider, a phenomenon called **anchoring-and-adjustment bias**. ...We recommend that, to reduce this **bia** ...
“ Cite ↗ Share

- [Hidden diagnosis behind viral infection: the danger of **anchoring bias**.](#)
7 Iwai K, Tetsuhara K, Ogawa E, Kubota M.
BMJ Case Rep. 2018 Oct 21;2018:bcr2018226613. doi: 10.1136/bcr-2018-226613. PMID: 30344151 [Free PMC article.](#)

A Simple Task

Take 3 sec to review the poker hand, then calculate the sum by doubling the value of each card (aces are worth 11).



3
2
1

Answer

Take 3 sec to review the poker hand, then calculate the sum by doubling the value of each card (aces are worth 11).

$$\text{Answer: } 50 = (2*5) + (2*4) + (2*3) + (2*2) + (2*11)$$

Follow-up “Safety Related” Question

Did you find any anomalies with the poker hand?



Inattentional Blindness

When your attention is otherwise engaged, you sometimes fail to notice a salient and fully visible, but unexpected object or event.

Psychol Sci. 2013 September ; 24(9): 1848–1853. doi:10.1177/0956797613479386.

“The invisible gorilla strikes again: Sustained inattentional blindness in expert observers”

Trafton Drew, Melissa L. H. Vo, and Jeremy M. Wolfe

<https://www.youtube.com/watch?v=qHUJ6seBoCg>



United Airlines Flight 173

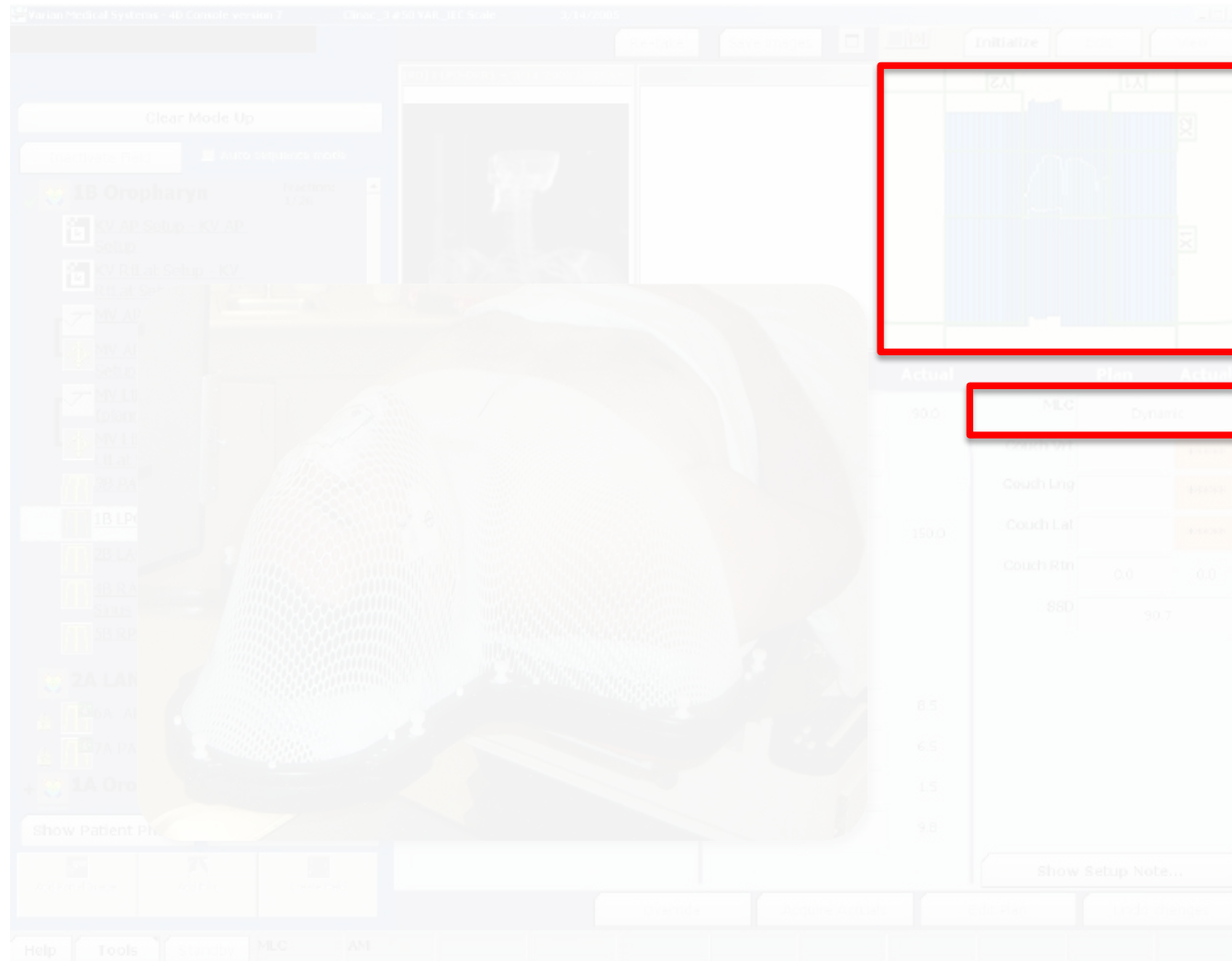


A United Airlines Douglas DC-8 similar to the one involved in the crash

Accident

Date	December 28, 1978
Summary	Fuel exhaustion due to pilot error (lack of situational awareness) and maintenance error with landing gear
Site	Near Portland International Airport, Portland, Oregon, U.S. 45.5225°N 122.499722°W
Aircraft type	McDonnell-Douglas DC-8-61
Operator	United Airlines
Registration	N8082U
Flight origin	John F. Kennedy International Airport, New York City
Stopover	Stapleton International Airport, Denver, Colorado
Destination	Portland International Airport, Portland, Oregon
Passengers	181
Crew	8
Fatalities	10 (2 crew, 8 passengers)
Injuries	24
Survivors	179

Rad Onc Example



The New York Times



Biases That Impact Causal Analysis

Hindsight Bias

Tendency to view the event as being more predictable than it really was.

Confirmation Bias

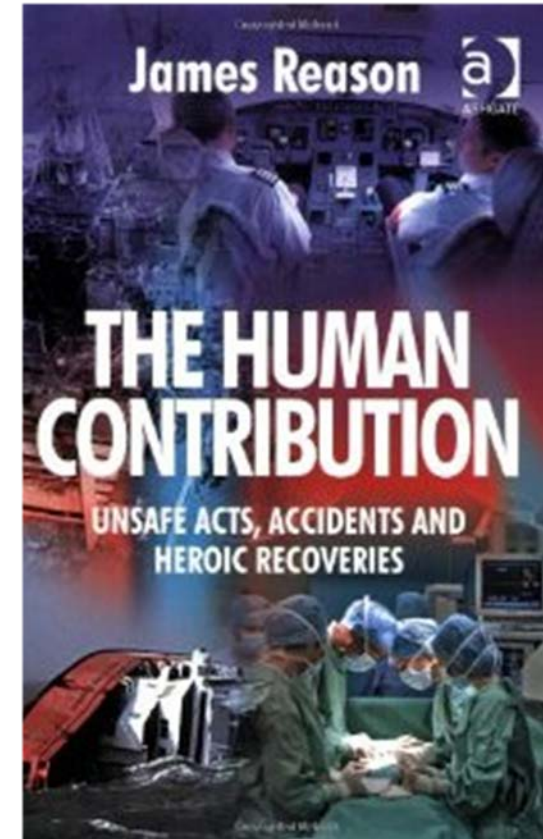
Jump to a conclusion, then look for evidence to support it.

Error Detection/Recovery is a Skill

We need to educate ourselves.

Biases can work in our favor.

When an accident is eminent, people can also make a miraculous recovery.



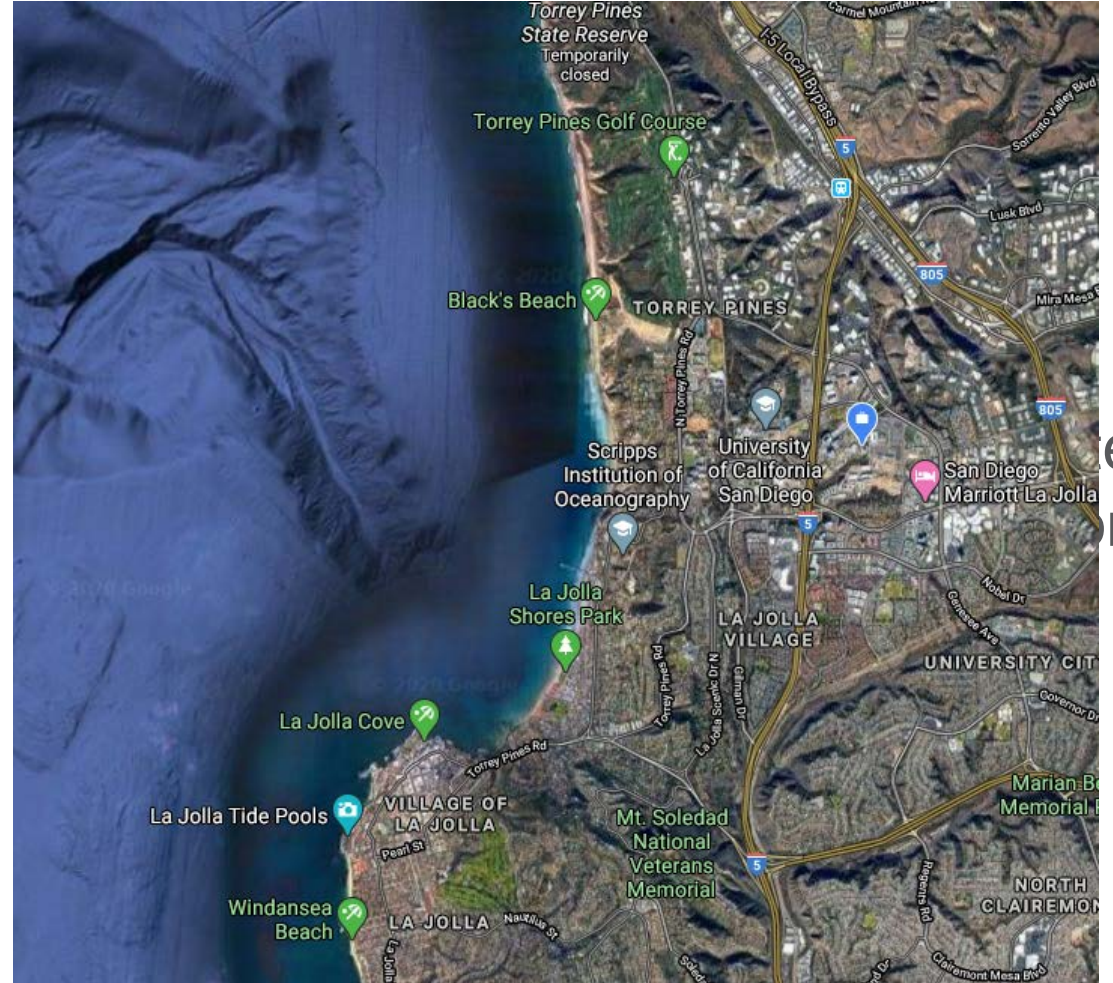
Summary

Be aware of our biases

- Anchoring
- Implicit
- Inattentional
- Confirmation
- Hindsight
- and many (many) more



The Next Presentation



ens

UC San Diego Health

RETHINKING MEDICAL PHYSICS

Collaborators

Suzanne Evans, MD

Ashley Rubenstein, PhD

Derek Brown, PhD