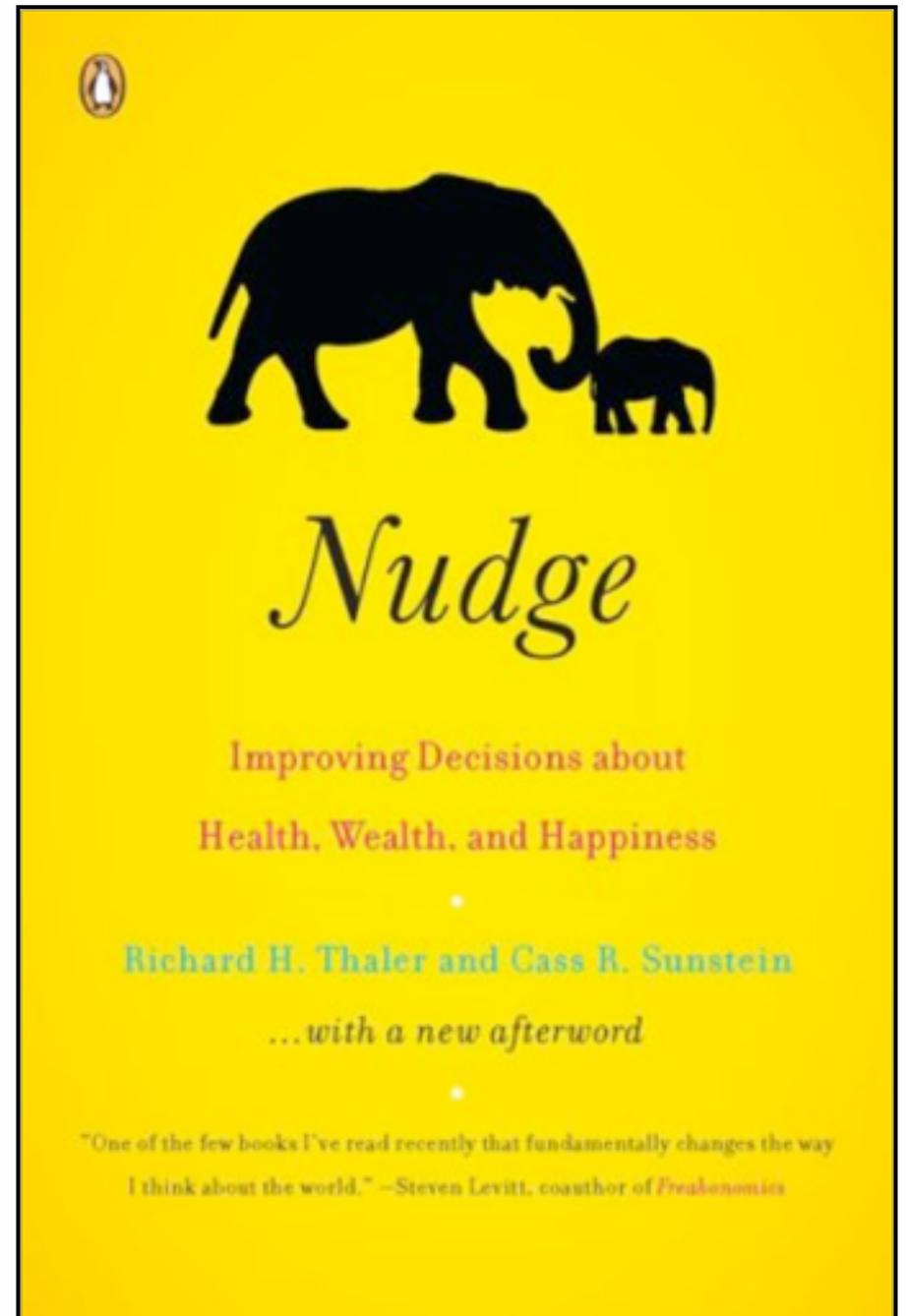


Behaviour-Based Safety Needs an Update



ALBERTA
**HEALTH &
SAFETY**
CONFERENCE

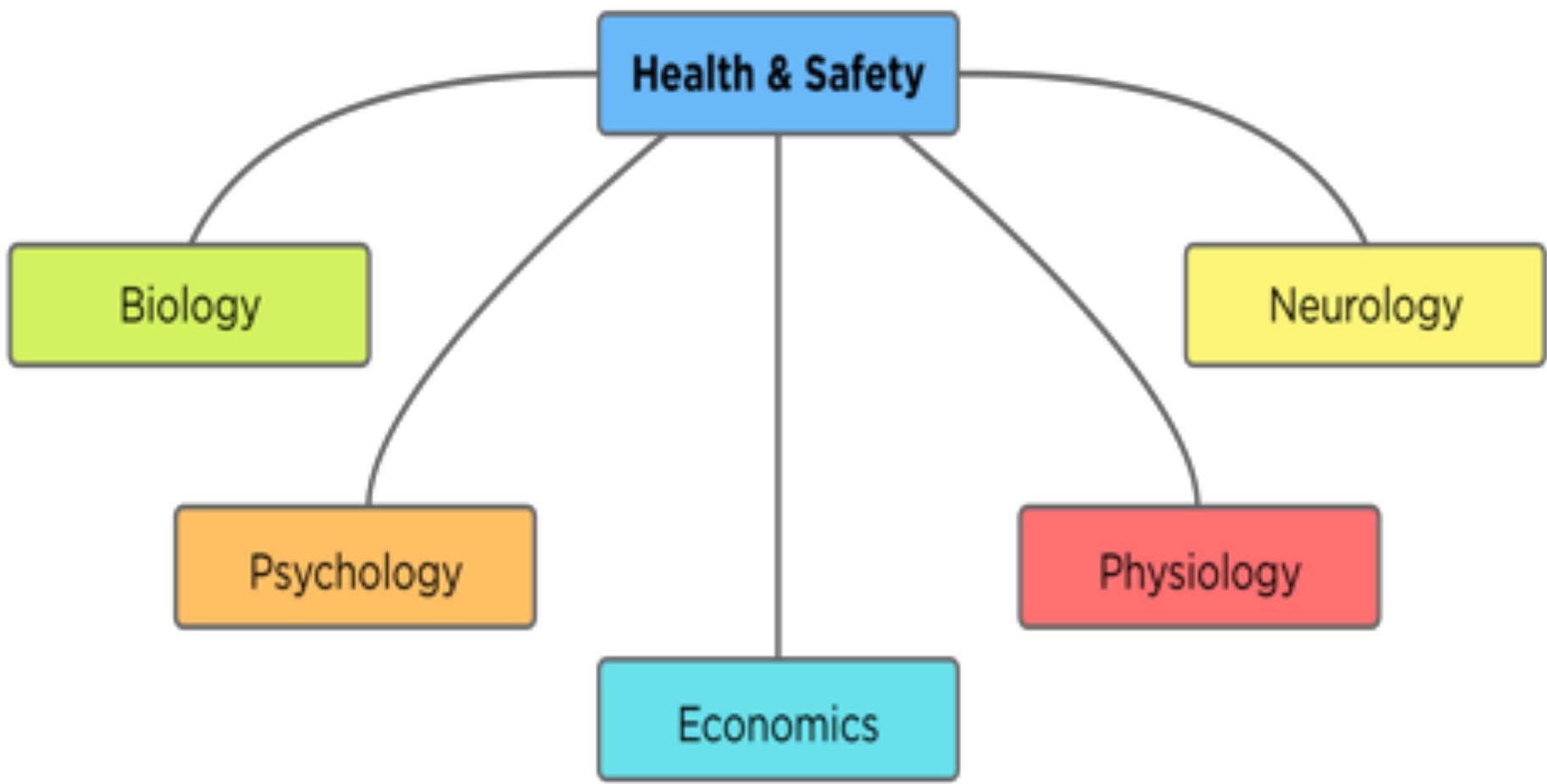
“A nudge, as we will use the term, is any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives.”







~80% reduced spillage





be·hav·iour

noun

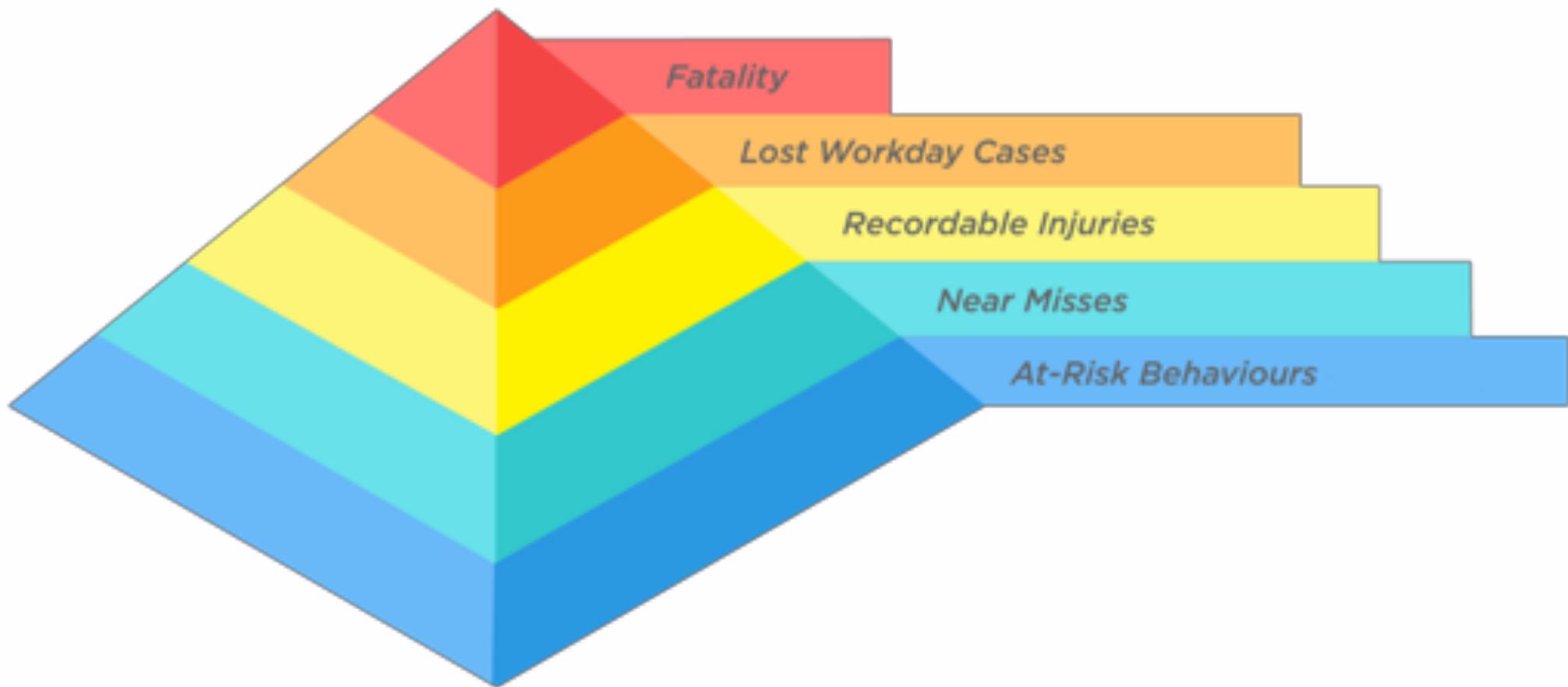
1.the way in which one acts or conducts oneself, especially toward others.

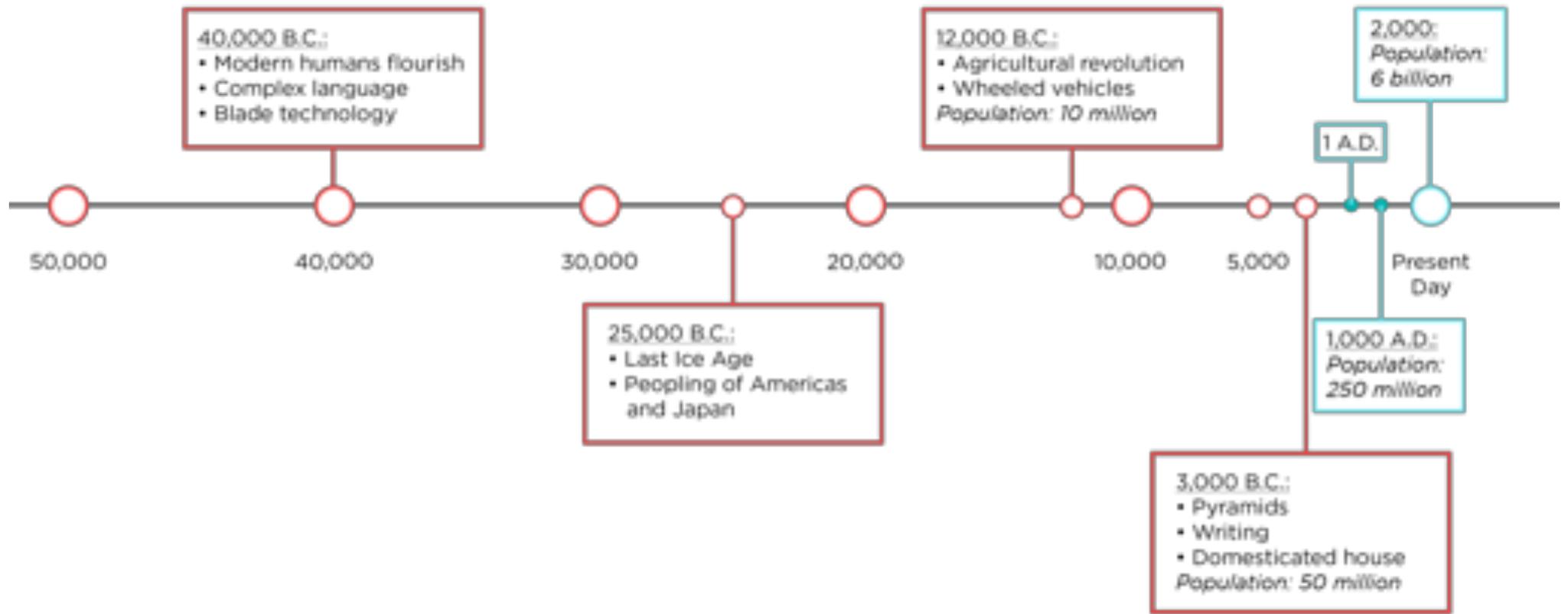
"good behavior"

- the way in which an animal or person acts in response to a particular situation or stimulus.

- Bird published in 1960s-1980s
- Assumes rationality
- Limited incorporation of new research









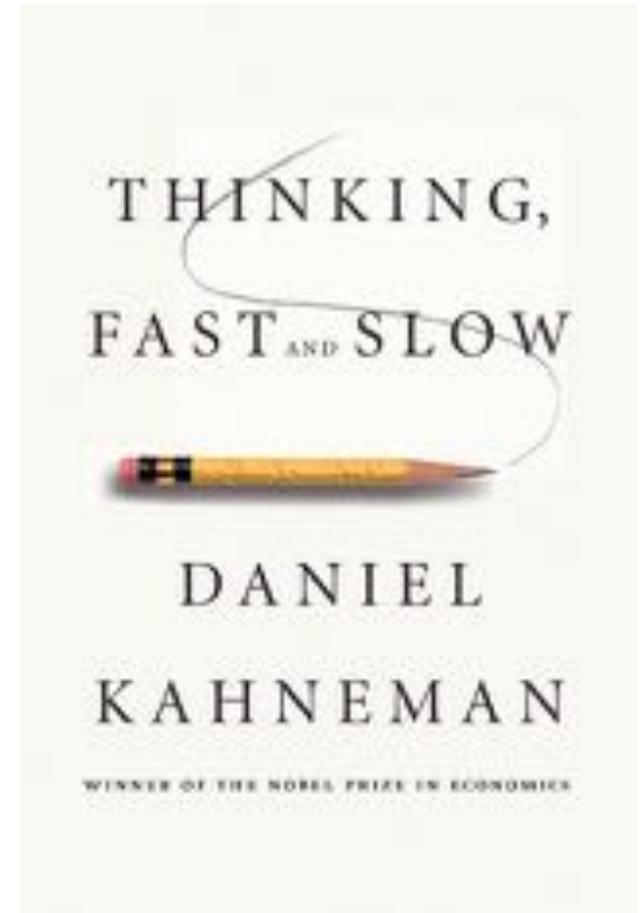
Two System Thinking



Daniel Kahneman

Amos Tversky

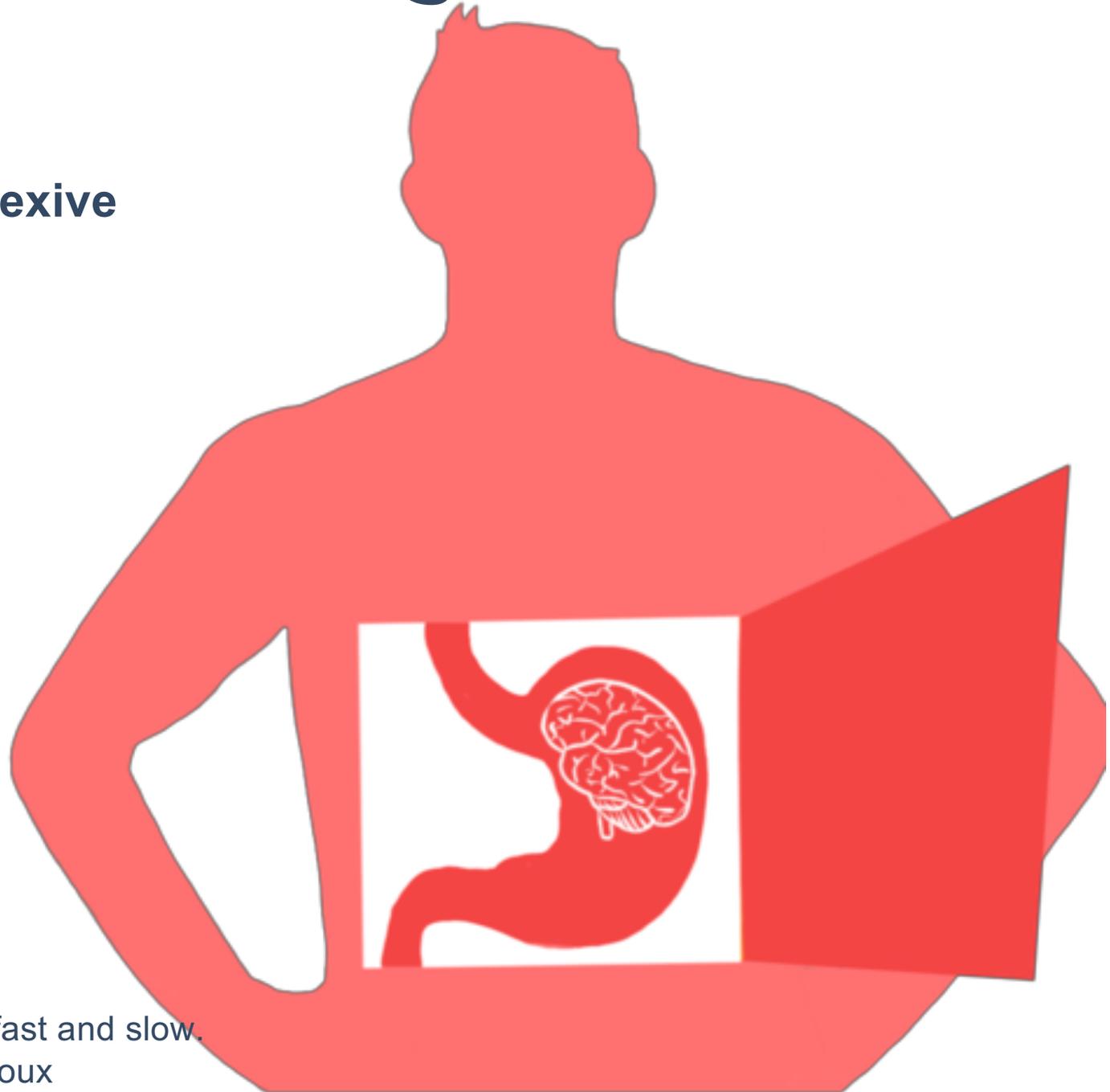
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Prospect Theory: An Analysis of Decision Under Risk
Econometrica, 47(2), pp. 263-291, March 1979

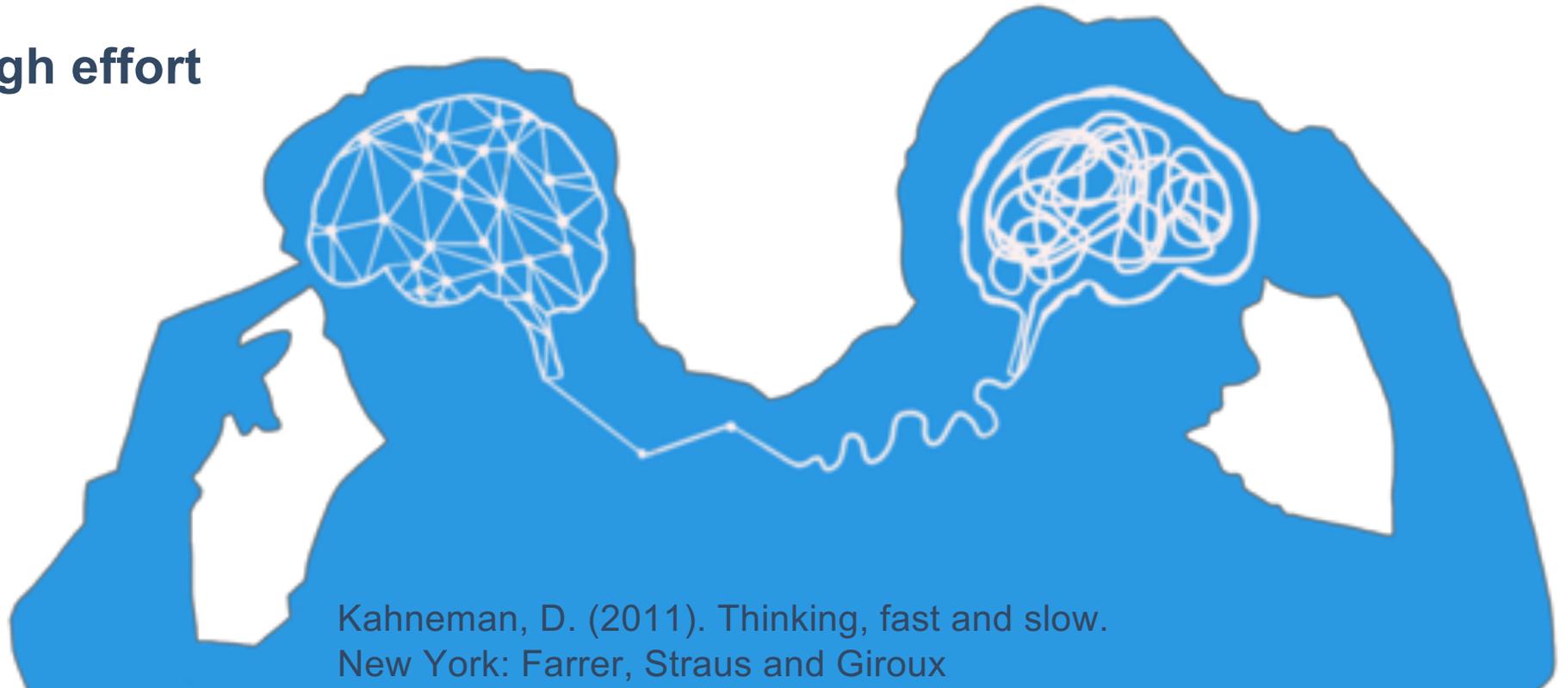
System 1 - Gut Thinking

- Unconscious; reflexive
- Intuitive - Feeling
- Fast
- Low effort



System 2 - Analytical Thinking

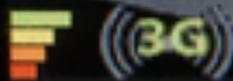
- Conscious reasoning
- Deliberate
- Slow
- High effort



Kahneman, D. (2011). Thinking, fast and slow.
New York: Farrer, Straus and Giroux



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23 08

04/11/20 15



MONER IS

SELECT TIP

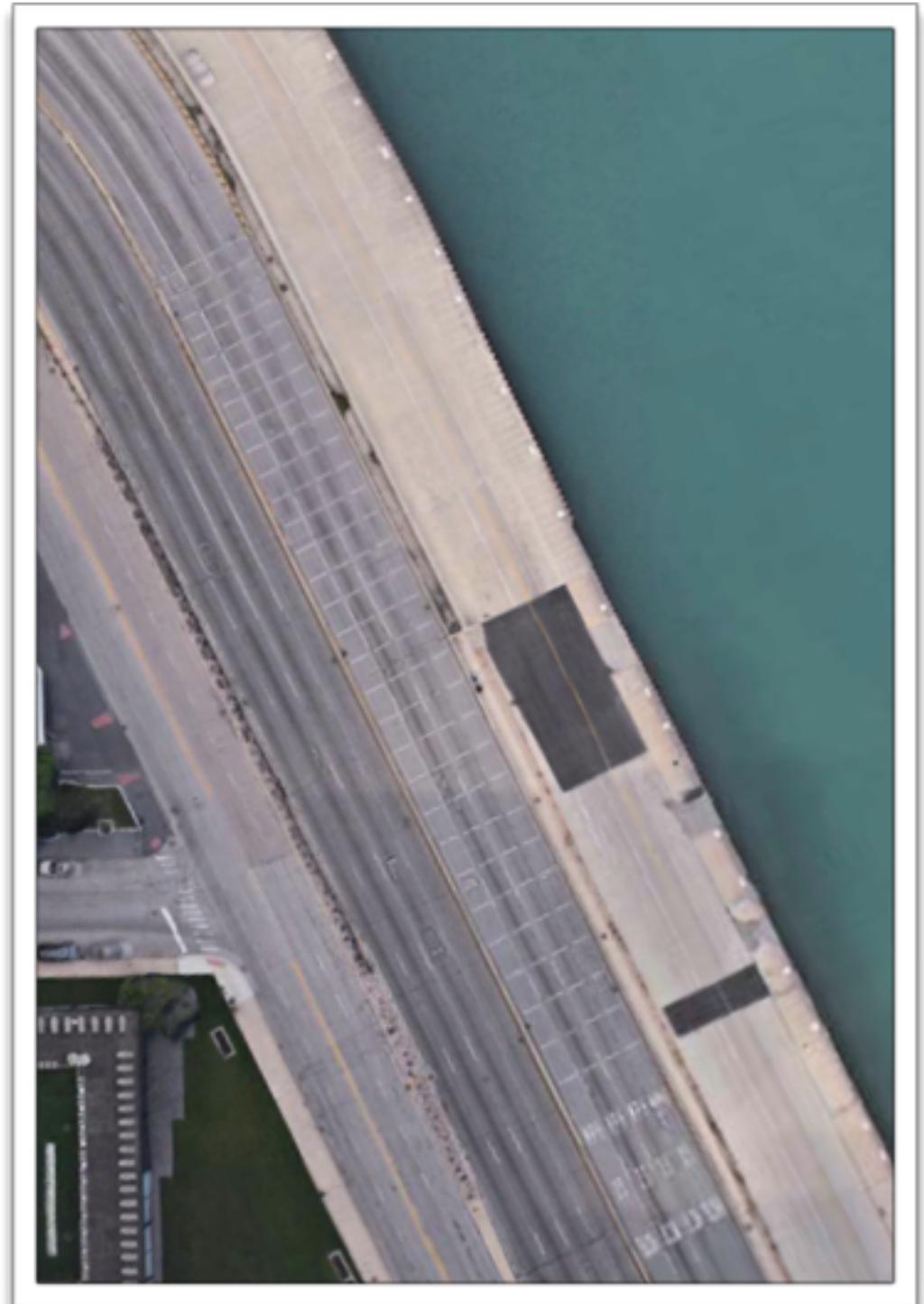
1- 15%=\$12.29

2- 20%=\$16.38

3- 25%=\$20.48

4- OTHER

- Lake Shore Drive, Chicago
- Signs; straightening; nothing prevented accidents.
- Post Nudge: 36% fewer crashes



Okanagan Hwy

Monte Lake, British Columbia

Google

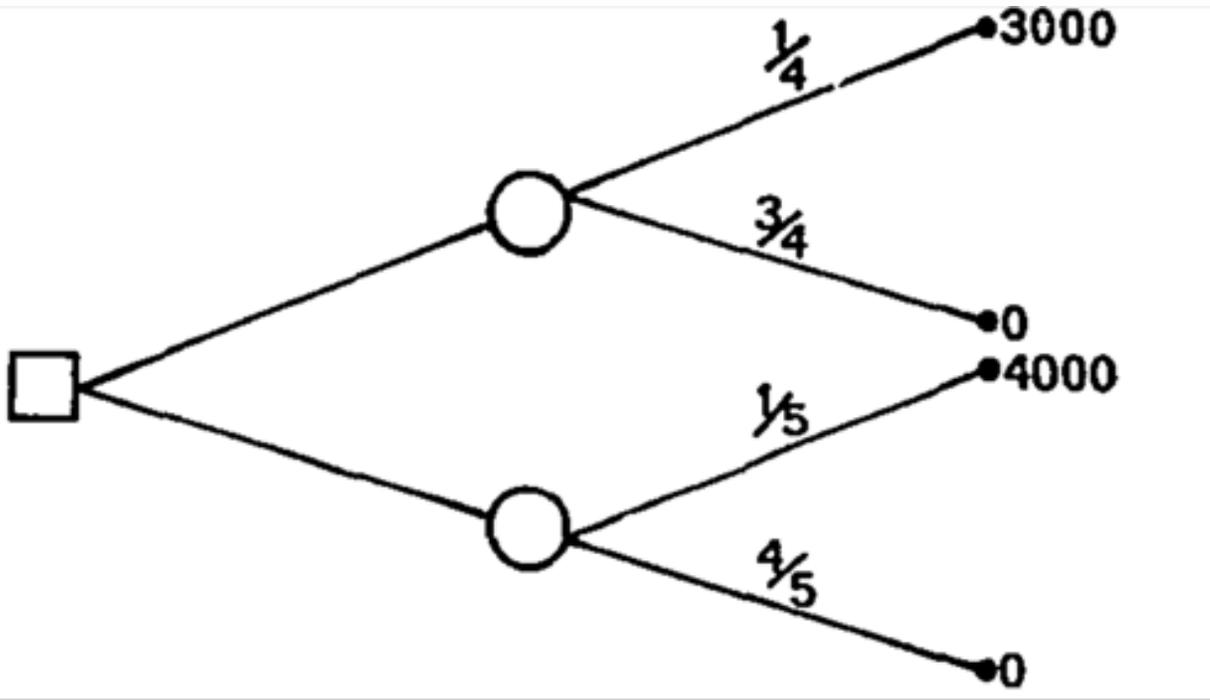
Street View - Aug 2018

Okanagan Hwy

Google

Image capture: Aug 2018 © 2018 Google

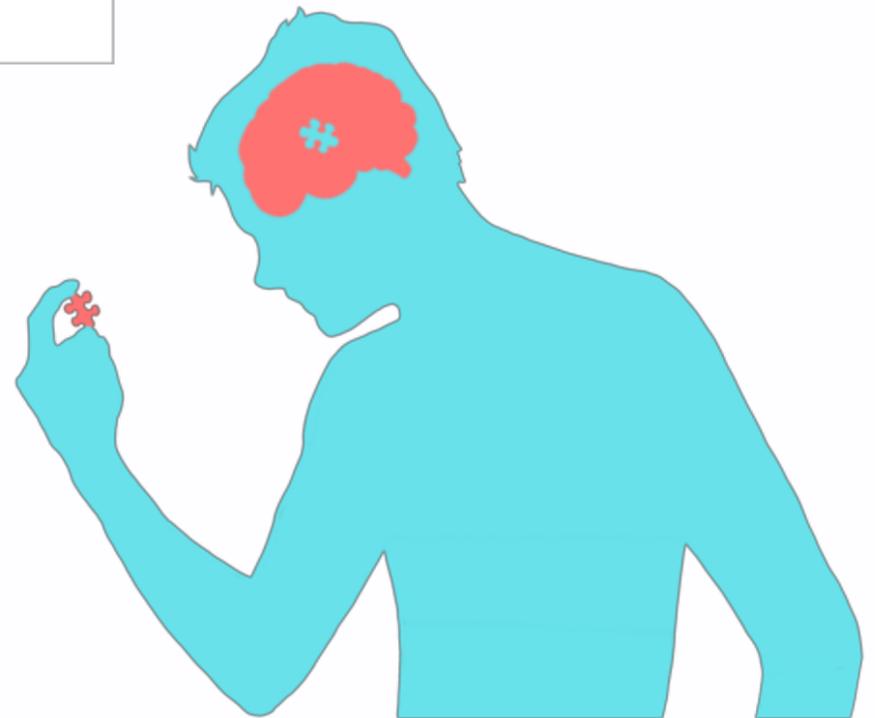




PROBLEM 4:

C: (4,000,.20), or D: (3,000,.25)

$N = 95$ [65]* [35]



Choose
Between

X% Chance of Gain

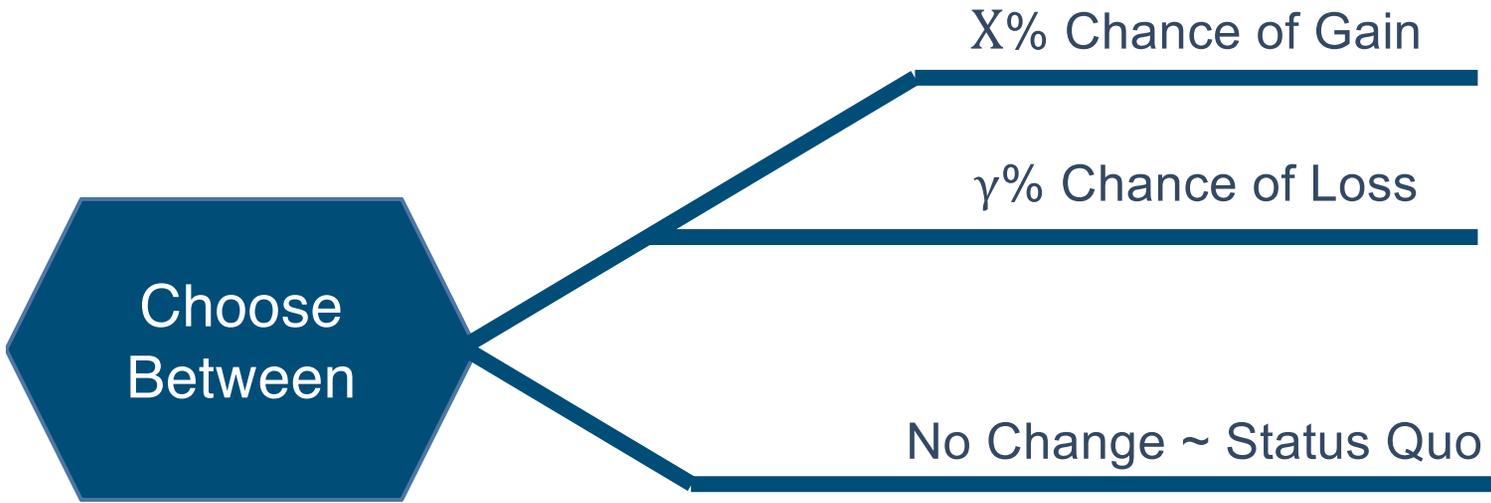


Choose
Between

X% Chance of Gain

γ % Chance of Loss





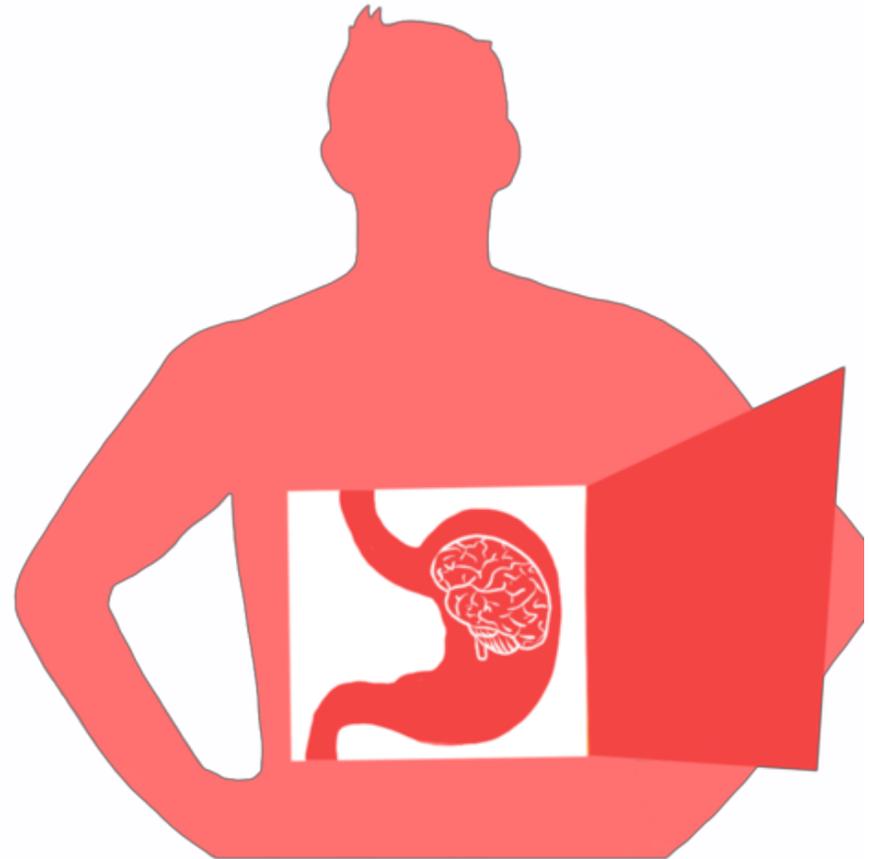
Economic theory and “rational man”

Always choose the “best” option

No subjective value



System 1 - Shortcuts



AVAILABLE NOW

Tversky and Kahneman, 1973

AVAILABLE NOW



Tversky and Kahneman, 1973



Vivid + Impactful = Memorable

Easy Recall = Higher Assumed Probability

Higher Assumed Probability = More Care & Attention

Problems with Probabilities

Consider the following choice:

- a) 0.001 probability to win \$5,000
- b) \$5 for sure



Problems with Probabilities

Consider the following choice:

- a) 0.001 probability to win \$5,000
(72%)
- b) \$5 for sure (28%)



N=72

Kahneman and Tversky, 1979

Problems with Probabilities

Consider the following choice:

- a) 0.001 probability to lose \$5,000
- b) lose \$5 for sure



Problems with Probabilities

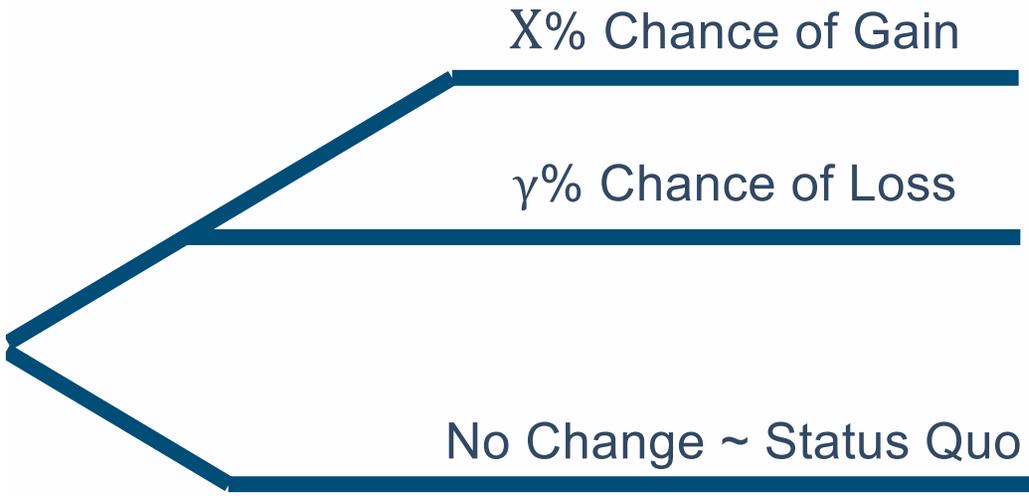
Consider the following choice:

- a) 0.001 probability to lose \$5,000
(17%)
- b) lose \$5 for sure (83%)

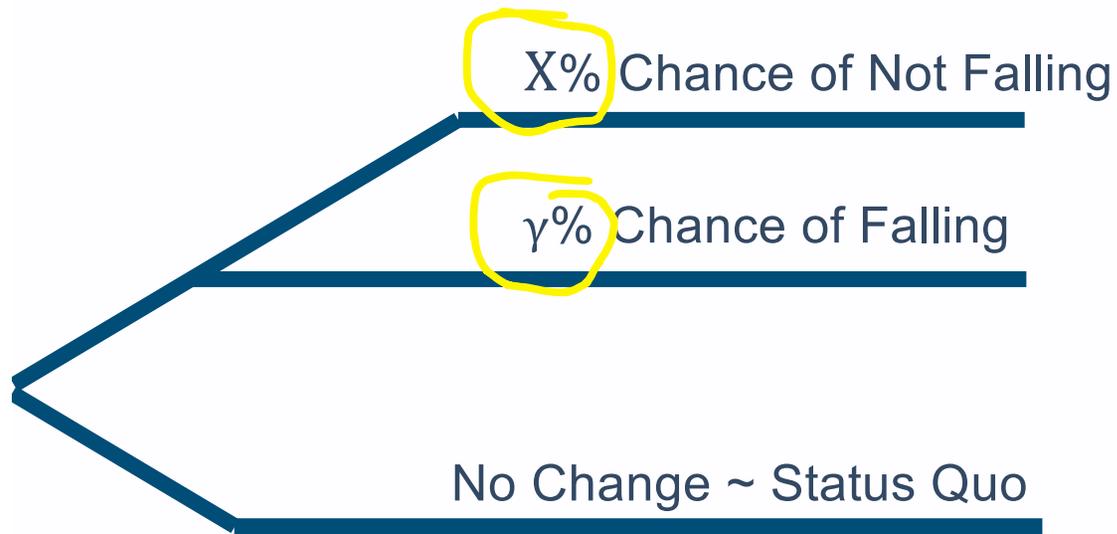


N=72

Kahneman and Tversky, 1979



Kahneman and Tversky, 1979

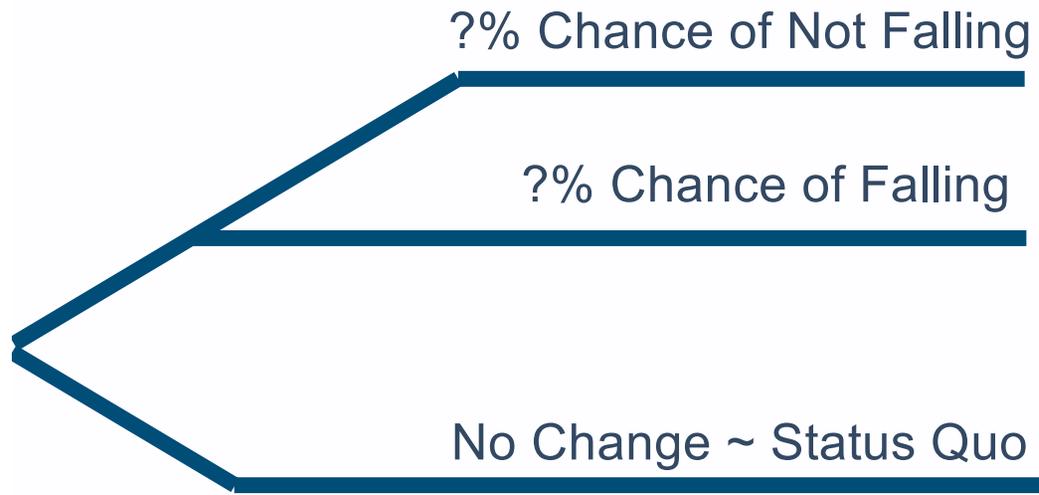


Probabilities are “weighted”

Weights are subjective

Probabilities in safety are rarely stated





- 1** Assign Probabilities
- 2** Probabilities are Weighted
- 3** Values Assessed

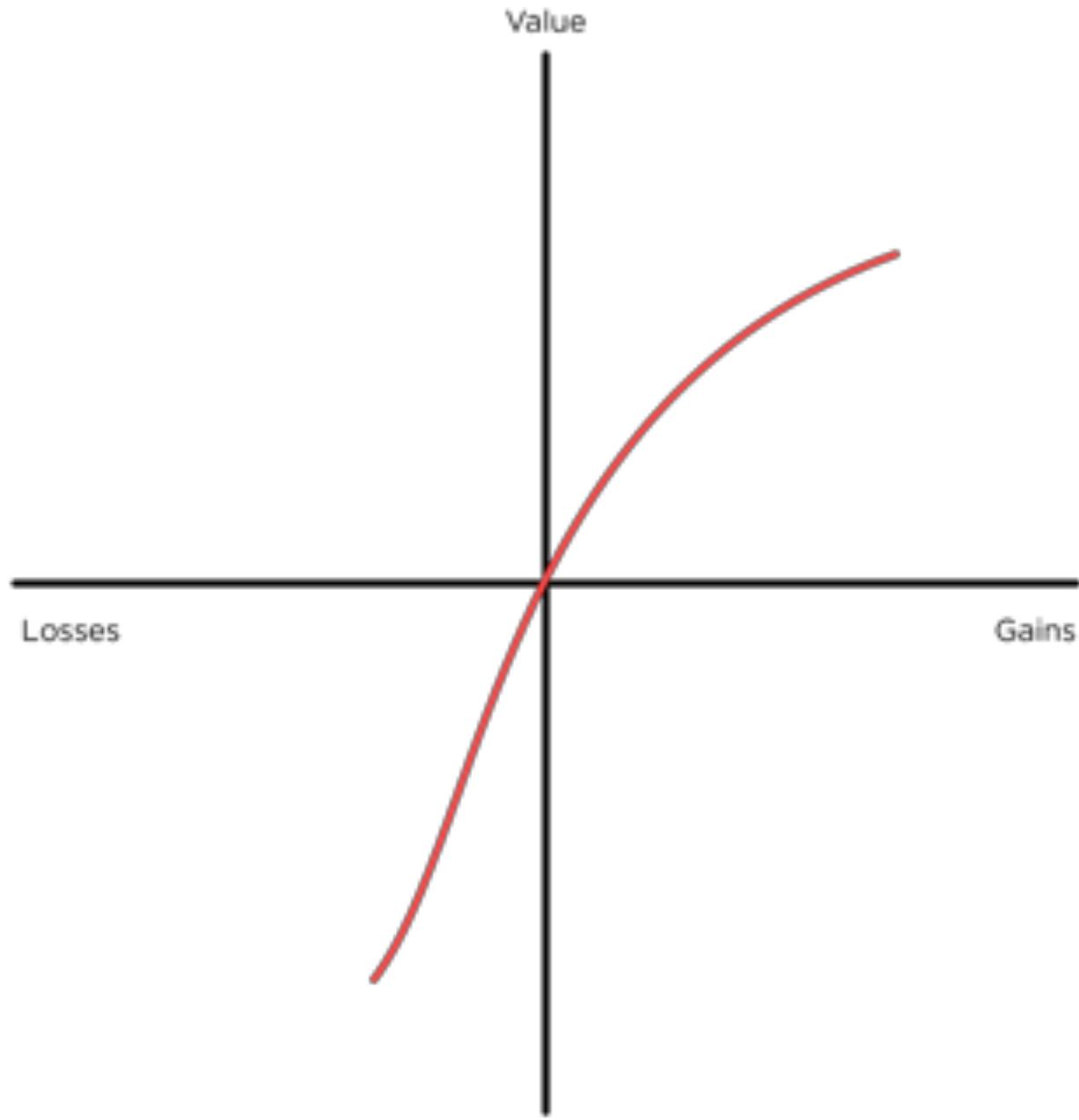


“Small feedback-based decisions” (Feedback \equiv Experience)

Underweight rare outcomes in experienced based decisions

Safety devices underutilized, despite irrationality of that (Grindle, et al. 2000)





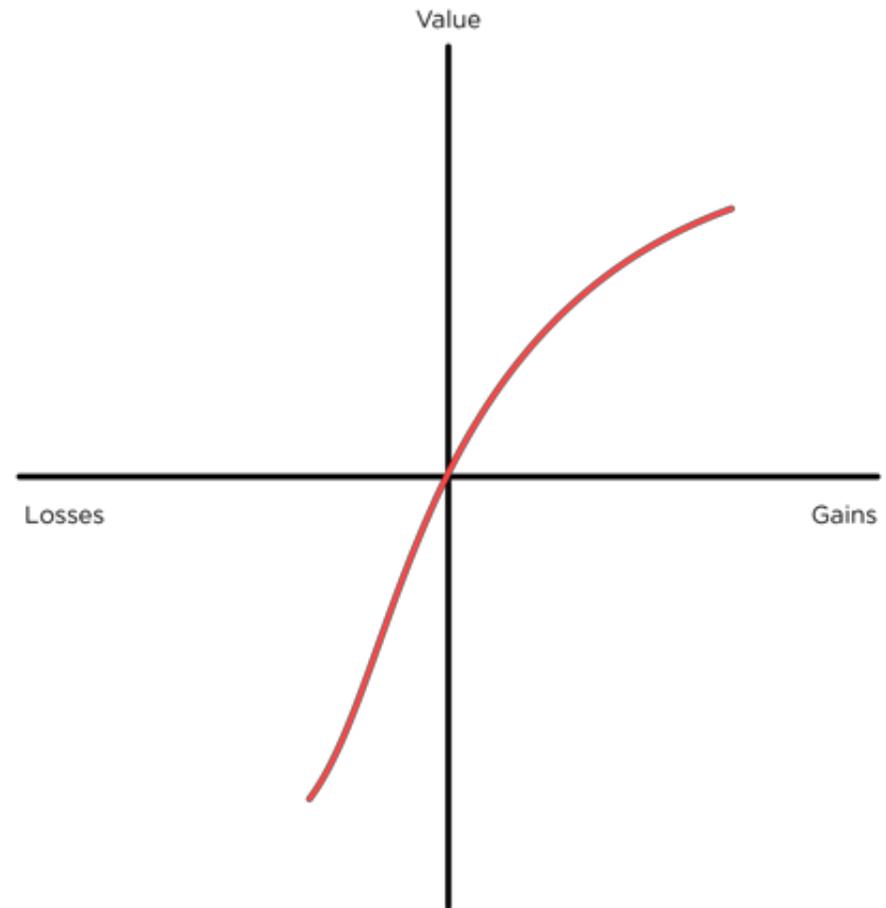
Kahneman and Tversky, 1979

Loss Aversion

Consider the following choice:

a) 80% chance to win \$4,000

b) \$3,000 for sure



N=95

Kahneman and Tversky, 1979

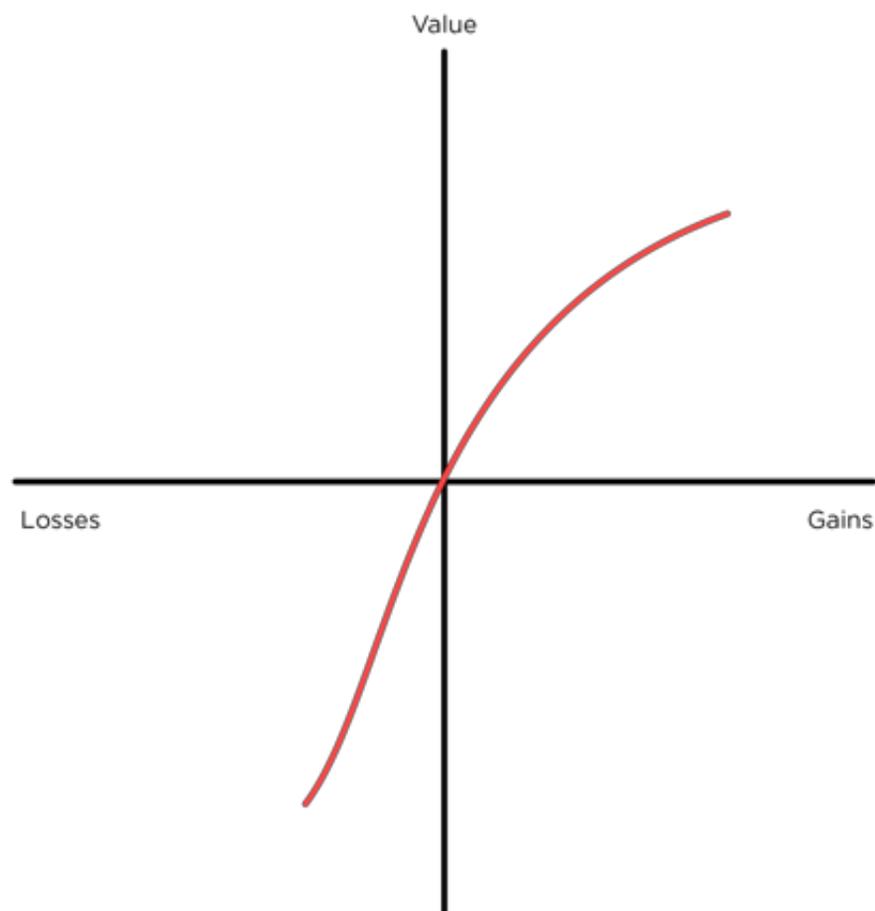
Loss Aversion

Consider the following choice:

a) 80% chance to win \$4,000 (20%)

b) \$3,000 for sure (80%)

Risk AVERSE



N=95

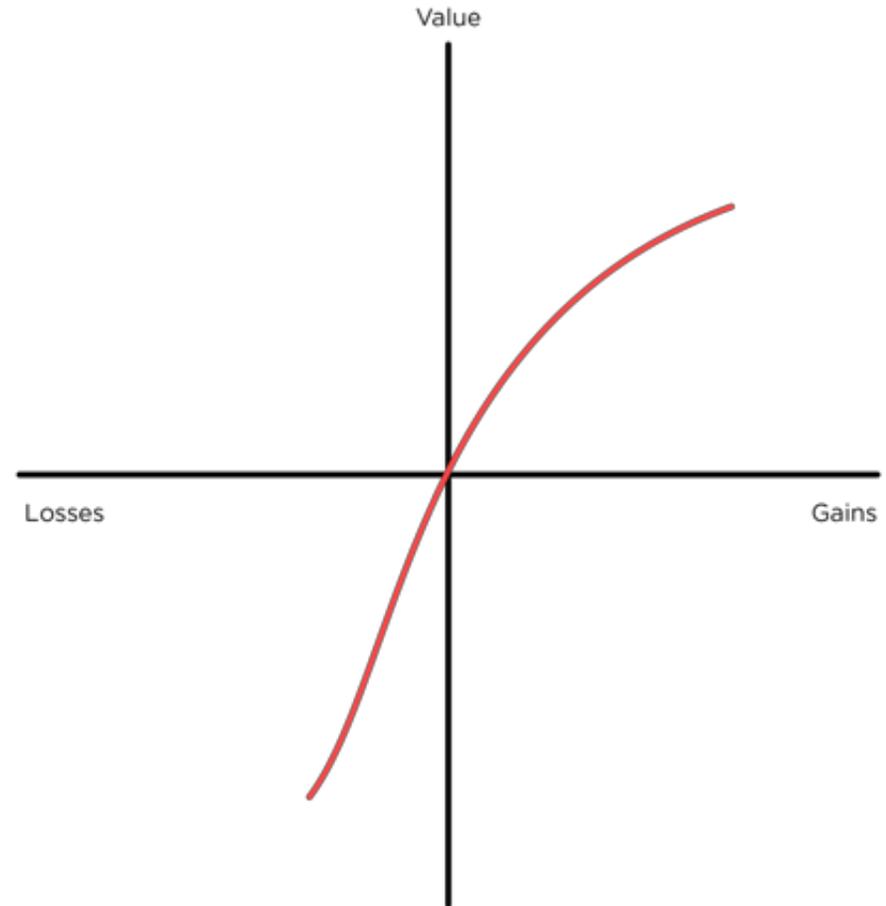
Kahneman and Tversky, 1979

Loss Aversion

Consider the following choice:

a) 80% chance to lose \$4,000

b) Lose \$3,000 for sure



N=95

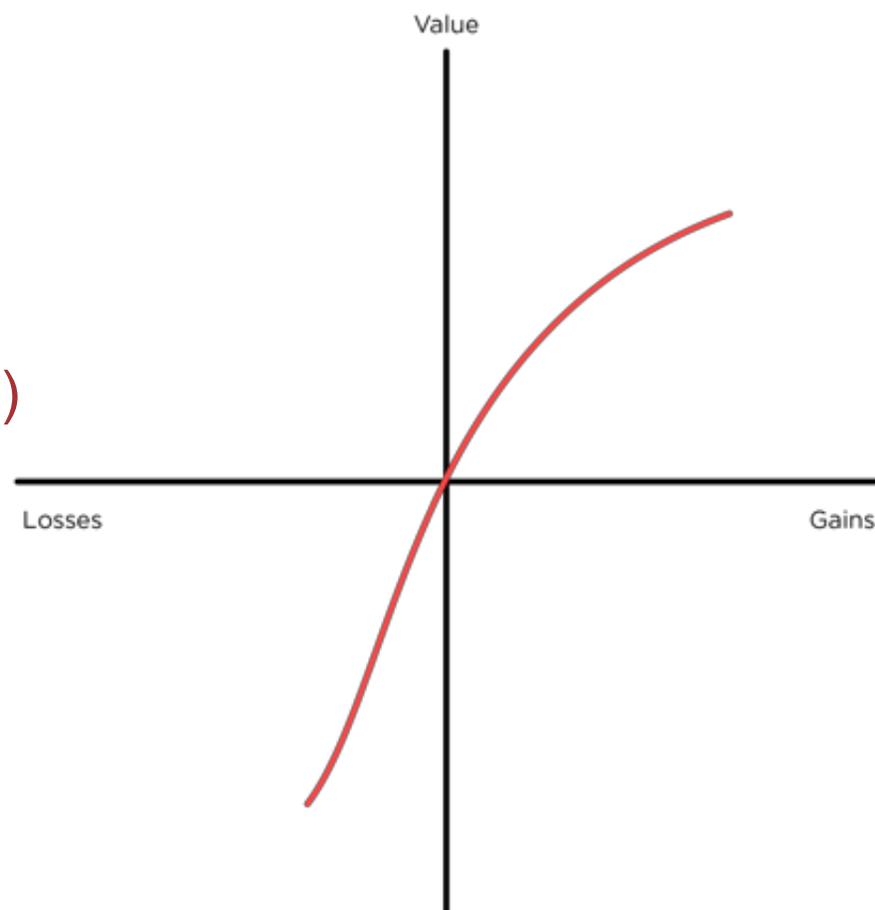
Kahneman and Tversky, 1979

Loss Aversion

Consider the following choice:

a) 80% chance to lose \$4,000 (92%)

b) Lose \$3,000 for sure (8%)



Risk SEEKING

N=95

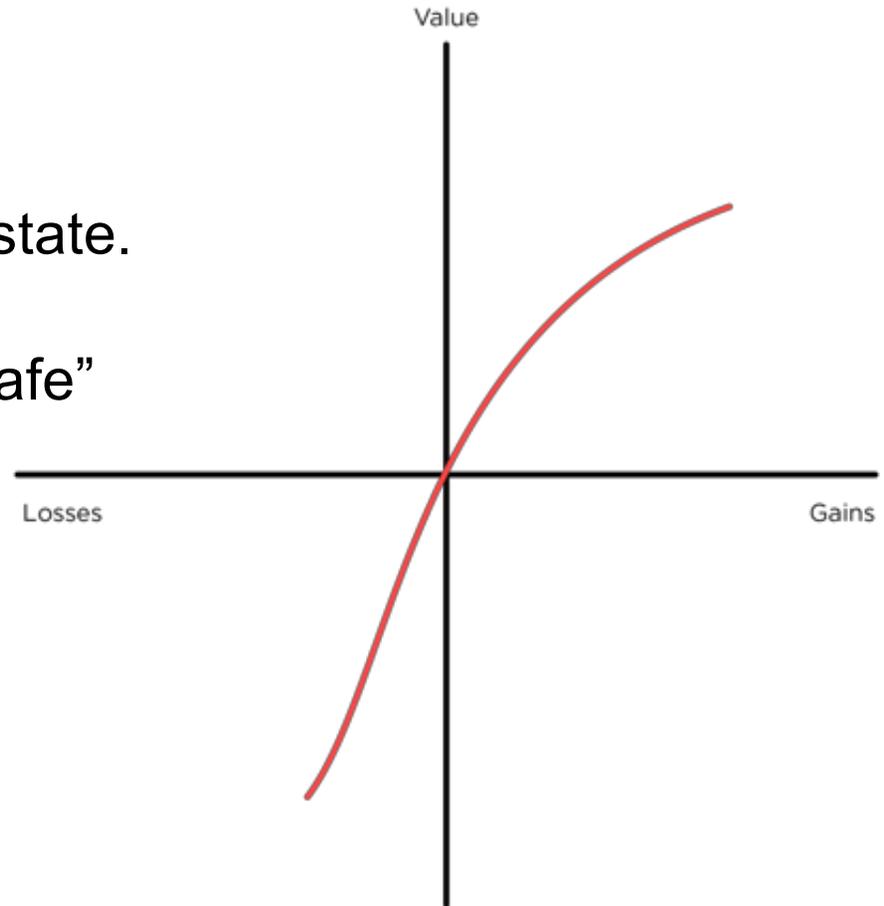
Kahneman and Tversky, 1979

Loss Aversion

The **change** matters, **not** the end state.

Additional costs associated with “safe” decision are sure losses.

Needs to reframe those “losses” to neutral, or eliminate from decision.



GAINS

LOSSES

High
Probability

RISK
AVERSE
Fear of disappointment

RISK
SEEKING
Hope to avoid loss

Low
Probability

RISK
SEEKING
Hope of large gain

RISK
AVERSE
Fear of large loss

600 Walking Dead

There has been an outbreak of a deadly disease, affecting 600 people. Choose one of the following treatment options:

If Program A is adopted, 200 people will be saved.

If Program B is adopted, there is a $\frac{1}{3}$ chance that 600 people will be saved and a $\frac{2}{3}$ chance that no people will be saved.



N=152

Tversky & Kahneman, 1981

600 Walking Dead

There has been an outbreak of a deadly disease, affecting 600 people. Choose one of the following treatment options:

If Program A is adopted, 200 people will be saved. **72%**

If Program B is adopted, there is a $\frac{1}{3}$ chance that 600 people will be saved and a $\frac{2}{3}$ chance that no people will be saved. **28%**



N=152

Tversky & Kahneman, 1981

600 Walking Dead

There has been an outbreak of a deadly disease, affecting 600 people. Choose one of the following treatment options:

If Program C is adopted, 400 people will die.

If Program D is adopted, there is a $\frac{1}{3}$ chance that nobody will die and a $\frac{2}{3}$ chance that 600 people will die.



N=152

Tversky & Kahneman, 1981

600 Walking Dead

There has been an outbreak of a deadly disease, affecting 600 people. Choose one of the following treatment options:

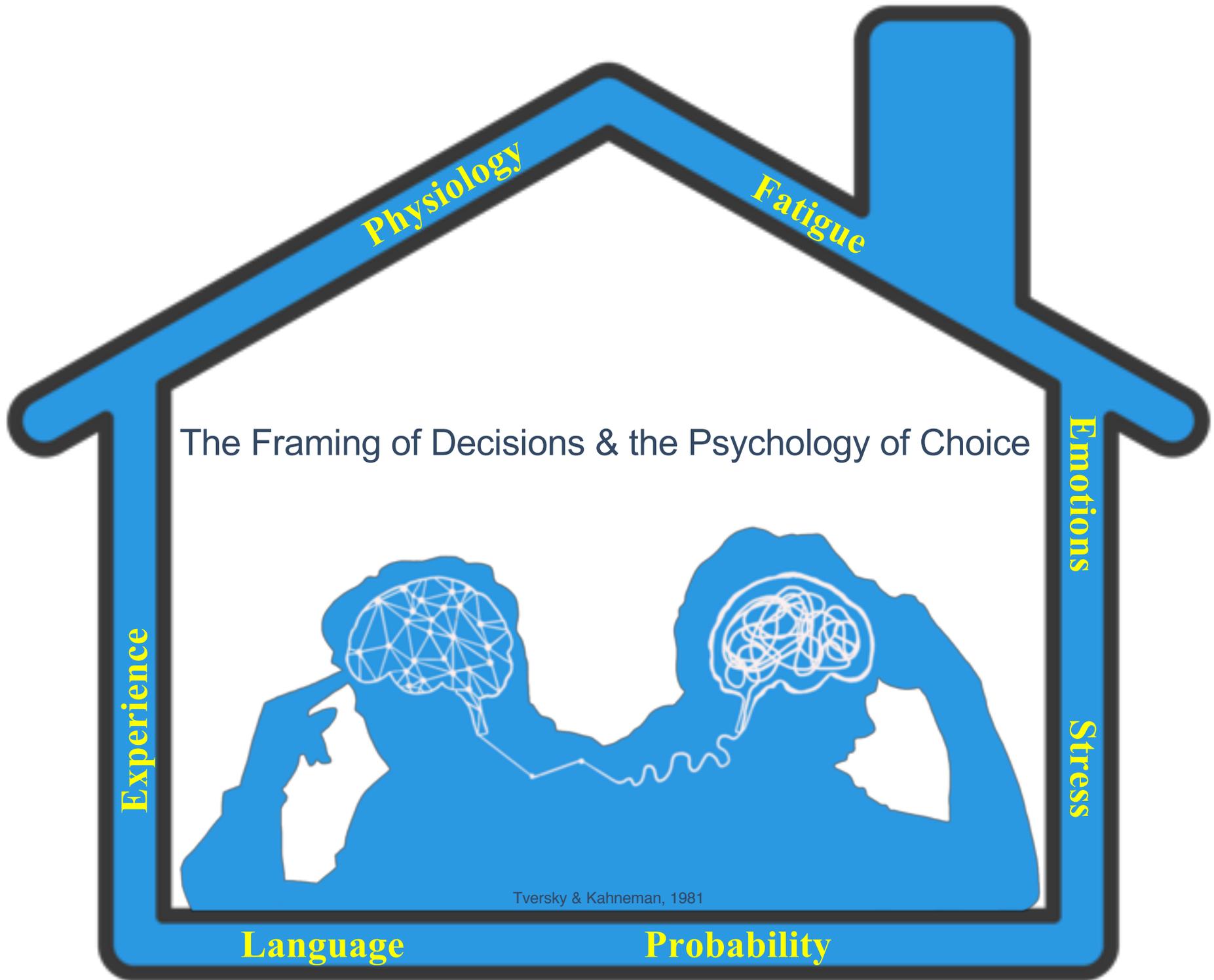
If Program C is adopted, 400 people will die. **22%**

If Program D is adopted, there is a $\frac{1}{3}$ chance that nobody will die and a $\frac{2}{3}$ chance that 600 people will die. **78%**

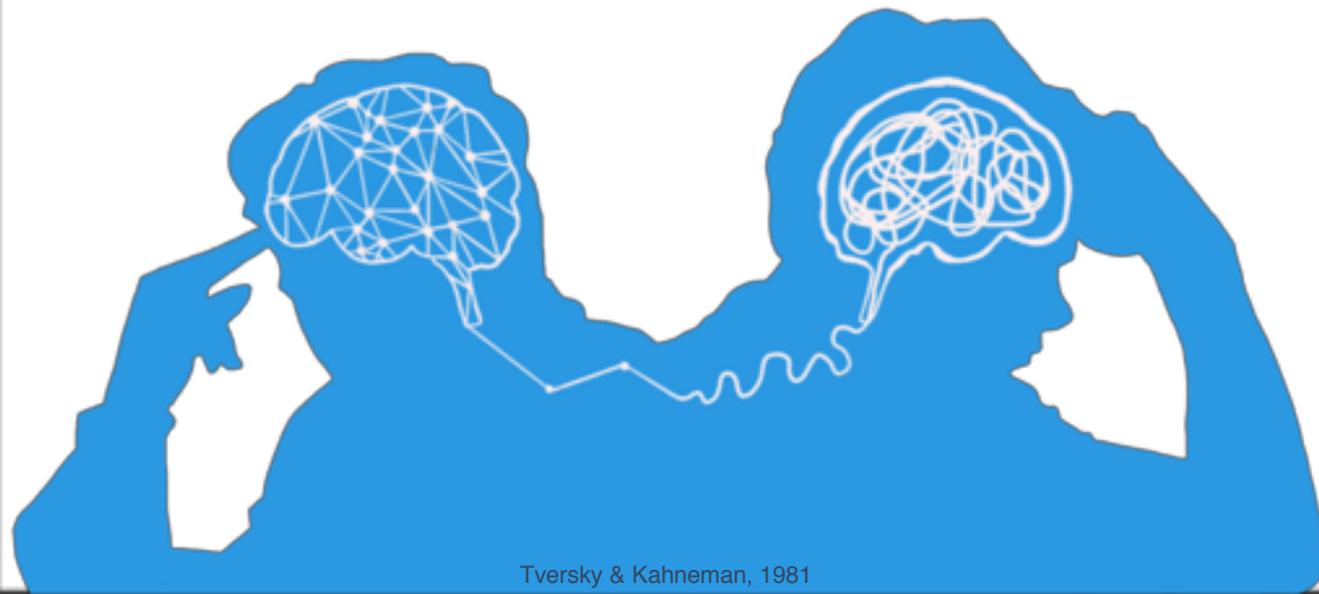


N=152

Tversky & Kahneman, 1981



The Framing of Decisions & the Psychology of Choice

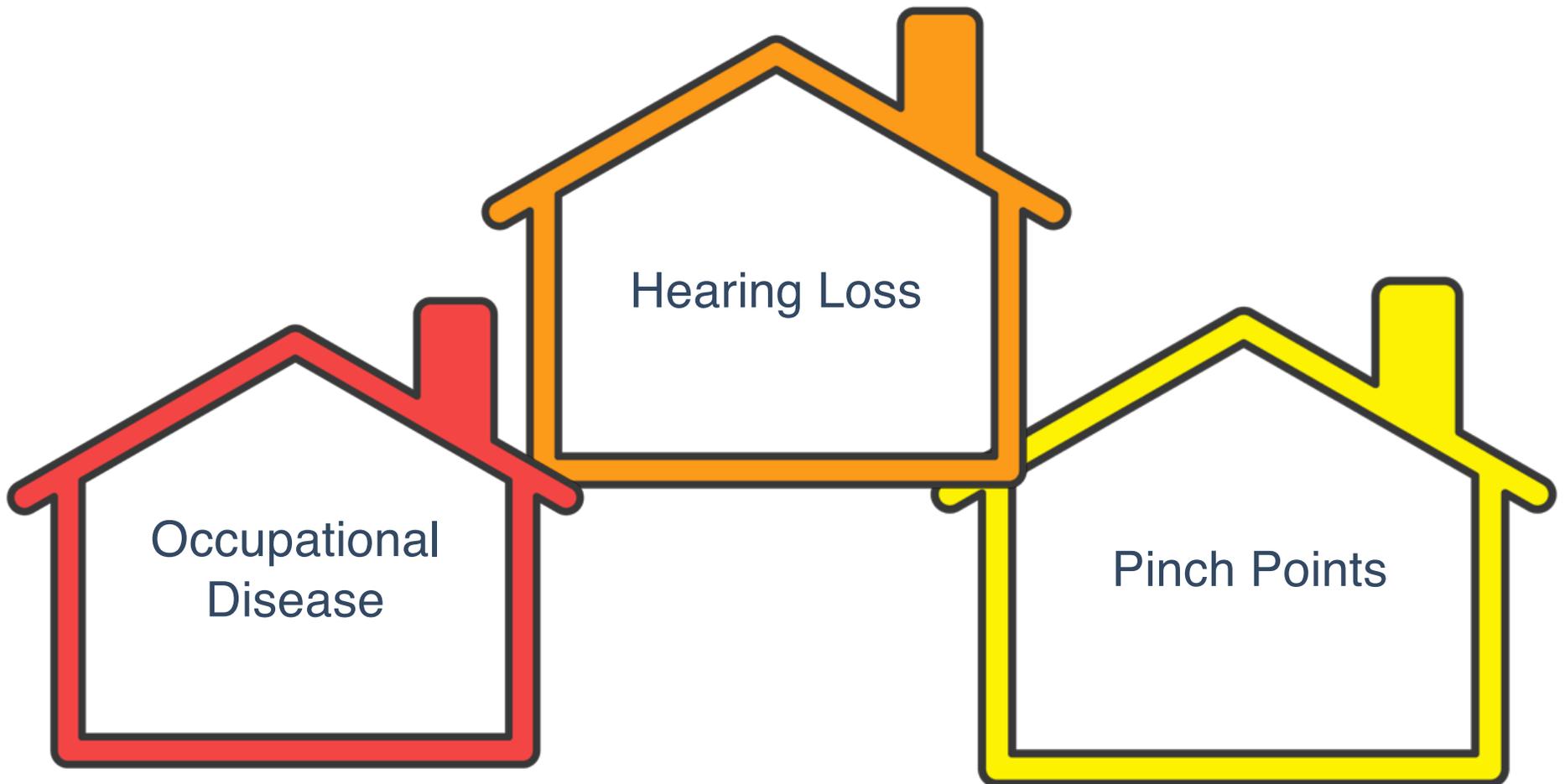


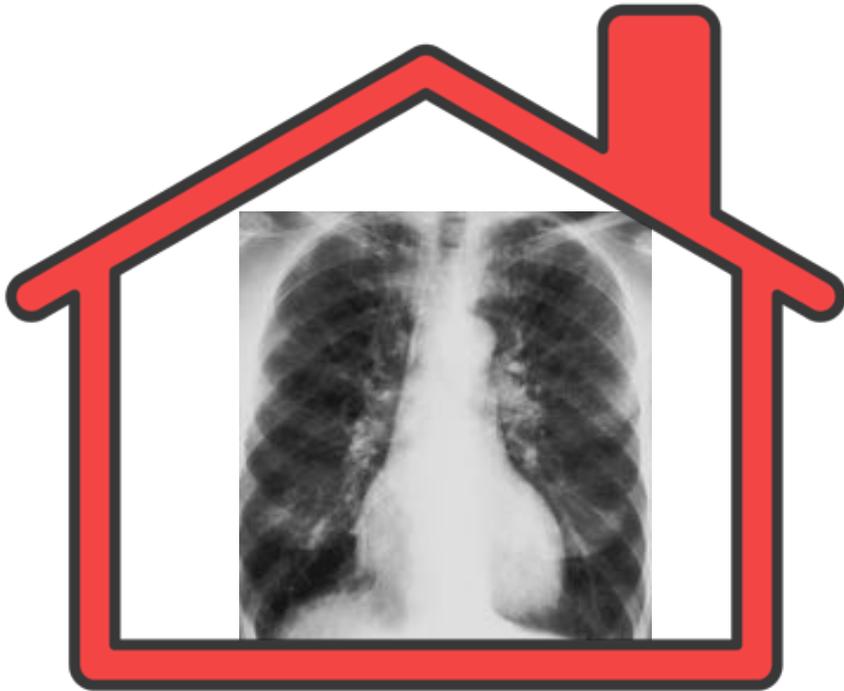
Tversky & Kahneman, 1981

Language

Probability

How do you frame consequences?

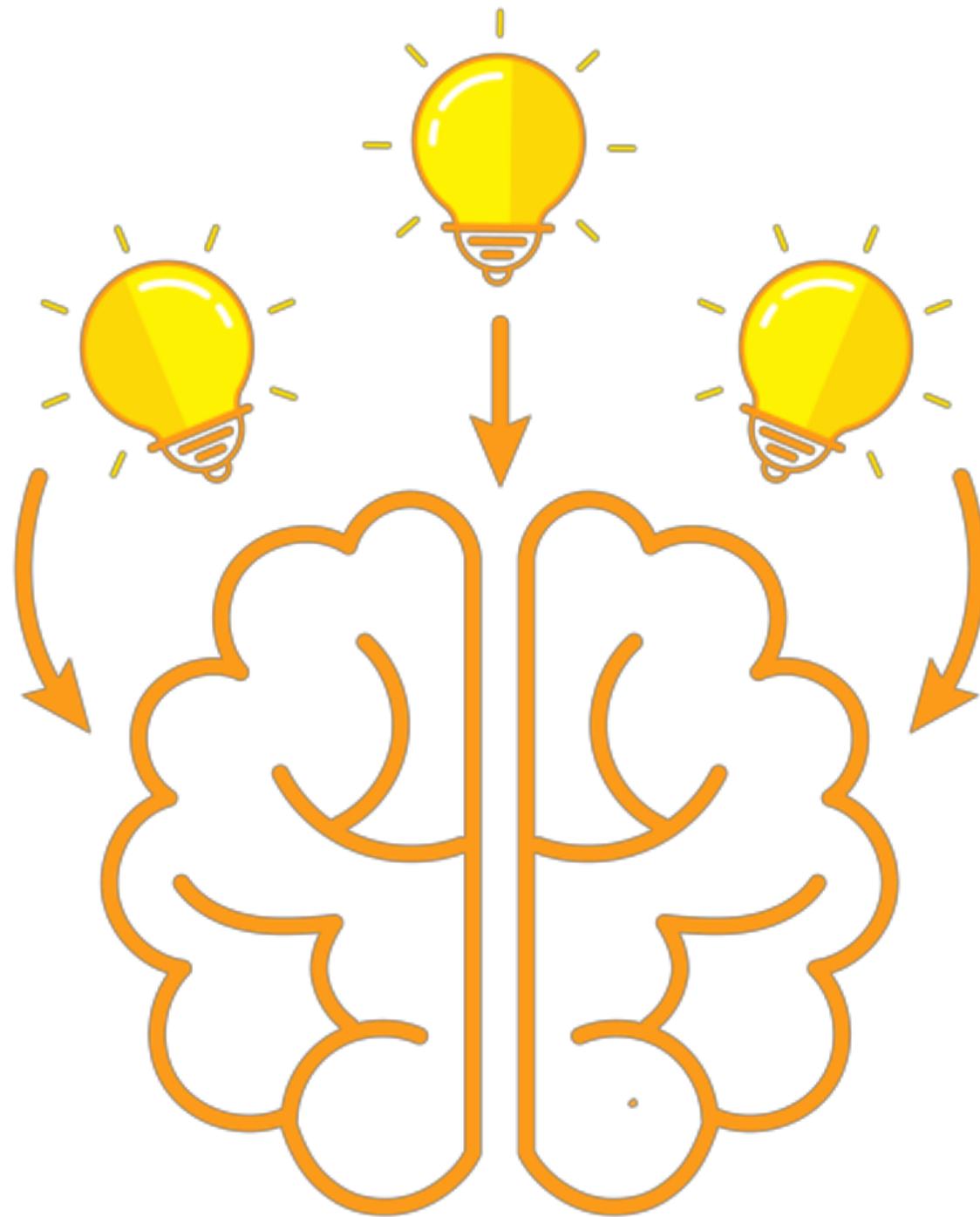




Sign here?

ROUTINE MAINTENANCE SAFE WORK PERMIT [REDACTED] (See Condition of Use on Reverse)			
Date:	Site No:	Completed By:	
W/O No:	Prime Contractor:		
Description of Planned Work:			
<small>Note: Record any significant unusual or unexpected events or issues.</small>			
Subcontractor(s):			
SECTION A: HAZARD IDENTIFICATION AND CONTROL			
Where the following <u>elevated risk site hazards</u> exist, the JSA on the reverse must be completed:			
<input type="checkbox"/> Overhead Power Lines	<input type="checkbox"/> Traffic	<input type="checkbox"/> Hazardous Material (Fuel, Asbestos, Toxic Chemical, Freon, etc.)	<input type="checkbox"/> Inclement Weather (specify):
<input type="checkbox"/> Potential Energy (Fluid or Gas under Pressure, Electricity)	<input type="checkbox"/> Slip/Trip	<input type="checkbox"/> Other (specify):	
Where the following <u>elevated risk work hazards</u> exist, the JSA on the reverse must be completed:			
<input type="checkbox"/> Mobile Heavy Equipment Activity (Boom Truck, Scissor Lift)	<input type="checkbox"/> Welding, Cutting, Grinding in non-hazardous atmosphere	<input type="checkbox"/> Excavation less than 0.5m	<input type="checkbox"/> Fuel Pressure/Vacuum Testing
<input type="checkbox"/> Coordination Interdependency (Overlapping Trades)	<input type="checkbox"/> Other (specify):		
Where the following <u>high risk work hazards</u> exist, the applicable critical task checklist or procedure must be completed and incorporated into the JSA on the reverse:			
<input type="checkbox"/> Work at Height above 1.5m	<input type="checkbox"/> Confined Space Entry (STP Sump, Car Wash Sump, etc.)	<input type="checkbox"/> Lock Out/Tag Out Equipment Isolation Required	<input type="checkbox"/> Use of Vacuum Truck
<input type="checkbox"/> Cutting, Grinding in hazardous atmosphere	<input type="checkbox"/> Critical Controls affected (Leak Detection, Video Loss, etc.)	<input type="checkbox"/> Heavy Equipment Lifting (i.e., with Crane or Boom Truck)	<input type="checkbox"/> Other (specify):
SECTION B: CONFIRMATION OF BASIC REQUIREMENTS			
<input type="checkbox"/> Work will be conducted in accordance with applicable OHS regulations and Prime Contractor's Safety Policy.			
<input type="checkbox"/> WHMIS Requirements are met, if applicable.			
<input type="checkbox"/> Appropriate Personal Protective Equipment will be used by Workers and Visitors in Work Area.			
<input type="checkbox"/> Certified appropriate Fire Extinguisher(s) are available in Work Area, if applicable.			
<input type="checkbox"/> Tools and Equipment to be used are appropriate and in good working Condition.			
<input type="checkbox"/> All workers are adequately trained for their Tasks.			
Tools/Equipment to be used that are Relevant to Safety (Ladder, Barricades, Tripod, Harness, Portable Gas Monitor, etc.):			
Additional PPE Requirements, if Any (at Minimum: Safety Boots/Hard Hat/Vest/Safety Glasses/Gloves Fit for Use):			
<input type="checkbox"/> Other Eye Protection (specify):	<input type="checkbox"/> Hearing Protection	<input type="checkbox"/> Other (specify):	<input type="checkbox"/> Fall Protection
		<input type="checkbox"/> Breathing Apparatus/Dust Mask	
SECTION C: LAST MINUTE RISK ASSESSMENT (LMRA) TESTING RESULTS (Periodic)			
Supervisor Company Name	Craft or Trade	Test Results (No. out of 4)	Supervisor Signature
<small>***Four criteria for testing LMRA quality: understands task, risk identification, adequate risk mitigation and attitude</small>			
SECTION D: ACKNOWLEDGEMENTS OF PLANNED WORK			
Name:		Signature:	
Responsible Tech 1	Person completing This Permit (Named Above)	_____	_____
Responsible Tech 2	_____	_____	_____
Responsible Tech 3	_____	_____	_____
RETAILER/SALES ASSOCIATE:			
_____	_____	_____	_____
<small>Signature</small>	<small>Work Start Time</small>	<small>Signature</small>	<small>Finish Time</small>
<small>NOTE: The Retailer/SA Assumes No Liability for the Health and Safety of the Workers.</small>			

Or here?

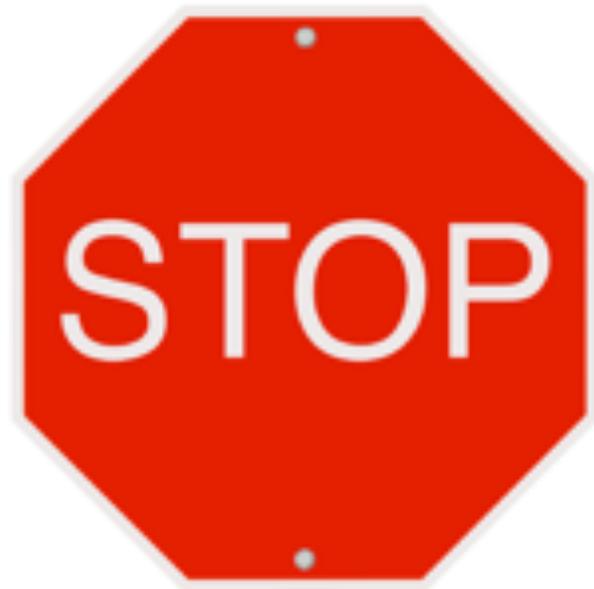


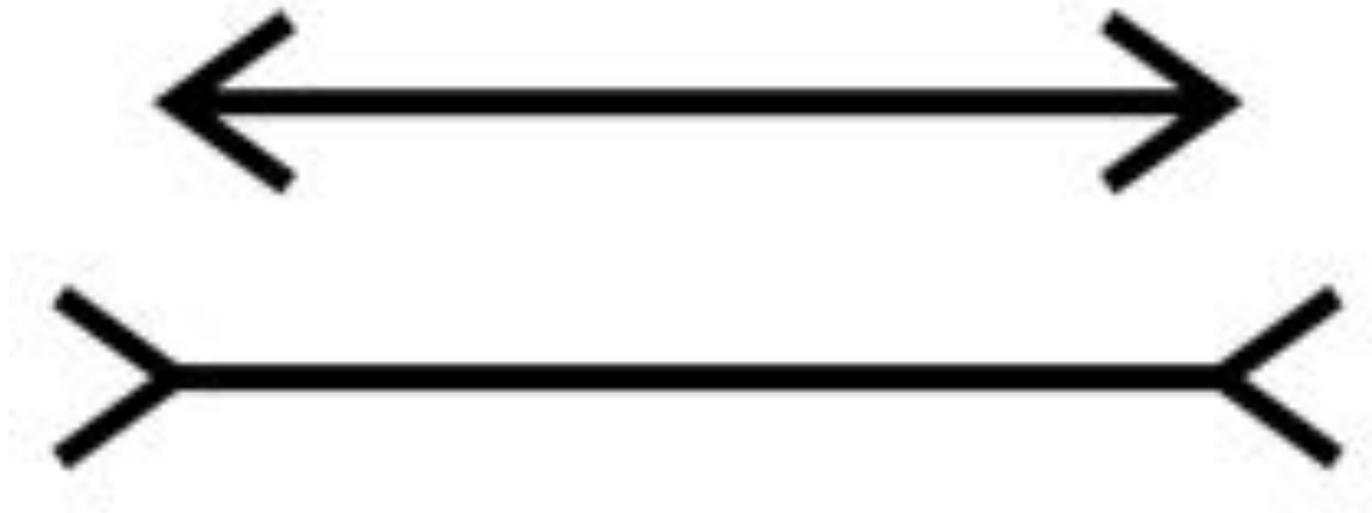
System one is the gut; the unconscious mind. The key thing about system one is that it works fast. It is what leaps in and pulls your hand away from a hot stove and makes you recoil from a snake. System one is fast, but at a cost: bias and shortcuts, called heuristics. System two is deliberative, but it takes a lot of effort. And we don't like effort. We default to minimal effort. Faced with a snake, we don't want to think; we want to move. System one is good at that. But when we are planning a critical task we want system two. *This is the worst slide in the entire presentation.* We don't want to stop thinking when it gets hard. That's where we need to engage workers in using system two instead of system one. One of the best ways to do that is to avoid allowing system one to engage or slipping something in to pull system two back into the decision making process. **Introduce. Cognitive. Disfluency.**



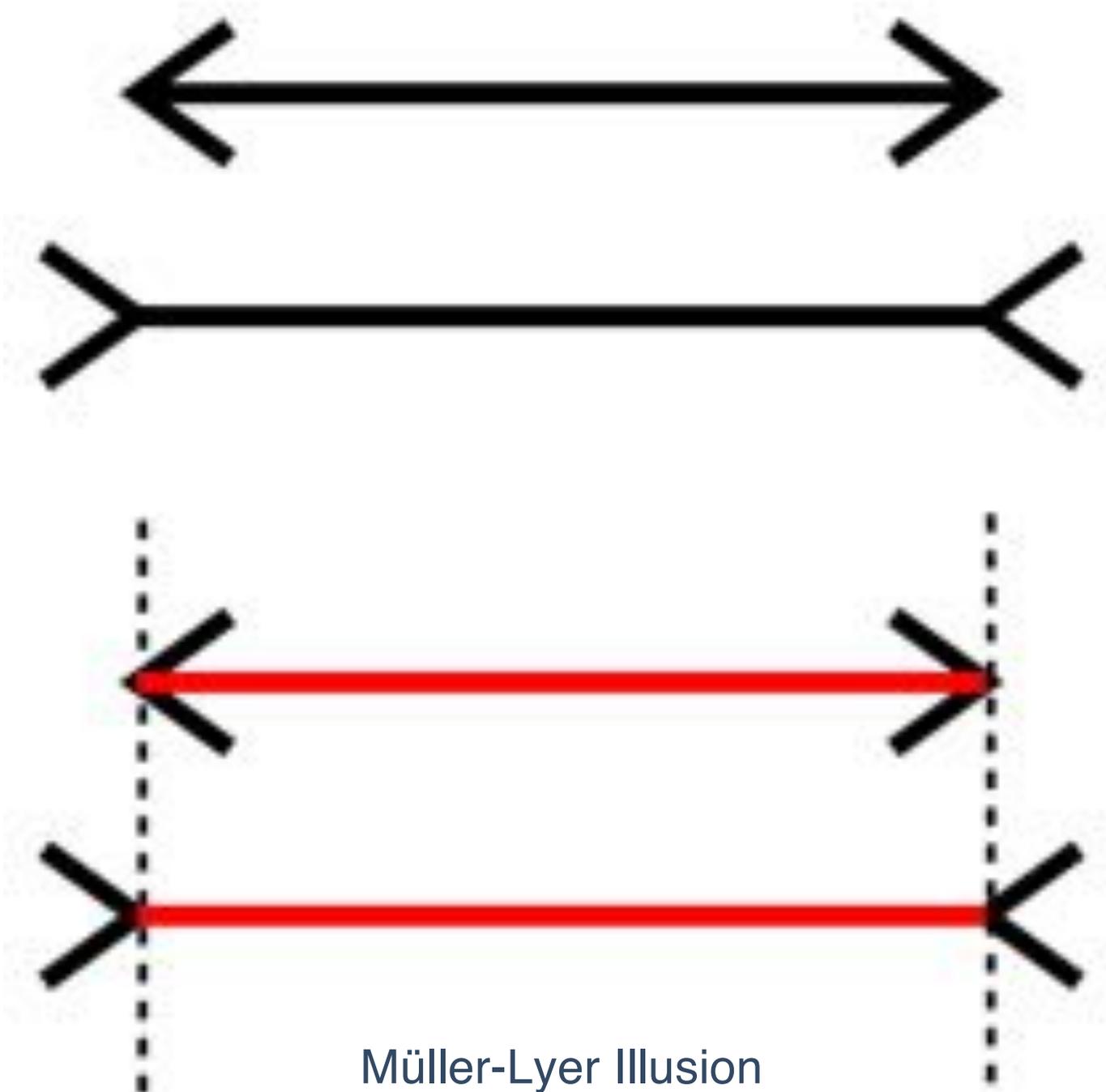
STOP



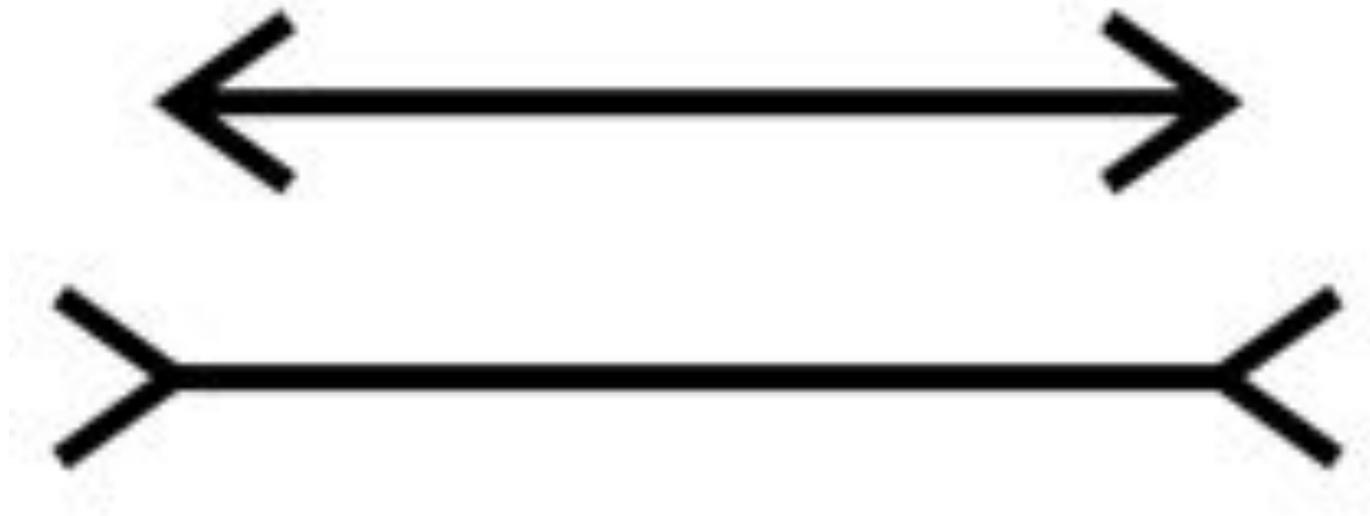




Müller-Lyer Illusion



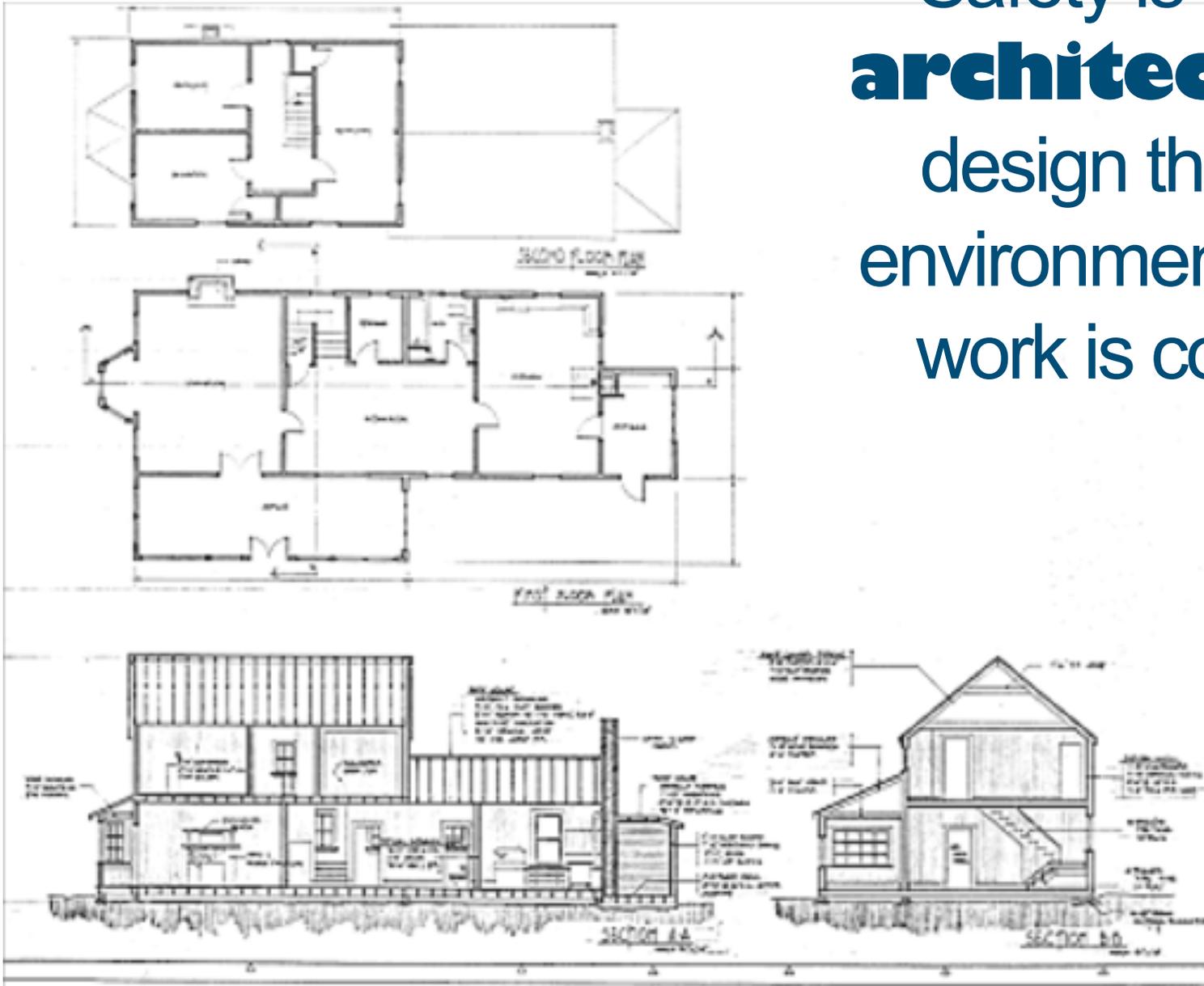
Müller-Lyer Illusion



Knowledge doesn't free us from bias – it gives us the ability to control for it

Müller-Lyer Illusion

Safety is cognitive **architecture**; we design the mental environment in which work is completed



FOR REFERENCES OR QUESTIONS – SEND ME A NOTE!

Ryan.Campbell@WhiteSwanSafety.com

