



Think Again

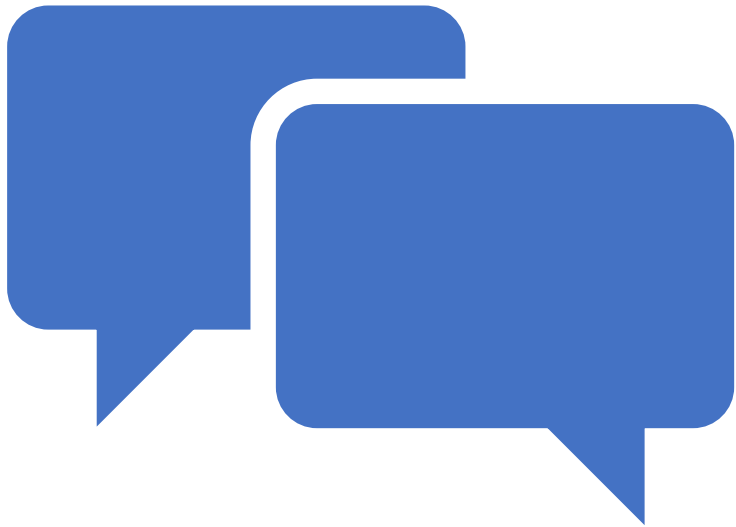
Fall Term 2021

Class 10

Email and Website

mattepstein7@gmail.com

<http://olli-think-again.weebly.com>



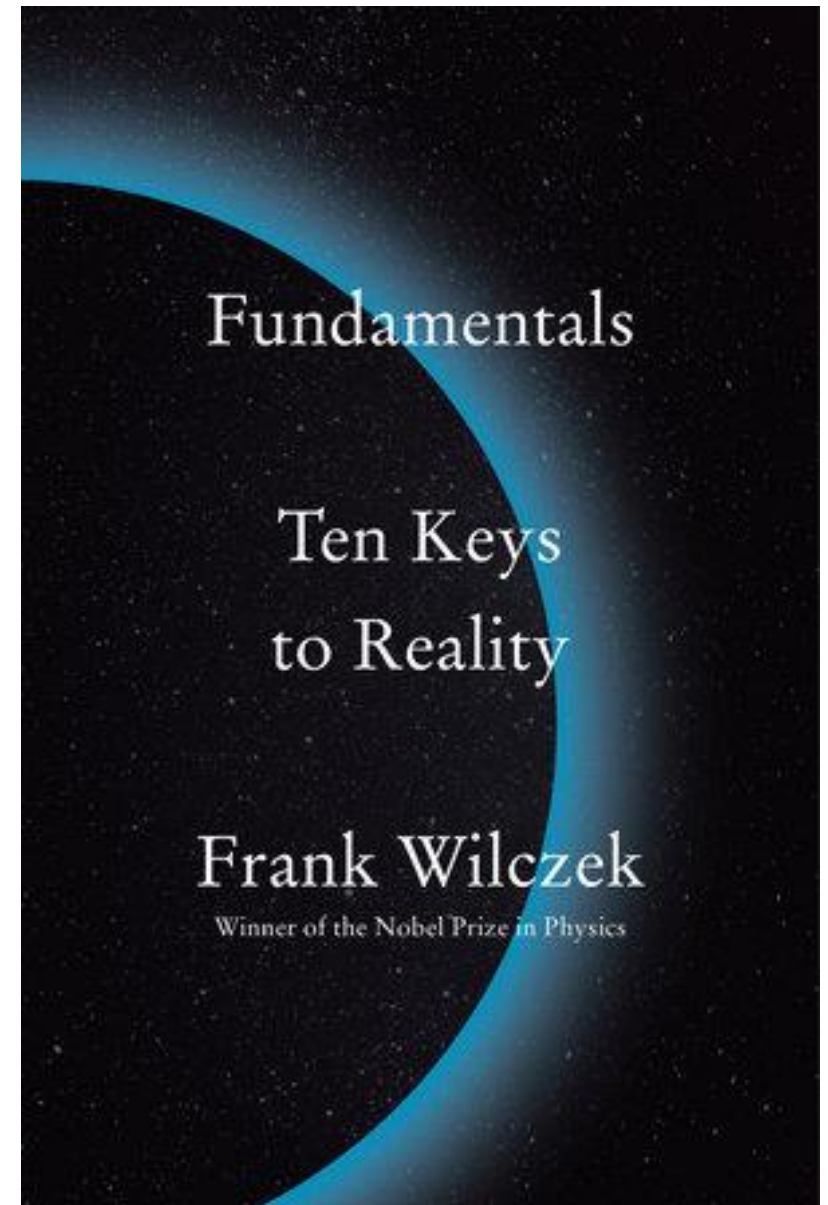
On Tap for Today

- Review
- Other Senses
- Inattention Blindness
- Choice Blindness
- Politics and the Brain
- Creating the Narrative

Review

- What we perceive is loosely related to reality at best.
- The brain has learned through evolution how best to use its limited resources.
- The brain doesn't do emotions. It prepares our bodies to effectively deal with physical needs. We attach emotional labels.
- We have the choice between being controlled and being in control.

- Detailed study of matter reveals that our body and our brain – the physical platform of our “self” – is, against all intuition, built from the same stuff as “non-self,” and appears to be continuous with it.
- Psychophysics reveals that consciousness does not direct most actions, but instead processes reports of them, from unconscious units that do the work.



Stroop Effect

- Research by J. Ridley Stroop for Doctoral Thesis in 1935 [Study](#)
- Words are more easily processed than color identification.
- If name of color is written in same colored ink, easy to identify quickly.
- If color of ink is different than name of color, difficult to identify color correctly.



Human Senses

+
○ •

+
• ○

We Have Five Senses Or Maybe Six, or Seven, or Eight

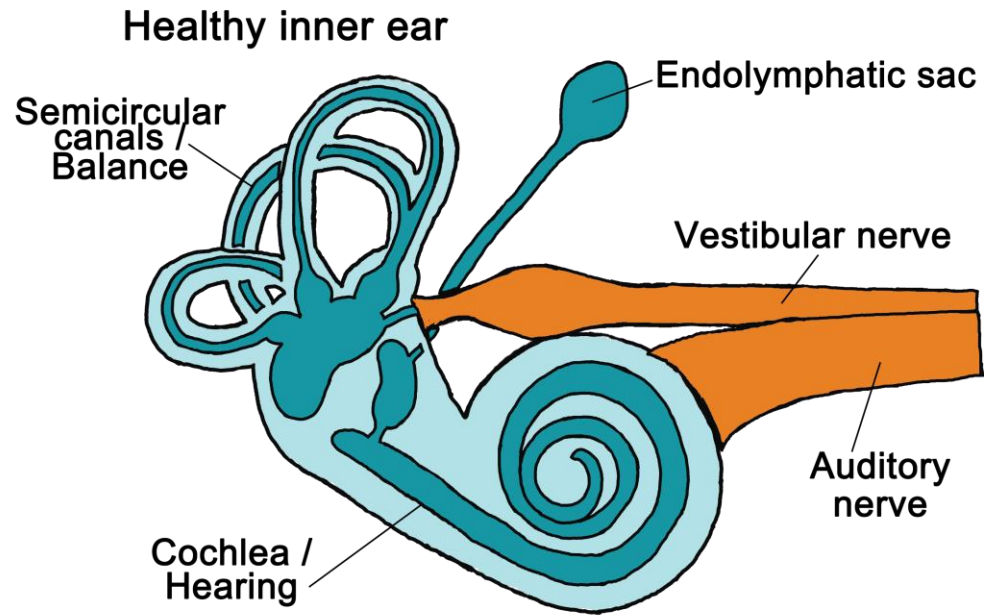
- We normally think in terms of the 5 basic senses:
 - Sight
 - Smell
 - Touch
 - Hearing
 - Taste
- While scientists disagree on how many additional senses we have, most include the following
 - Vestibular
 - Proprioceptive
 - Interoceptive



The Vestibular System

- Contributes to balance and orientation in space.
- Leading system informing us about movement and position of head relative to gravity.
- Movements include rotations and linear directionality.
- Rotation is detected by the semicircular canal system in the inner ear.
- Linear direction, acceleration, and deceleration are detected by small calcium carbonate crystals called otoliths, also in the inner ear.

Semicircular Canals



Otoliths

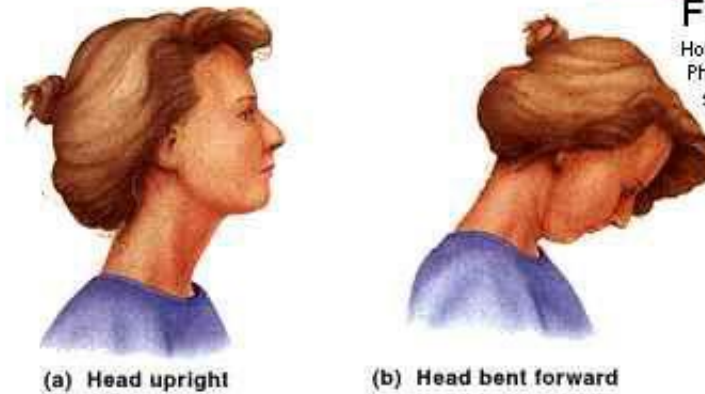
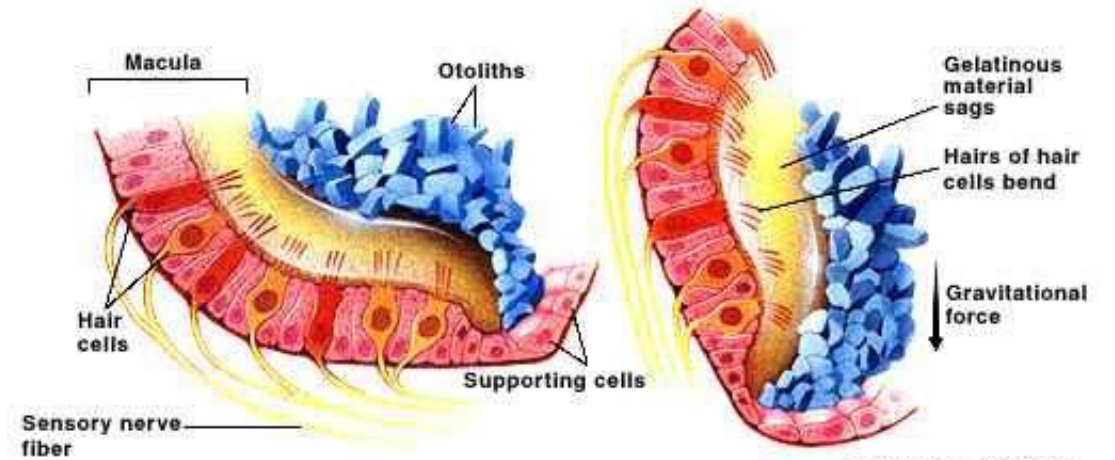



Figure 12.20
Hole's Human Anatomy and Physiology, 7th edition, by Shier, et al. copyright © 1996 TM Higher Education Group, Inc.

Proprioceptive System (Kinesthesia)

- Senses position, location, orientation, and movement of body muscles and parts.
- Provides sense of relative position of neighboring body parts
- Also provides sense of effort used to move body parts.
- Allows us to move freely without thinking about our environment.
- Examples include walking or kicking without looking at our feet or touching our nose with our eyes closed.
- Continuous feedback loop between sensory receptors located in skin, joints, and muscles.



WHAT IS PROPRIOCEPTION ?

[Video](#)

Interoceptive System

- The Interoceptive System detects sensations related to the physiological and physical condition of the body.
- Provides a sense of what internal organs are feeling.
- Examples include hunger and thirst.
- It has special nerve receptors all over our body including internal organs, bones, muscles, and skin.
- We place emotional labels such as anger, sadness, or happiness on the physical sensations the brain is compiling.

WHAT IS INTERO- CEPTION?



[Video](#)

Too Much Information

- It has long been established that crossing one's hands makes it more difficult to determine which hand is involved when the fingers are touched. [Study](#)
- Experimenters tried the same experiment with the subjects' eyes closed and found it increased performance. [Study](#)
- Neither of those are particularly surprising since it would make sense that the visual information would create confusion.
- Tactile sensation could also create confusion so it would make sense that one source of confusion rather than two would lessen the effect.

Would You Take That Lying Down?

- Our vestibular and proprioceptive systems are always functioning when we are conscious (and maybe when not) but we do not think of them as taking any effort.
- In fact they do.
- In this study the crossed-hand experiment was performed with the control group sitting up and the experimental group lying down.
- The experimental group performed better, apparently not focusing as much on orientation in space. [Study](#)



Directed Attention

- Conflict between word and color of ink requires activity in the ACC to resolve conflict.
- Ability to do so requires Directed Attention to overcome reflexive response based on word.
- Directed Attention helps us make correct choice but leads to Directed Attention Fatigue (DAF), leads to incorrect choices and irritability.

Stroop Test

- Used to measure capacity for Directed Attention
- Also helpful to experience the conflict and fatigue.
- Stroop Test [link](#)

RED	YELLOW	BLUE	GREEN	BLACK
PINK	ORANGE	BROWN	GRAY	PURPLE
GREEN	GRAY	BLACK	BLUE	YELLOW
GRAY	BROWN	PINK	ORANGE	BLUE
YELLOW	RED	GREEN	BLACK	GRAY
BLACK	BROWN	PURPLE	ORANGE	PINK
PURPLE	BLACK	YELLOW	RED	GREEN
ORANGE	PINK	BROWN	GRAY	PURPLE

RED	YELLOW	BLUE	GREEN	BLACK
PINK	ORANGE	BROWN	GRAY	PURPLE
GREEN	GRAY	BLACK	BLUE	YELLOW
GRAY	BROWN	PINK	ORANGE	BLUE
YELLOW	RED	GREEN	BLACK	GRAY
BLACK	BROWN	PURPLE	ORANGE	PINK
PURPLE	BLACK	YELLOW	RED	GREEN
ORANGE	PINK	BROWN	GRAY	PURPLE

Inattention Blindness

The most effective cloaking device is the human mind

Daniel Simons

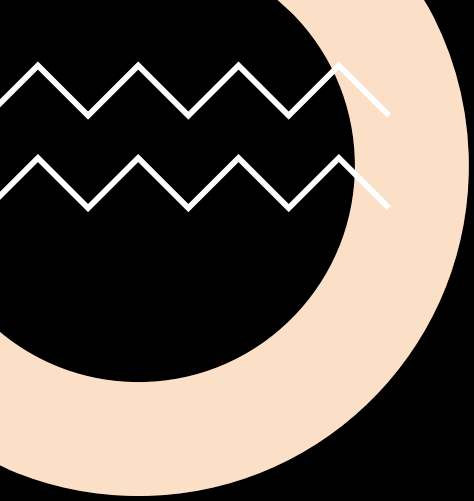
Video



© 2010 Daniel J. Simons

Monkey Business

- I assume most of you saw the gorilla.
- I included it since it was the original experiment of its type and led to the development of a whole field of psychology.
- Around 50% of all people do not notice the gorilla.
- In our setting, people are more likely to be on guard.



Video



[Video](#)



Attention

- Stimuli may be subconsciously detected or not detected at all.
- Subconsciously detected stimuli may be brought to conscious awareness or not depending on whether new prediction needed.
- Can exercise Executive Control to focus on particular stimuli.
- Attention limited, often difficult to focus on more than one thing at a time.



Multitasking Myth and Cost

- Multitasking – Only 2.5% of people can do it.
- Attempts at multitasking actually are rapid shifts between tasks.
- Brain not designed for that many quick changes, takes serious toll over time and reduces efficiency.
- Do not have to be consciously aware of multiple tasks to suffer consequences.
- Most common example is cellphone with continual subconscious awareness.
- Research shows adverse impact on school performance.

Limited Attention

- When focusing on one thing, other things that normally would be brought to conscious awareness can be missed, can intrude, or can replace primary focus.
- Particularly miss things that are consistent with past experience and not individually important, such as color of a shirt.
- Can have multiple layers and permutations.
- Attention capacity is limited so we consciously or subconsciously allocate it among tasks.
- Not a defect but a design developed through evolution.

Inattentional Blindness

- The event in which an individual fails to perceive an unexpected stimulus that is in plain sight.
- Talking with person at party
 - Most can focus on conversation
 - Likely to hear but not be aware of content of other conversations
 - Exception when own name mentioned
- Other sounds – siren, baby screaming, person crying – break through easily

Change Blindness

- Change blindness is a perceptual phenomenon that occurs when a change in a visual stimulus is introduced and the observer does not notice it.
- Similar causation to Inattentional Blindness but also related to number of visual clues that bombard us every second.
- The distinction is between directing focus among multiple stimuli and blocking out change.



Problem is our Denial

- Change and Inattention Blindness are much like other characteristics of the brain.
- Such as – optical or auditory illusions or decisions based on emotions
- They are not defects but rather evolutionary developments that help us survive.
- Problems arise when we deny them or fail to adapt our behaviors and expectations accordingly.

We Believe We See Everything

- Levin, et. al. experiment – [Study](#)
- In multiple experiments, people were asked if they would notice certain types of changes.
- In general, people predicted they would for over 90% of the scenarios.
- In fact, they only did so 0% to 50% of the time.





Problem Areas

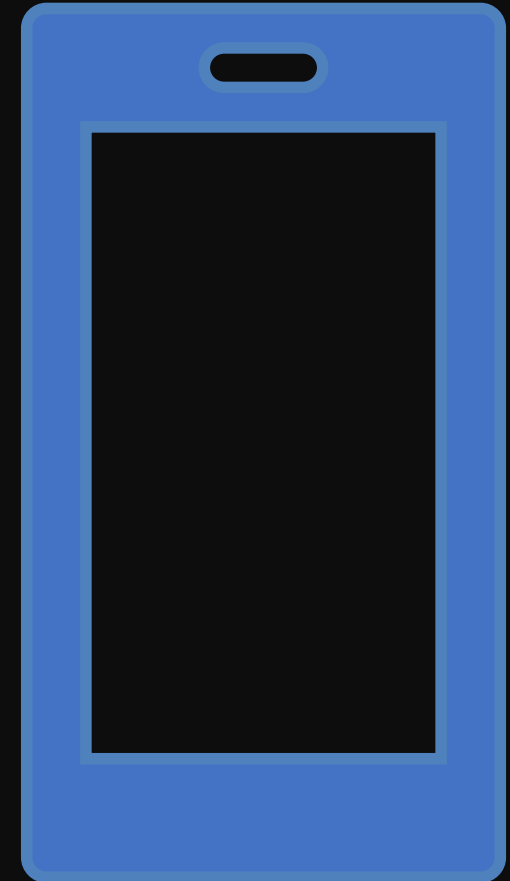
- Eyewitness Identification – problem is not how bad we are but rather how good we think we are and how good juries think we are.
- Using cell phone while driving
- Air Traffic Controllers missing threats
- Military targeting of friendly troops



[Video](#)

Cell Phones and School Performance

- Students perform better when cell phones are banned from school – [Article](#) (hundreds of studies)
- Student use of cell phones correlated with college GPA and test scores. – [Article](#)
- Compare performance with cellphones on desk, in pocket, and outside classroom



ADHD

- Those diagnosed with ADHD less susceptible to Inattention Blindness – [Study](#)
- Research supported Hunter – Farmer hypothesis
- Is ADHD an evolutionary advance or a problem or both?
 - Works well with technology and so-called multitasking
 - Not so much in the classroom
 - Is the problem the pathology of the student or how we structure classrooms based on hundreds year old model?



Physical and Genetic Differences with ADHD

Hunter Farmer comparison based on genetic analysis of ADHD [Study](#)

Meta-analysis of association between ADHD and the 7-repeat allele of the dopamine D(4) receptor gene (DRD4) [Meta-Analysis](#)

Large scale study found physical differences in brains of those diagnosed with ADHD [Study](#)



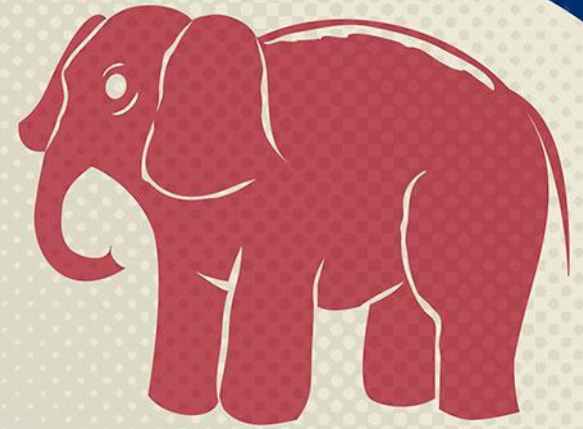
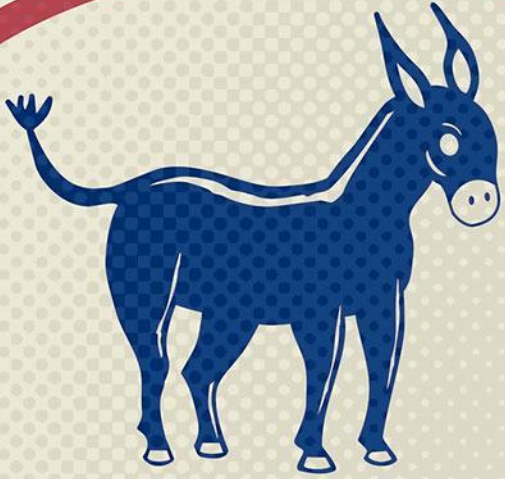
[Video](#)

Choice Blindness

Choice Blindness

- Failure to recall a choice immediately after making it
- Term coined by Swedish psychologists Lars Hall and Peter Johansson who conducted much of the groundbreaking research and run the Choice Blindness Laboratory at Lund University in Sweden
- Related to Introspection Illusion where people incorrectly believe that they fully understand the roots of their emotions and thoughts, yet believe that other people's introspections are largely unreliable

Politics



The Brain and Politics



" NO TALKING POLITICS DURING 'HAPPY HOUR'! "



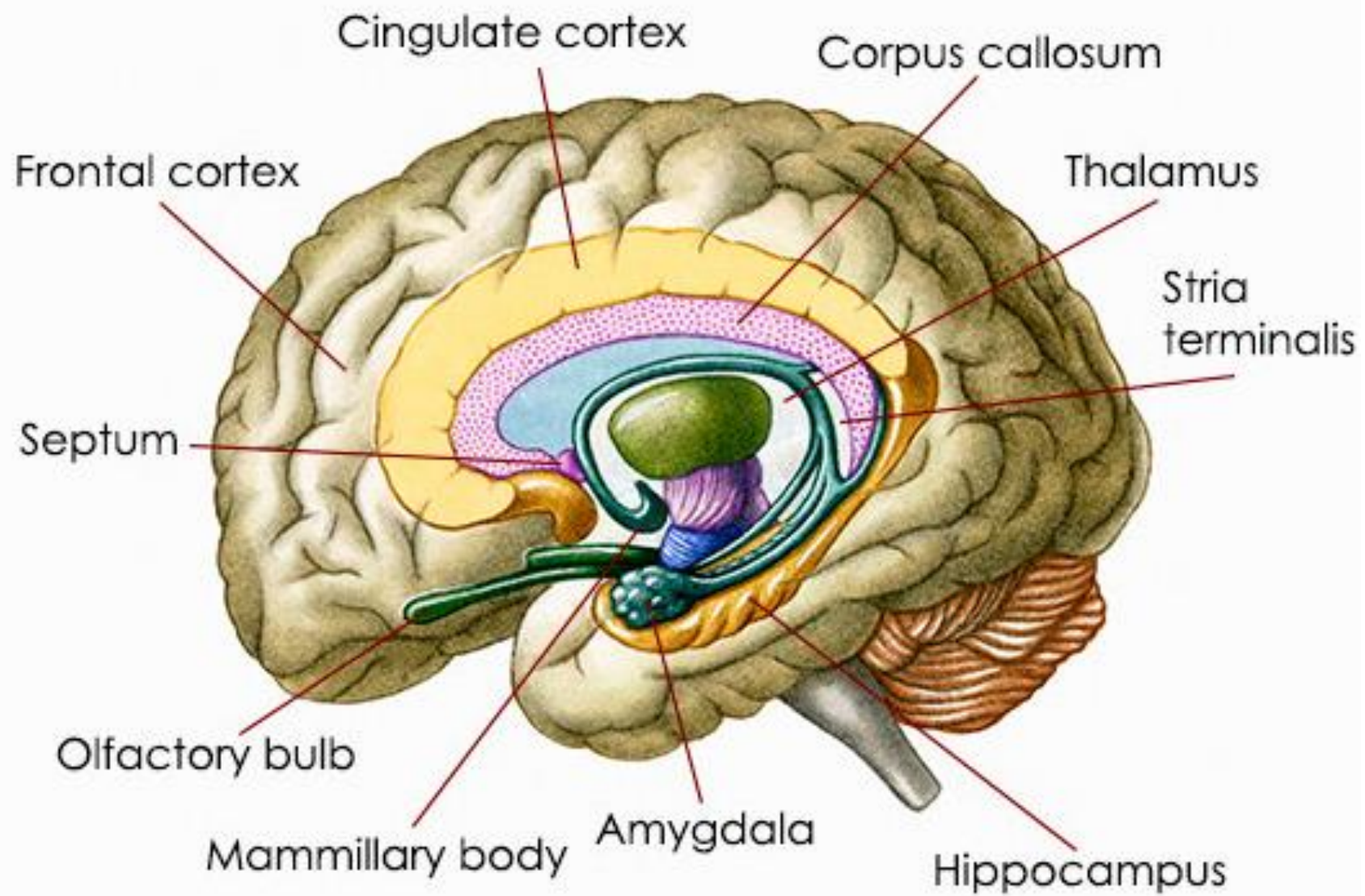
Never
Discuss
Politics and
Religion

Why?

- Neither is real to the brain.
- But they evoke strong emotional responses.
- Fear, joy, safety, disgust are real and have neurotransmitters.
- The overrides are always fear and disgust related to risk of loss.
- They are necessary and adaptive.
- We differ as to sensitivity, strength of reaction, and triggers.

Things to Consider

- How parts of the brain may differ in size.
- Which parts of the brain become active in response to specific stimuli.
- Brain response to things that do not obviously relate to politics.
- Remember fear of loss is a built-in alarm system that overrides rational thought.
- Rational thought can also help control the fear response.
- The responses are neither good nor bad, both evolved to help us survive.



Sample Studies

These are a sampling of studies correlating brain components, sizes, and responses to political orientation.

Many more that are consistent.

Consistent findings and multiple replications tend to support findings.

Gray Matter in Amygdala and ACC

- **Political Orientations Correlated with Brain Structure in Young Adults**
- UK Study on Young Adults
- Self reported political orientation on Liberal to Conservative scale (-5 to +5)
- Liberals greater amount of gray matter in Anterior Cingulate Cortex (ACC)
- Conservatives had larger volume in right amygdala (negative emotions – fear and sadness)
- No difference in left amygdala (memory and thought of emotions)
- Amygdala larger in men than women – [Study](#)

Amygdala and Attitudes Towards Social Order

- Two independent neuroimaging studies
- Larger bilateral amygdala volume positively correlated with belief that existing social order was legitimate and desirable.
- Applied across advantaged and disadvantaged groups and across men and women.
- Sample statements such as, “Society is set up so that people usually get what they deserve.” and “American society needs to be radically restructured.” were rated as agree to disagree on a 1 – 9 scale.
- Not surprisingly, attitudes correlated with self described political orientation as to conservative to liberal. [Study](#)

Reaction to Change

- **Neurocognitive correlates of liberalism and conservatism** – [Study](#)
- Subjects filled out questionnaire on political orientation – high correlation with voting
- Trained to respond to Go signal until it was habitual
- Limited introduction of No Go Signal
- Liberals more accurate and showed greater activity in Anterior Cingulate Cortex (ACC)
- Suggesting greater neurocognitive sensitivity to cues for altering a habitual response pattern.

Sensitivity to Stimuli

- Political attitudes vary with responses to stimuli - [study](#)
- 46 participants with strong political beliefs
- Those with lower sensitivity to sudden noises and threatening visual images more likely to support foreign aid, liberal immigration policies, pacifism, and gun control
- Those with stronger physiological reactions more likely to favor defense spending, capital punishment, patriotism, and the Iraq War

Disgust



- Disgust is an innate protective reaction to environmental threats.
- Same reaction appears in response to emotional threats.
- Strength of disgust reaction one of the highest correlates with political orientation.
- Sensitivity and strength of response unlikely to change.
- Triggers of the response can change.

+

•

○

Body Odor Disgust (BODS)

- Body odor disgust sensitivity (BODS) predicts authoritarian attitudes.
- Used validated measures of BODS and authoritarianism.
- BODS positively correlated with authoritarianism.
- Similar results for support of Donald Trump (study conducted during campaign, before election).
- Association with BODS fully explained Trump support. [Study](#)

Response to Disgusting Images

- Nonpolitical Images Evoke Neural Predictors of Political Ideology – [Study](#)
- “Disgusting images, especially those related to animal-remainder disgust (e.g., mutilated body), generate neural responses that are highly predictive of political orientation.”
- The greater the reaction, the more conservative.
- “Brain responses to a single disgusting stimulus were sufficient to make accurate predictions about an individual subject’s political ideology.”



Disgust and Political Ideology

- Primary differences were in the Amygdala but there were also differences in the Insula, Hippocampus, and other regions.
- There were no differences in the subjective conscious response to those images.
- Other evocative images showed no similar difference.
- Studies show almost all people believe their political orientation is well thought out and cognitive.



Roll with the Good or Confront the Bad?

- Shown both positive and negative images, conservatives focus more on negative ones
- Conservatives demonstrate stronger physiological reactions to negative images [Study](#)
- Both approaches bring strengths – liberals openness, conservatives conscientiousness

Dunning-Kruger Effect

- Partisanship, Political Knowledge, and the Dunning-Kruger Effect
- Dunning-Kruger Effect - individuals with low levels of competence will judge themselves to be higher achieving than they really are.
- Many studies show Effect applies to political knowledge.
- This study showed that partisan identity exacerbated the Effect [article](#) - [study](#)

Political Judgment Not Incorporate Reasoning

- Before 2004 election partisan subjects were shown contradictory statements by candidates Bush and Kerry.
- Critical opinions applied only to disfavored candidate.
- No activity in dorsolateral prefrontal cortex associated with reasoning.
- Most active were orbital frontal cortex that processes emotion, anterior cingulate cortex that processes conflict, and the posterior cingulate cortex that processes moral judgments.
- Once conclusion reached, activity in ventral striatum related to reward and pleasure. [Study](#)



Darren Schreiber

- US political scientist currently Professor, University of Exeter in UK.
- Conducted a number of studies looking at brain differences between Democrats and Republicans as it relates to risk-taking.
- More recently focused on brain differences between those with partisan affiliation vs. those without.

Risk Taking Behaviors

- Subjects involved in non-political task where they had to choose between accepting a safe reward vs. choosing to take risks that had higher potential gains but also potential losses.
- Republicans and Democrats made similar choices.
- During decision-making process, Republicans showed greater activity in amygdala, more related to attention to external threat.
- Democrats showed greater activity in the insula, more focused on internal awareness. [Study](#)
- Brain scans alone could predict party affiliation with 82.9% accuracy.

Neuronal Nonpartisanship

-
- Same study but looked at nonpartisan vs. partisan rather than Democrat vs. Republican.
 - Nonpartisans did not vary from partisans based on activity in the amygdala or insula but did differ in other areas related to social cognition where there were no differences between Democrats and Republicans. [Abstract](#) [Article](#)

Understanding both Liberals and Conservatives

- Brain differences described above are not related to intelligence, although triggers may be.
- Problem solving and critical thinking are increasingly becoming more important so evolution supports greater development in those areas.
- But conscientiousness is also an important trait.
- Conservatives were more likely the protector class, such as military and police today. That class have historically held the highest rank and still do in many countries.

Predicting Possible Trump Victory

-
- I do not have the citation but watched interview with political scientist who asked political questions of subjects undergoing fMRI's.
 - He found a large number of subjects who spoke disparagingly of Donald Trump and claimed they would be voting for Hillary Clinton.
 - Under the imaging, their amygdalas show strong activity in response to questions about immigration.
 - When questioned afterwards, admitted they were leaning towards voting for Trump.

A Conservative is a Liberal Whose Has Been Mugged

-
- There is some truth to that statement.
 - When a person experiences fear, it tends to create more conservative attitudes, even to unrelated issues.
 - The opposite is true for feelings of happiness or security.
 - Authoritarian and rightwing groups grew during influx of refugees in Europe.
 - That is not surprising but it also moved attitudes toward conservative positions on other issues.

[Video](#)



FEAR IN POLITICS

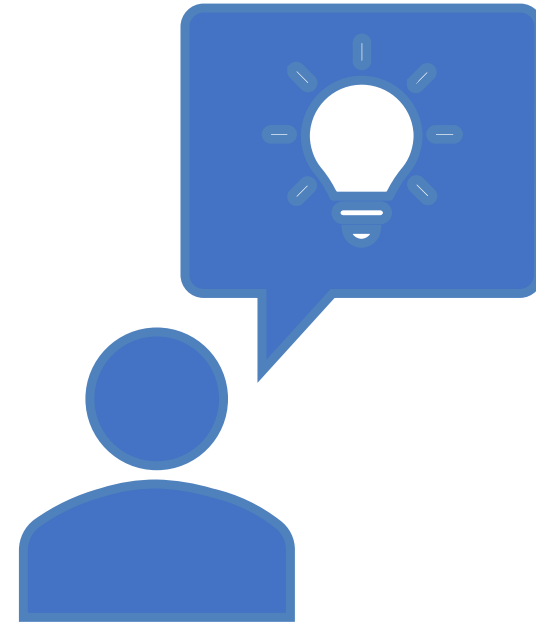


Narrative

With Inattention Blindness, our Brains See Things but our Conscious Minds do not

Sometimes our conscious minds are aware of things that do not actually exist – The myth of rational thought.

We create the narrative to fit the belief.





Alvaro Pascual-Leone Study

- Used transcranial magnetic stimulation (TMS) to stimulate parts of the brain that caused movement in right or left wrist.
- Instructed to decide which and then on the next cue to move that hand.
- Brain scan could tell which hand would move before actual movement occurred.
- [Article](#)

Why Did You Move That Hand?

-
- Next part of study seemed identical to subjects but used TMS to override the choice and move the opposite one to the one chosen by subjects.
 - Asked why they moved that hand instead of the one they chose, all said they changed their mind.
 - Feeling they made the choice was independent of whether they did or not.



Procrustes



Procrustes (Greek Mythology)

Procrustes had a house by the side of the road where he offered hospitality to passing strangers, a meal and a night's rest in a very special bed. Procrustes described it as having the unique property that its length exactly matched whoever lay down on it. What Procrustes didn't volunteer was the method by which this "one-size-fits-all" was achieved, namely as soon as the guest lay down Procrustes went to work on him, stretching him on the rack if he was too short for the bed and chopping off his legs if he was too long.

Procrustean

- Enforcing strict conformity through disregard of individual differences or special circumstances
- Often connotes venality or brutality
- Also used more generically where the facts are stretched or changed to fit the theory



We Create the Narrative

- Once we have a perception, we automatically create the narrative necessary for it to make sense.
- Remember the European organ donation differences where people chose solely based on the default option but invariably provided rational explanations for their choices.
- There need be no attempt at deceit or subterfuge, just the way the brain is designed.
- We identify a pattern and make predictions based on it.
- The narrative creates the pattern.

Severed Corpus Callosum Experiments

- Corpus Callosum connects brain hemispheres.
- Sometimes severed to treat severe epilepsy
- Left eye and right eye see different images without the knowledge of the other side.
- One side was shown a picture of a chicken claw and the other a picture of a snow scene.
- Each side was asked to pick a card that went with what they saw, with the chicken claw choosing a chicken and the snow scene choosing a shovel.
- The side that saw the chicken claw was asked why the other side chose a shovel and immediately said it was to clean out the chicken coop.

Left/Right Hemispheres and False Memories



- True memories originate in the Right Hemisphere. (sort of)
- Creative stories originate in the Left Hemisphere. (sort of)
- If answer is based on actual memory, only the Right Hemisphere lights up. If there is no actual memory, both light up.
- Often changes eye gaze allowing professionals to tell when someone is lying. Are they trying to remember or trying to create?

What is the Brain Doing?



- Hypothesis is that the right side stores actual memories and the left side tries to make sense of information presented
- Less lying than attempt to understand environment – identify pattern for future predictions
- Interplay between two hemispheres is unique to humans and to a lesser degree higher primates

Petter Johansson Choice Blindness [Video](#)

