

defining feature of Science  $\rightarrow$  falsifiable

Materialism  $\rightarrow$  mental life comes from physical being/matter.

Dualism  $\rightarrow$

Descartes  
 $\rightarrow$  materialism ✓ animals  
 $\times$  humans  $\rightarrow$  material  $\rightarrow$  body  $\Rightarrow$  Dualism

$\hookrightarrow$  argument ① human's creativity  $>>$  animals/robots ?  
② "Your feelings could be wrong."

"I think, therefore I am"  
can't be wrong that you have a mind/consciousness.

Neurons  $\rightarrow$  "All or nothing"  $\rightarrow$  continuum enabled by freq./num. of neurons  
alcohol  $\rightarrow$  inhibitory firing.

## Brain

The brain is highly resistant to damage (a distributed system?)

$\rightarrow$  super efficient wiring  $\rightarrow$  extremely fast (based on the hardware (Tissues))

$\rightarrow$  Medulla, Cerebellum, Hypothalamus, cerebral cortex (that we have)

Contralateral organization: Left hemisphere controls right-side vision

motor control

$\hookrightarrow$  Corpus Callosum  $\rightarrow$  communication between 2 hemispheres

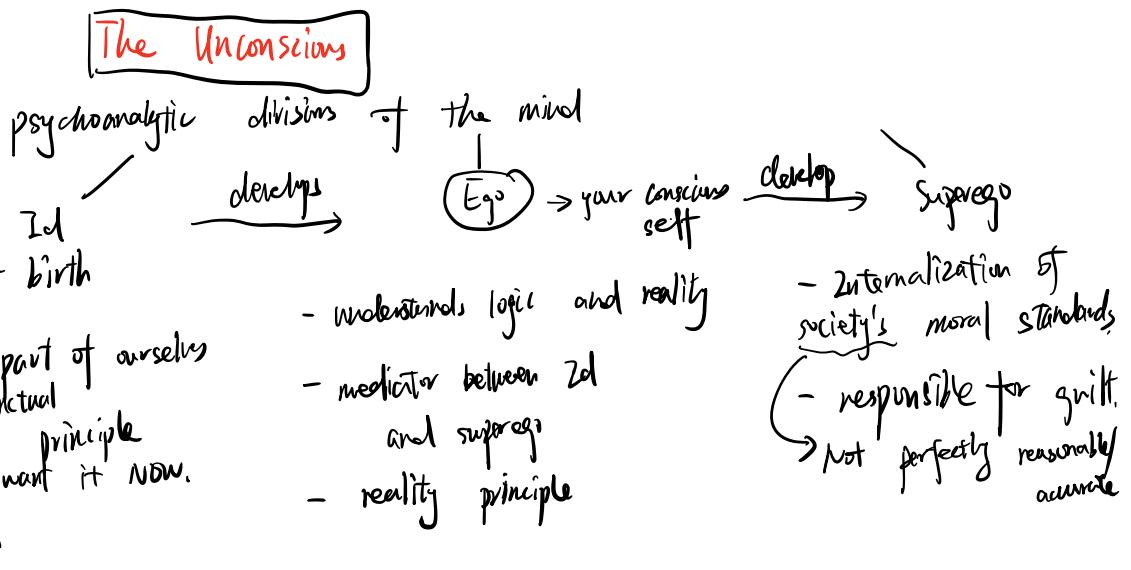
# Sigmund Freud.

→ Psychoanalytic → investigate interaction between conscious & unconscious and bring repressed feelings to consciousness

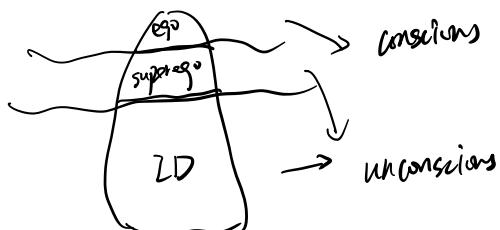
## Important Ideas

- Unconscious motivations (there are unconscious reasons for feelings and actions)
  - Reject the idea that
 

"you know what you're doing"
  - not aware of your decision-making process.
- Unconscious dynamics
  - conflict between systems in the brain which lead to errors, jokes ...



## Lacberg



Freud's developmental theory → described by erogenous zones

- Oral      birth - 1 year
- Anal      1 year - 3 year
- Phallic      3 year - 5 year      → Oedipus complex
- Latency      5 year - puberty      → suppressed sexuality.
- Genital      puberty -      → healthy adults find pleasure in  
*love and work*

Obstacles in these developmental stages lead to fixation

### Defence Mechanisms

→ conflict between id and superego (id has "inappropriate" thoughts deemed by superego)  
→ when ID spills out

→ displacement → redirect energy / focus to "better targets"  
→ hates dad, but bullies kids at school.

→ Sublimation → direct energy to targets valued by society  
(in a good way)

→ projection → reduce anxiety by attributing unacceptable impulses to  
someone else (I shouldn't be feeling this → he's doing it)

→ Rationalization → reason

→ Regression → retreat to behaviors of an earlier stage of development.

→ Reaction formation → replace threatening thoughts with their opposites.

↓ when defensive mechanisms fail?

## Hysteria

- blindness, deafness, panic attacks (symptoms)
- ways to keep memories/desires under lock
- Treatment: try to trigger catharsis (explosive release of insights)

Dreams → wish fulfillment

Lots of Freud's statements are unfalsifiable.

The core Freudian idea of The Unconscious remains intact.

# Skinner → behaviorist

## Behaviorism Key ideas

- ① Emphasis on learning → no such thing as "human nature".
- ② Anti-mentalism

→ Science!!! No Freud!

→ Use terms like "stimulus", "response", environment  
NOT "desires", "wishes", "emotions".

- ③ No difference across species (learning mechanisms) ?

## 3 Learning mechanisms according to behaviorists

### ① Habituation

→ "get used to sth". Decline in tendency to respond to familiar

stimuli due to repeated exposure.

→ keep us focused on **novelty**

### ② Classical Conditioning → passive

→ Learning by association (Pavlov's dog)

Starts with

① a neutral stimulus (bell)

② an unconditioned stimulus (food) that elicits an  
unconditioned response (saliva) → innate or learned.

fetish? maybe not

Conditioned compensatory responses  
→ conditional stimulus elicits responses  
that "compensate" the upcoming effect of  
the unconditional stimulus.  
→ "dog is coming" → more sensitive  
to pain → counteract the dog's effect.

Through conditioning  
neutral stimulus becomes conditional stimulus.

blocking → if association already exists  
between A and C, A blocks association  
between B and C (A inhibits C,  
"blocks" B and C).

There's a sorting tendency called "preparedness"  $\Rightarrow$  we learn the most reliable/salient stimulus as the predictor

Reinforced trials  $\rightarrow$  reinforces learning  
(bell + food)

unreinforced trials  $\rightarrow$  decrease response. (extinction)

(treatment of phobia  $\rightarrow$  systematic de-sensitization)  
may only inhibit response, not unlearn it (a new env may renew it)

Essentially: classical conditioning is body's clever adaptive preparation mechanism

that gives you sensitivity to a cue of an event that prepares you for that event (conditional stimulus prepares you for the bell unconditional stimulus food)

### ③ Instrumental / operant conditioning. $\rightarrow$ active

$\rightarrow$  reward and punishment

$\rightarrow$  shaping  $\rightarrow$  reward approximate behaviors.

$\rightarrow$  partial reinforcement effect

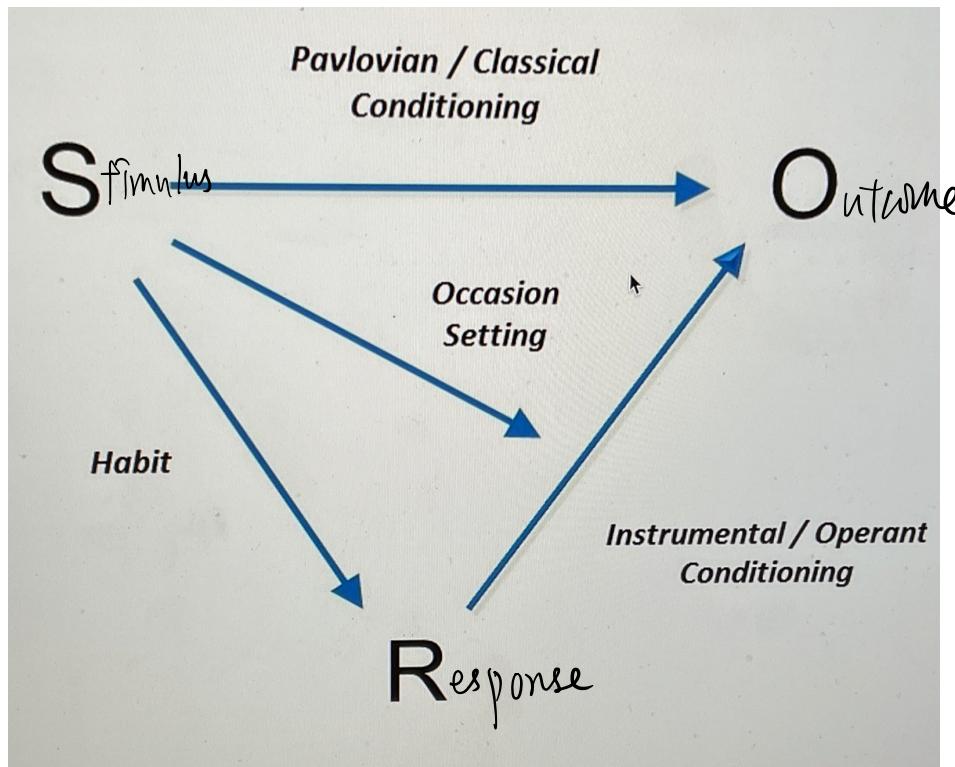
$\rightarrow$  don't reward every time  $\rightarrow$  behaviors stick around uncertainty?

$\rightarrow$  instrumental responses under stimulus control (e.g. light on + press lever)

Notice how behaviorism's every claim is refuted.

- Latent learning (learning without feedback) is not mentioned in the 3 categories of learning in behaviorism. Also observational learning oversimplifies richness

- Chomsky's critique: behaviorist underestimate the complexity of human mental life  $\Rightarrow$  empty explanations: we like painting because it's reinforcement (basically saying because we like painting)



Learn here means  
"associate with", not  
"lead to".

## Development & Language.

Big questions about development

- Morality → start moral / immoral / ammoral
- Continuity → personality as a child  $\xrightarrow{?}$  as an adult.
- Knowledge → how much are we born with / how much do we
  - $\swarrow$  empiricism
  - $\downarrow$  Nativism
  - $\searrow$  Constructivism
 need to learn?

Jean Piaget — developmental psychology

"Schemas": frameworks (mental structures) that develop to help organize knowledge

Modes of learning

- Assimilation: fit new info into existing schema
- Accommodation: modify existing schemas / create new ones.

His theory of cognitive development:

- ① Children think in vastly different ways than adults. (like Newton vs Einstein difference)
- ② Development as styles, in how the world works (not accumulations)

### Piaget's developmental Stages

#### ① Sensorimotor (0-2 years)

- Info gained through senses / motor actions
  - perceives, manipulates, but does not reason.
- object permanence obtained
  - object exist independent of our actions / senses. (物体独立于我们的行动和感觉)

#### ② preoperational 2-7 years

- emergence of symbolic thought (time, ...)
- reasoning develops, not high level tho.
- egocentrism → cannot perceive from others' perspectives. (similar to autism)
  - the world I see  $\cong$  the world others see
- No concept of conservation (slice cake into 2 halves  $\Rightarrow$  more)

③ Concrete operational | 7-12 years

- inability to reason abstractly / hypothetically

- less egocentric, more logical

④ Formal operational | 12 - adult.

- think abstractly / scientifically

But Piaget did not answer the qns regarding "how did development happen"  
(the detailed mechanisms)

Method > for studying infants: Brain scans / sucking / looking.

→ How are children diff?

- Moral (maybe?)
- cannot think other people's thoughts (not egocentric)
- think that other people cannot have false beliefs-
- the idea of private thoughts.

→ How to explain development?

① Neurons

- pruning → get rid of some neuron
- myelization → takes time to develop → faster propagation of signals.
- frontal lobe → inhibition

② Modules? modular development?

event-related potentials.

# Language

## Some facts

- somewhat instinctive

- universal (in every society)

[realization: people don't share a language.

make a common communication system (pidgin)

↓

their children transform pidgin into creole  
(full-blown language with syntax...)

- Hear a sentence that you've never heard before

You understand!!!



Language is NOT rule-learning

You've just heard of these before!

## Phonology

phonemes (units of sound)

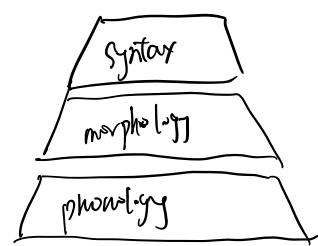
our brain automatically segment speech into words (using learned principles)

## Morphology - morphemes

smallest meaningful units ⇒ have to be learned  
can be combined to form words.

## Syntax - how morphemes are organized.

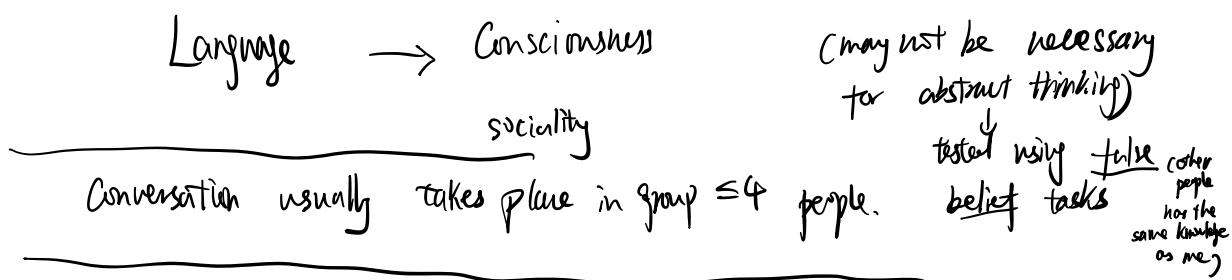
- may generate ambiguity.



All kids learn to talk regardless. (No feedback/conditioning needed)

- kids more more sensitive to phonemes
- critical period for language acquisition

Does the language you learn change the way you think?



Linguistic reconstructions of negative events have therapeutic effects.  
Languages influence conceptualization

## From the World to the mind

perception attention memory

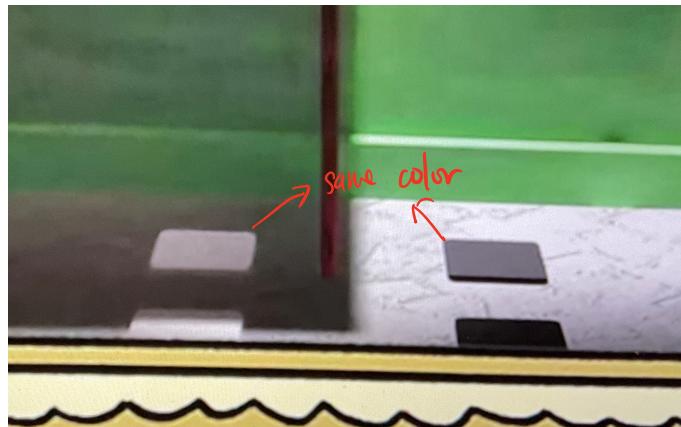
## Perception

vision: 3D real world  $\rightarrow$  2D image  
make sense of from

How do we perceive brightness, object, depth? (lots of unconscious/anti inference going on) proven by illusions

Brightness: Not just about light intensity.

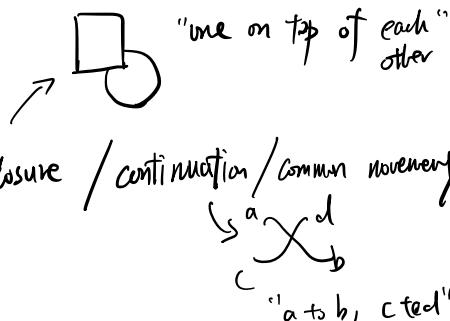
e.g.



CONTEXT matter, brain unconsciously compensates / adjusts perceived images.

Object :

\* segmentation : based on proximity / similarity / closure / continuation / common movement / good form  
unconscious inference going on.



Depth : Also lots of inference going on (under depth, assumption)

Center (Fovea)	vs	Periphery
Cones		rods
Color (3 types of cones for RAB)		dim
slow		quick
higher resolution		details sacrificed.
photopigments replenish faster.		photopigments replenish slower

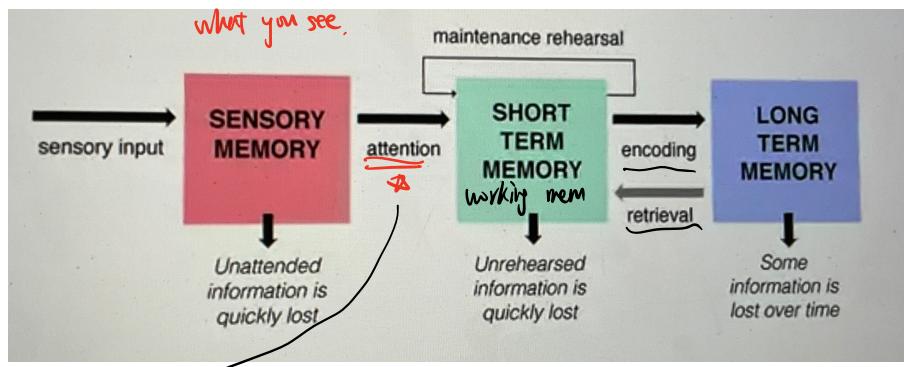
Contrast : brightness gradient  $\Rightarrow$  more info than the absolute amount of light.  
encodes information  $\Rightarrow$  enhanced using lateral inhibition.

\* Binocular advantage : redundancy  $\rightarrow$  less likely to miss a signal  
difference perceived by 2 eyes  $\rightarrow$  reconstruct 3D images

vestibulo-optical reflex (eyes move reflexively to compensate for head movement)

## Memory

3 stages



## Attention

Sometimes it's effortless, sometimes it's involuntary

Stroop effect. → need to detect <sup>←</sup> Russian spies.

We miss a lot of stuff.

Selective attention: select certain stimuli to process, ignore other ones

Cocktail party effect

Many models of selection

distinctiveness is key

Multi-tasking? → possible if unconscious / muscle memory

## Memory Storage

short term memory:  $7 \pm 2$  "chunks" / memory units

Learning makes short-term memory easier (by making "chunks" bigger)

e.g. To non-chinese Learners, every stroke  
is a chunk. For Chinese people, one  
word/phrase is a chunk.

## Encoding (short-term mem $\rightarrow$ long-term)

How?

1. Depth of processing.  
 $\rightarrow$  make more connections
2. Mnemonics
3. Understanding

Retrieval  $\rightarrow$  might be the deciding factor. (sometimes you can recognize but not recall)

1. Retrieval cues
2. Compatibility principles  
 $\rightarrow$  retrieve in the same context when you learn them.
3. Searching strategies  
 $\rightarrow$  approach from diff angles / reconstruct diff aspects

$\rightarrow$  Not "reading disks", rather, reconstruct every time you recall

## Failures of memory

Why do we forget things?

1. Decay (molecular basis for memory breaks down)
2. Interference
3. Changes in retrieval cues.

forget things before age of 2-3  
→ language remodels memory construction?

Implicit vs Explicit memory  
skills facts.

## False Memory

How do our memories get distorted?

1. Expectations
2. Leading questions.
3. Hypnosis (works like recalling, but it's actually creating credible stories)
4. Repressed memory
5. flashbulb memory (memories about shocking events are more vulnerable to distortion)

# Emotion in contexts

Not EVERYTHING  
is an evolutionary adaptation  
(some are by-products/accidents)

Life is impossible without emotions

Facial expressions

→ Social signals

e.g. Smile

→ Happiness smile

→ Greeting Smile (ID photo)

→ Coy smile (Appeasement smile)

## Kinship

- seemingly strong selective pressure against altruism. (cheat vs cooperate)
- But selects FOR kinship (caring) → **kin selection**
  - Selfish genes lead to unselfish animals.
- Child's attachment to parent
  - Skinner (Behaviorism)
    - conditioning (reward from parents)
  - Bowlby (nativism, evolutionary)
    - positive force (food, warmth, comfort)
    - negative force (fear of strangers)

Friendship / cooperation among non-kins

reciprocal altruism

punishment for cheaters is key

tit-for-tat  
corresponding emotions

		Player 2	
		Cooperate	Defect
		P1: GRATITUDE	P1: ANGER
Player 1	Cooperate	P2: GRATITUDE	P2: GUILT
	Defect	P1: GUILT	P1: DISAFFECTION
		P2: ANGER	P2: DISAFFECTION

The usefulness of "irrationality"

"rational" people are easily exploited (won't respond to provocations and assault)

"irrational" → "Zmma Kill you!" (also a role played by emotion)

政治上被极权施压，不反击。

(cultures of honor)

Importance of Reputation depends on culture / strength of local law & order.

Auditory looming bias. → things sound louder if they're approaching (ambulance)

Sexual overperception bias of males (high cost of missing out on chances of reproduction)  
(error management theory)

Desire (wanting) <sup>excitement/interest</sup> → left frontal cortex  
↓ willingness to work hard for sth damage of which lead to depression dopamine

Emotional responses involve networks of activation (There's no THE part/organ responsible for a single emotion.)

Pleasure (separate from desire)

Fear (freeze or flight)

Rage

Love

Grief (separation/loneliness)  
→ produced by the attachment network.  
→ very close to the brain region responsible for "pain"

# ★ Social

Social priming (think abt sth/intact with sth  $\Rightarrow$  affect behavior)  
e.g. hold warm coffee  $\Rightarrow$  more compassionate.

## Self

★ The spotlight Effect  $\Rightarrow$  we think that everyone notices us.  
"The spotlight is on me"

Lake Wobegon effect  $\Rightarrow$  Everyone thinks we are above average.

★ self-serving bias  $\Rightarrow$  "positives are a result of my hard work"  
negatives are a result of external factors

★ cognitive dissonance theory (avoid / resolve inconsistencies in our head)

1. Avoid inconsistent ideas (confirmation bias)

2. Insufficient justification effect | e.g. does not get enough reward  
 $\downarrow$   
it must've been enjoyable.

Ask your enemy  
to do you a favor  
 $\downarrow$   
your enemy loves you

e.g. 2 I was harassed when I tried to  
get into this frat  
 $\downarrow$   
must've been worth it

force your child to read  
 $\downarrow$   
your child thinks he  
hates reading

e.g. 3 I paid  
 $\downarrow$   
must be good  
I did not get  
paid (volunteer)  
 $\downarrow$   
must've been  
enjoyable.

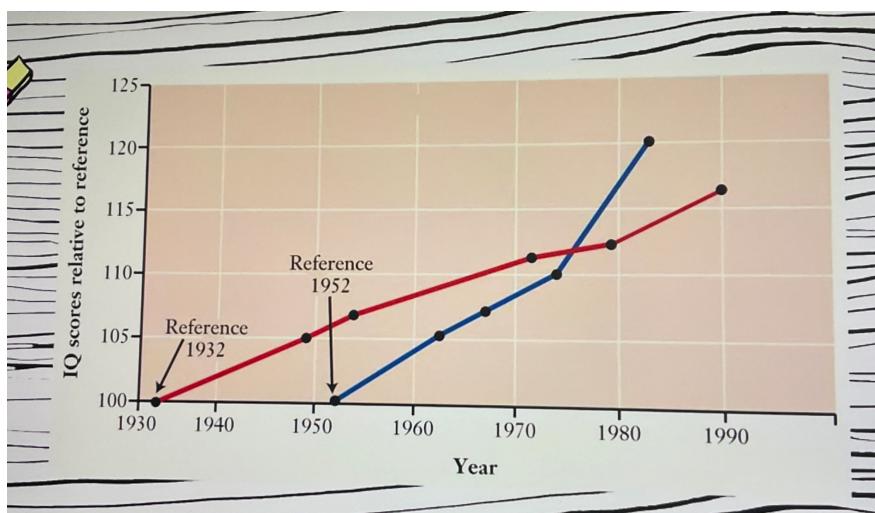
person bias: we attribute things people say/do to the person himself/  
his personalities  
e.g. movie characters = actors.

Why do we like people?

Familiarity, similarity, attractiveness

First impression very powerful / people form first impressions very quickly.

Self-fulfilling prophecies: we behave with the tendency to fulfill other people's expectation of us.



Person-centered therapy  $\Rightarrow$  aimed at personal growth

Memory: we remember (peaks and endings)