

# PSYCHOLOGY

## FIELDS OF PSYCHOLOGY

1. Biopsychology - neuroscience
2. Clinical - diagnosis, pathology, ~~behaviour~~
3. Social - how a individual behave in a social situation
4. Industrial & Organizational - applied in the workspace : hiring/promotion
5. Cognitive - thinking, memory, problem solving
6. Health - hospital setting : prepare ppl for surgery, pain management  
getting ppl to behave in a particular way

## PRACTITIONERS

1. Clinical
2. Counselling
3. Educational Psychologist  
↳ a good test is discriminatory, reliable
4. Industrial Organizational
5. Sports
6. Social Work
7. Environmental Psychology - architecture

## METHODS

### \* Formulating hypotheses and theories

- ↳ inspiration from previous research
- ↳ Based on personal observation

### \* Collect Data

#### 1. Observational Method

- ↳ researchers observe people and records : measure / impressions of their behaviour [inter-rated reliability]
- ↳ archival analysis

#### 2. Correlational Method : to understand relationships between variables

(-) ~~correlation~~ \* causation, confounding var.

#### 3. Surveys

- ↳ need representative samples [sampling errors]
- ↳ self-reporting

#### 4. The Experimental Method

- Answering causal questions
- 2 conditions, identical except for independent variable
- \* involves direct intervention from researchers

Trade off

Internal Validity : degree of control over extraneous variables other than IV.  
 ↳ ensured through random assignment of participants

External Validity : the extent to which results generalize  
 ↳ proper representative sample  
 ↳ lab test is artificial

\* Replication in both lab and field settings

NOTE Most American studies on psychology involve sophomores

#### Ethical Issues

↳ Informed Consent      ↳ Debriefing      ↳ IRB : Institutional Review Board  
 in IIT → IEC : Institute Ethics Committee

#### BRAIN

##### NEUROIMAGING

↳ PET : Positron Emission Tomography  
 - Depicts brain activity by showing the consumption of radioactive glucose

→ MRI : Magnetic Resonance Imaging      → not good for real-time but great for localisation  
 - Injection of contrast agents

→ fMRI : comparing MRI after an interval of a few seconds

##### EVOLUTION OF BRAIN

Spinal Chord → Hind brain → Mid Brain → Fore Brain (cortex)  
 (cerebellum, medulla)      (C)



## FOREBRAIN

Neurons + Glial Cells

association cortex : cluster of glial cells

- Broca's Area : related to speech production (left hemisphere)
- Prefrontal Cortex : Thinking, planning, executive, rational (more left prefrontal)
- Somatosensory Cortex : Sensory information
- Wernicke's Area : ~~under~~ language comprehension
- Visual Cortex : Optic Nerve → Occipital Lobe
- Auditory Cortex : Hearing
  - Profound deafness : damage / non-functional auditory nerves

\* Frontal Lobe : speaking, muscle movement, planning, judgements

↳ Motor Cortex : Controls movements

\* Fingers and Mouth - more cortical space

\* Parietal Lobe : sensory cortex (skin senses, movement of body parts)

\* Temporal Lobe : auditory cortex

\* Occipital Lobe - Visual cortex

NOTE Schizophrenia involves auditory hallucinations - activations in temporal lobe

## MID BRAIN

↳ limbic system (Centre of Emotion)

- Hypothalamus : below thalamus,
  - hunger, thirst, body temp., sexual behavior
  - Pleasure Center - expt. by Olds & Milner, 1954

\* Olfactory Bulb

- Amygdala : seat of emotion
  - lesioned a monkey's brain → docile other raged
  - ↳ rage & fear

- Pituitary Gland : master gland of endocrine system

- Hippocampus : explicit memory

## HIND BRAIN

- Brainstem : central core
- Medulla : heartbeat and breathing
- Pons - co-ordinate movements (balance)
- Crossover Point : connection between both hemispheres of brain
- Thalamus : Top of brainstem
  - ↳ brain's sensory switchboard
  - receives signal and sends to higher
- Cerebellum : co-ordinates voluntary movements
  - Memory, discriminate sounds, textures, judge time

## NEUROTRANSMITTERS

- Acetylcholine : muscle action, learning, memory
- Dopamine : movement, learning, emotion
- Serotonin : mood, hunger, sleep, arousal
- Norepinephrine : alertness, arousal
- GABA (gamma-Aminobutyric acid) : inhibitory role
- Glutamate : excitatory role

NOTE	Lack of Dopamine : Parkinson's	Excess Dopamine : Schizophrenia
	↓ dopamine psychoses	↓ dopamine suppressors Tardive dyskinesia

Brain's Plasticity : Patterns are retained

Hemispherectomies : Other side of brain compensating

Blind : better touch, acute hearing

Deaf : better peripheral vision



## CONSCIOUSNESS

- ↳ Anesthesiology
- ↳ Alertness / awareness of ourselves and the environment
- ↳ Dennet : color - phi phenomenon
  - Awareness comprises the memory trace
- ↳ Hippocampal complex : short term episodic memory
  - recollection when cues stimulate memory (both recent and remote)
  - Hippocampal damage : affect recall of recent information
- ↳ - Oliver Sacks , "Greg" brain tumor

## Visual Perception

- Crick and Koch : perceptual unity
- Cat's visual cortex : oscillations ; neurons firing in synchrony
- Thalamus - cortex - reverberatory circuit : for very short-term memory
- Sight Unseen - case of DF (ventral stream) higher consciousness
  - different streams for conscious perception and visually guided behaviour (dorsal)
- Wegner (2002) : responding  $\frac{1}{10}$  second before becoming conscious to tap
- Soon (2008) : can predict decision 7s before participants

## CIRCADIAN RHYTHM

- ↳ body clock
- ↳ brightness control : bright light activates retinal protein
  - ↓
  - Suprachiasmatic (in hypothalamus)
  - ↓
  - Pineal Gland
  - [modulates melatonin] 'sleep-inducing hormone'
- ↳ Dement : Microsleep (when sleep deprived) ⇒ lose consciousness

## SLEEP

### REM Sleep Rapid Eye Movement

- Dream State
- EEG similar to awake state ( $\alpha$  waves)

### Stage-2 :

- Get sleep spindles (dark regions in EEG)
- Body temp drops, heart rate slows

### Stage-3 :

- ~~Parasomnia~~ Parasomnias (sleep walking, night terrors, talking, bedwetting)
- Transition between non-REM and REM
- Slow waves ( $\delta$  waves) interspersed with smaller, faster waves

### Stage-4 :

- Deep Sleep ( $\delta$ -waves) low freq, high troughs and peaks
- As we go to end of sleeping, Stage-4 is not reached

### Cycle between Stages

REM - • appear like awake

- heart rate increases, rapid breathing
- no body movement (brain stem blocks wave to from going down spinal cord)

↳ Lucid Dreaming (rare)

- can control dreams

↳ Sleep paralysis → cannot move, become conscious to this

• In REM-deprived patients : REM 'compensates' when later allowed

NOTE Sleep Inertia : Lethargy / Drowsiness when woken

↳ Disturbing REM

### Function of Dreams

- Filing memories - 'Echo'
- Makes sense of neural static
- Provide periodic stimuli



Monozygotic twins are said to have similar sleep patterns

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### Freud's Theory

- Dreams are psychic safety valves (let out emotions)
- manifest content : literal content/storyline
- latent content : symbolic meaning of the 'literal content' [unremembered]

### NOTE - Sleepwalking in Stage 4

- When body temp. falls, sleep is induced
- Sleep protects immunity
  - Depression / Old Age - disturb circadian rhythm
- Afternoon naps - doesn't disturb circadian rhythm
  - cultural influence (eg. siestas)

### Narcolepsy - sleep attack (of ~5min)

- not related to sleep deprivation
- Orexin not regulated properly (neurological disorder)

### Sleep Apnea - Stop breathing during sleep. DANGEROUS!

### DRUGS

#### - Psychoactive Drugs : Change perception

↓

#### - Depressants : lower neural activity

↳ Alcohol

- disinhibition (lower consciousness, self-awareness)
- hippocampus / cerebellum = drunken gait (lack of co-ordination)
- low REM sleep

↳ Barbiturates

- tranquilizers
- FATAL if combined with alcohol

↳ Opiates

- morphine / heroin
- brain stops producing endorphins
  - ↳ natural opiate
  - ↳ causes runner's high

## Stimulants

↳ Heart Rate ↑, Breathing ↑, dilated pupils, Energy ↑

↳ Caffeine, Nicotine

↳ affects acetylcholine, dopamine & epinephrine [ADDICTIVE]

↳ Methamphetamine

↳ dopamine release → Euphoria → Reduces baseline dopamine

↳ Cocaine

↳ affects dopamine/serotonin/norepinephrine

↳ rush then crash

## Hallucinogens

↳ LSD : vivid hallucinations

↳ Marijuana (aka cannabis) : mild hallucinations

↳

Habituation : Same dose but less effect → causes addiction

## Other Causes of Addiction in some people

i) Some biological influence (eg. predisposed to alcoholism ← genetic)

• Adopted individual

- correlation with problem in one of biological parent

ii) Social / Psychological influences

↓

→ Stress, depression  
cultural influences  
(overestimation of usage)  
Peer pressure

NOTE ~~In~~ Near Death Experience; 12-40% of people

Hallucinatory action of brain (oxygen deprivation)

heart hbs

## LEARNING

### Classical Conditioning

~ learning through association

- Pavlov : Expt. with digestive system

US : unconditioned stimulus, UR : unconditional response



US (food) -- UR (salivation)

Neutral S (tone) -- no response

US + Neutral S -- UR

Neutral S -- UR

### • higher order conditioning

light + tone } 2<sup>nd</sup> order conditioning  
light -- salivation

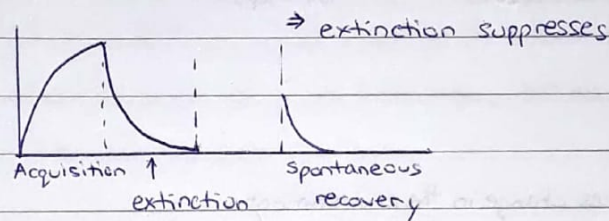
↳ weaker than 1<sup>st</sup> order conditioning

- Field (2006) : cartoon characters (icecream/brussel sprouts)

- Olsen & Fazio (2001) : attitudes to Pokemon (+ve/-ve words)

• Extinction : diminishing response when the CS occurs repeatedly without the US

• Spontaneous Recovery : reappearance of weakened CR after a pause



• Generalisation - Pavlov : diff tone also worked

- Pollak et al ('98) : Abused vs control resp children's response to an angry face

### • Discrimination

Are the laws of learning universal ?

- Biological predisposition

↳ natural stimulus : learn associations that enhance its survival

expt : Garcia & Koelling (1966)

- were studying effects of radiation on mice ← stopped drinking water in plastic container

- Taste aversion associated with sickness among rats → DELAY

- Aversion only to food NOT sight & sound (taste)

• Gustavson et al ('74-'76) coyotes & wolves poisoned sheep carcass

• Pfeffer

- Prevented baboons from raiding gardens

## Application of Classical Conditioning

- Drug Use : places/people associated with a high
- Antabuse (disulfiram) - weaning off alcohol
- Placebo

↳ subjective placebo effect : patient 'feels' better

↳ objective placebo effect : immune system gets rallied ⇒ actually gets better

→ Watson & Rayner - 'Little Albert' : 11 month old toddler

↓  
white mouse + loud noise (hammer on steel)

↓  
howling at any white furry object

→ got fired ⇒ went to advertising

Maxwell House Coffee Break

## → Advertising

- Pair neutral stimulus with an affective stimulus (UCs) repeatedly

• De Beers Diamond

• Japan's Valentines Day + White Day  
chocolatiers toy shops

## Operant Conditioning

- Action of learner makes change in the environment

- Reinforcement

+ +ve : Reward ⇒ increases likelihood of event occurring [ ]

- -ve : Event whose termination is contingent on the response [noise]

- Punishment : follows response ⇒ decreases likelihood of event occurring [fines]

o - Omission of Reinforcement : stop the reinforcement to decrease likelihood of event [no TV]

• Thorndike - The Law of Effect

↳ responses followed by satisfaction ~~get~~ are more likely to occur

• B.F. Skinner Skinner's Box

↳ Behaviour Shaping : reinforcers gradually guide the animal's behaviour

- Successive Approximations

! Rats sniffing out mines, ! Dogs leading the blind

• Continuous OR Partial Reinforcement

↑  
intermittent

(eg. fishing OR gamble)



→ actually get better  
noise (hammer on steel bar)  
the funny object

UCs) repeatedly

[noise]  
[Fine/Sparks]  
end of event  
[no TV]

is behaviour

## Schedules of Reinforcement

- (i) Fixed Ratio Schedule
- (ii) Variable Ratio Schedule : High levels of responding
- (iii) Fixed Interval Schedule : Stop - Start pattern (rapid responding near reinfo.)
- (iv) Variable Interval Schedule : Slow - Steady responding

- Latent learning : learning that becomes apparent only when there is some incentive to demonstrate it.
- Cognition - Expectancy

## Observational Conditioning

- Modeling : Observe and imitate models
- Mirror Neuron : Rizzolatti, Parma Italy
  - Macaque Monkeys - some neurons in inferior frontal cortex fire when they pick peanut AND also when seeing person pick up peanut
  - 10% of neurons have mirror property in inferior frontal cortex and inferior parietal cortex
  - Specialized to understand not just actions but also intentions, the social meaning of their behavior and their emotions

expt. Bandura - Bobo Doll expt.

- Child watches adult aggressively play with Bobo Doll
- Then brought to another room with toys, then frustrated them to keep them back (for others)
- When brought back to the first room, imitated adult's violence

NOTE Meta - Analysis : Quantitative Review

Prolonged exposure to violence desensitizes viewers

## MEMORY

The Ebbinghaus Forgetting Curve : made up 3 lettered words. ~~For~~  
Greatest drop in recall in 2 by 20 min mark

Serial Position Effect - ~~Primacy~~ Primacy Effect start  
Recency Effect end

Saving : Rehearsing after completely forgetting is slightly faster

## MISINFORMATION EFFECT

\* Loftus & Palmer - film of traffic accident

- How fast were the cars going when they smashed / collided / banged / hit / crashed  
40.8      39.3      32.1      24.0      31

- After 1 week, "do you remember seeing any broken glass?"

↳ actually NO glass	Smashed	Hit	Control	
Yes	16	7	6	
No	34	43	44	

Acquiescence bias  
(leading answers)

**Eyewitness Testimonies:** Post event info, Weapon Focus, Intoxication, Suggestibility, Disregard (time)

Perception + what happened next ⇒ taken as 1 memory (not untangled)

\* Gonsalves et al - Visualising something and actually perceiving something activate similar brain areas.

RUBBISH

- Repressed Memory: Therapists "re~~re~~cover memory"

- Source Amnesia: Remember info, but forgetting source

Recall VS Recognition

Context Effects: Place Congruent Memory

Mood: Mood Congruent Memory (NOTE: good mood improves mem)

Alcohol

## NEUROBIOLOGY OF MEMORY

\* Hippocampus: new memories formed.

↳ Densely packed with neural layers

- Connection to cortex → ~~LS~~ LTM

Classical Conditioning: memory → pathways are formed



## FORGETTING

- Encoding Failure - Attention to detail
- Storage Decay - Fading
- Retrieval Failure - 'Tip of the Tongue' phenomena
- Interference - Proactive : earlier info disrupts  
Retroactive : later info disrupts
- Aging - Episodic memory is affected not ~~sem~~ semantic  
↳ hippocampus may shrink ⇒ EXERCISE !
- Alzheimer's Disease -  $\beta$ -amyloid plaques spread over the cortex
- Dementia - vascular dementia (not enough bloodflow)
- ~~Ret~~
- Amnesia
  - ↳ Retrograde : Events before incident - brain injury/stroke
  - ↳ Anterograde : new memories - brain injury, sleeping pills, alcohol
  - ↳ Psychogenic Amnesia - traumatic event (absence of brain injury)