

3. Richards shit

11 May 2019 16:54

VISION

Human vision samples only a small part of the EM spectrum

MARR AGAIN

Levels of Abstraction:

- 1) Computational Level: what is computed
- 2) Algorithmic Level: the procedure
- 3) Implementational Level: the physical substrate

Ipsilateral projection: left side of body projected to left hemisphere

Contralateral projection: Left hemisphere strongly controls RHS of body (in vision it occurs for each eye.)

PERCEPTUAL SPAN

Region of perceived text

Receptive field: part of visual field that affects level of activity of neurons

Fovea: back of retina - responsible for high fidelity visual processing

Foveal Region: section of words/letters projected onto fovea that clear+accurate






Parafoveal Region: either side of the foveal region in which letters are partially processed

Regressive Saccade: next fixation point is opposite to direction of reading

Hopter: point both eyes focus on (processing is different outwith)

Binocular Disparity: distance between 2 fixation points of L/R eye

"GOOD FORM"

Similarity	
Proximity	
Good continuation	
Symmetry	
Periodicity	

VISUAL CUES

Edge Tint: naming verification tasks showed no difference between objects & cartoons

Central Bias: tendency to fixate in middle of picture for initial viewing

Movement Parallax: nearer things seem to be moving faster relative to more distant things

Binocular disparity: slight differences between what each eye sees

Scale Invariance: property of the natural world we might expect cognition resonate with

IDIOGRAPHIC VS NOMOTHEIC

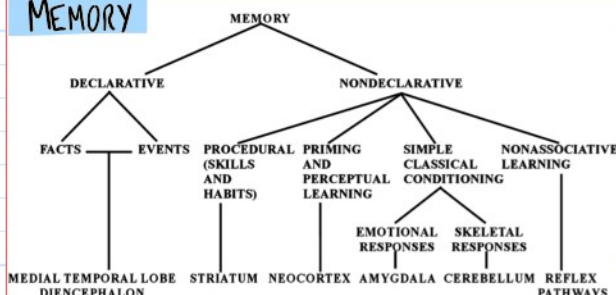
IDIOGRAPHIC (specify)

- Therapy
- Case Studies
- Culture
- Philosophy

NOMOTHEIC (types & general)

- Experiments
- Technology
- Generalisations

MEMORY



Declarative can be stated in language/
some other formalism

Non-Declarative things that defy linguistic
description

- always liable to defeat by new data

Superpositional Storage: new memory laid over same substrate as old memory \rightarrow both coexist
Catastrophic Interference: laying down later memory interferes w/ storage & access of old memory
Oscillator: flips between 0 or 1 at a frequency to date stamp events

Ways to define memory

- 1) By content
- 2) patterns of impairment
- 3) anatomical locations

★ Tradeoff between trying to capture all the data points & having the fewest parameters

RETRIEVING & FORGETTING

Factors affecting:

- strength of trace
- context of event
- temporal recency

BRAIN SHIT

Cortical Equipotentiality: multipurpose nature of neocortex

Glia cells: cells other than neurons which facilitate fast transmission

Penfield's Homunculus: topographic mapping of parts of body onto sensory & motor cortex

Distributed Learning: structured changes associated with learning occurs across many different assemblies of neurons

Neo-cortex: part of cerebral cortex that processes sight & hearing (most recently evolved)

Division of labour between different specialisms

Coarse Coding: hemispheric style of seeing the bigger picture (Qualitative)

Fine Coding: seeing the small details (Qualitative)

Ventral stream: object and visual identification & recognition

Dorsal stream: processing objects spatial location relative to viewer

NEUROIMAGING "it's all about blood"

IMAGING TECHNIQUES

Near Infra-Red Spectroscopy (NIRS)

Doppler sonography

Positron Emission Tomography (PET) - Radioactive water injected into participant \rightarrow Parallel slices imaged

Magneto-Encephalography (MEG) - Picks up magnetic disturbances outside skull.

Functional Magnetic Resonance (fMRI) - magnetic field aligns protons (hydrogen), EM pulse causes emission

Electro Encephalography (EEG) - Skullcap ting (accurate timing)

Diffusion tensor tractography

Transcranial Magnetic Stimulation (TMS) - Disrupts electrical activity on cortex \rightarrow Function can be localised

Direct Current Stimulation (DCS)

Single cell Recording

Facial Recognition

The problem: how to identify a person through expression change, lighting change, head tilt.

★ You want emergent cognition to be specified in as general terms as possible

THE EXPERIMENTUM CRUCIS

★ What can studies of atypical development teach us? (looked at children who were profoundly visually/auditorily impaired)

- Activity is critical in a world in which the culture is objectively expected & changed in social practices
- We internalise this & become conscious humans in the process

THE INCEST TABOO

Inbreeding increases homozygosity

- deprives survival

\rightarrow genetically encoded module, created by natural selection.

- Explanations: avoid disruption in family, force intergroup alliances by out-breeding

MODULARITY

- a) Informationally encapsulated
- b) Fast
- c) Mandatorily activated
- d) Domain specific
- e) Shallow outputs
- f) Limited accessibility
- h) Fixed architecture

"Our modern skulls house a stone aged mind"

COGNITIVE MODELLING

Concrete Universals: Basic form of a concept, can be a building block for related concepts (stem cell)

Abstract Universals: Name of a set, intended to capture that which is similar across entities but doesn't participate

LANGUAGE USE

for the emergence of language:

- Breathing, upright posture, group structure/cohesion, neural pathways, vocal tract, facial muscularisation
- brain size, functional connectivity, eye contact, gesture, extended juvenile period, planned action sequences...
- we orient to novelty
- The shwa (open vowel) sound is the simplest and most commonly occurring sound in speech

HEMISPHERICITY

hemispheric independence has increased during evolution

hemispheric asymmetry is radically greatest in the human brain

- bigger brain = greater travel time = greater hemispheric autonomy

Hemispheres are relatively encapsulated, autonomous, differentiated

- in development: symmetrical movements → asymmetrical movements

Lateralisation: A division of labour between the left half of the brain and the right half

VOCAL IMITATION

only 8 lineages show vocal imitation

AUTISM

Language:

- delayed development
- comprehends literal meanings

Mindblindness Theory: lacks functioning theory of mind

Weak Central Coherence Theory: cannot integrate perceptual/cognitive domains

Empathising/Sytemising Theory: essentially bimodal cognitive skills E-S, ADS maladaptive extreme of poor empathising & high systemising

Extreme Male Brain: Extreme version of male cognition

JAMES IV - INCHKEITH EXPERIMENT

2 children raised on island by mother who couldn't speak english

- equivalent to feral children (kind of).

READING - INTERACTIVE ACTIVATION MODEL

- Strokes make up the letter
- Strokes activate letters in different positions
- letter recognised by becoming more activated than any other in that position
- Recursive four words