

DISORDERS OF HIGHER NERVOUS FUNCTIONS

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Memory and memory disorders

Current topics:

- **Memory and memory disorders**
- **Disorders of symbolic functions**
- **Disorders of intellect**
- **Disorders of thinking**
- **Disorders of affectivity and emotions**

Terms

Definition: ability to store and retrieve past data, events and images at will

Modified by:

- ⇐ consciousness (general and selective attentiveness, alertness)
- ⇐ interest (motivation, mood, reward, etc.)

Memory characteristics:

1. **Exactness** (details, objectivity)
2. **Familiarity** (confidence)
3. **Novelty** (new vs. old)
4. **Orientation** (time, space)

Memory skills:

mechanical (kids), logical, deductions (adults), visual, auditory, etc.

Phases :

1. **Reception** (encoding) - better in youth worse in elderly
2. **Retention** (storage)
Ebbinghaus curve of forgetfulness
3. **Recall** (retrieval, reproduction)
Ribot gradient (in retrograde amnesia one tends to lose recent memories compared to old ones)

Attention → Encoding → Storage → Retrieval

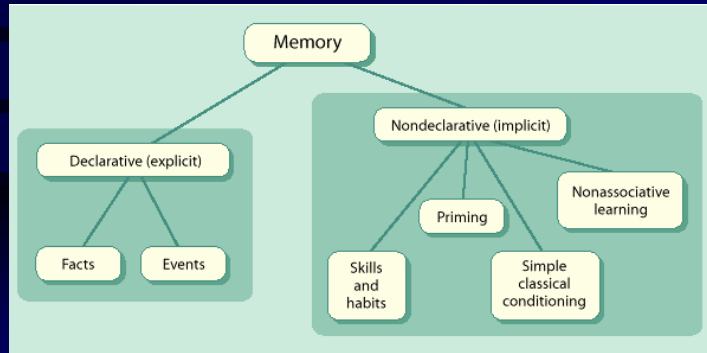
Types of memory

According to duration

- very short (register) (ms, sec)
- short (min, hours)
- long term (years)

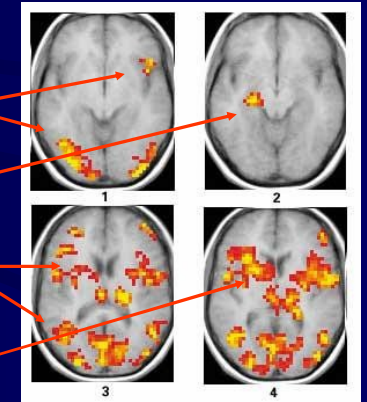
According to processing:

- working memory
- permanent memory

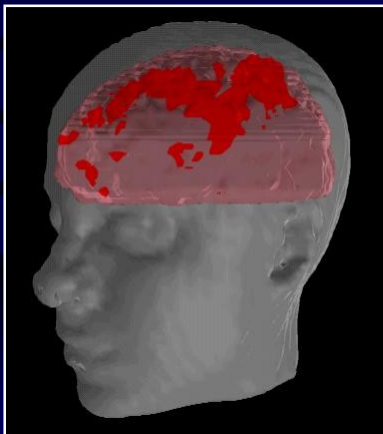


Visual memory task example

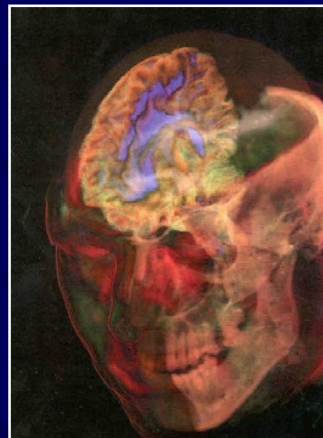
1. Perception of new face - visual and frontal cortex
2. Imagination of recently seen face - hippocampus
3. Comparison with previously remembered faces - visual cortex + parietal + frontal assoc. cortices
4. Decision whether the face was seen before - frontal cortex



- No theory that explains why we forget
- Forgetting follow some rules - not known
- Some rehearsed knowledge will never be forgotten ('permastore')



Working memory



Permanent memory

Disorders of memory I

Loss of memory - forgetfulness

Amnesia

- retrograde (RA), anterograde (AA) (post-traumatic)
- total (trauma) vs. partial (delirium)

Examples: trauma (bilateral temporal damage, prefrontal laesions)

Hypoxia, ischaemia, avitaminosis B1 (Wernicke-Korsakov sy.), epilepsy, malnutrition CO poisoning, commotio, contusion, degenerative brain diseases

Specific disorders of memory

1. **Hypermnnesia** (↑ recall + ↑ sureness <-> ↓ accuracy + ↓ storage)

Examples: mania, delirium, schizophrenia

2. **Hypomnesia** (↓ recall + ↓ sureness <-> ↑ storage ↑ pr)

Examples: drunkenness (alcohol intoxication), brain trauma (commotio)

Disorders of memory II

3. Dysmnesia

A. Paramnesia - impaired timing of memory traces

Ekmnesia (e.g. recent event recalled as far past event)

Duplicity (e.g. division of one event into 2 different events)
joining of two different events into 1 event)

B. Allomnesia – distorted sureness (certainty) of memory traces

Cryptomnesia (hidden memory) - experiences that people believe to be original but which are actually memories they've forgotten.

Illusions of memory – sureness that certain pictures, sounds or events happened before (illusionses deja vu); people remember events that never happened

C. Confabulations (false memories) - fantasy that has unconsciously replaced real facts in memory (e.g. abduction by aliens)

D. Memory hallucination (Pseudoreminiscence) – experience of memories to something that never existed (e.g.

E. Pseudologia phantastica - the form of falsifying reality (not ordinary lying, or delusion, or false memory)

Hemispheric specialities in cognitive functions

	Left hemisphere	Right hemisphere
Cognitive processes	Speech (full), verbal analytic, deductive sequential processing conscious, planned	Symbols, iconic holistic, synthetic simultaneous processing subliminal, automatic
Visual functions	Right visual field Sceneries	Left visual field Faces
Motor functions	Right side of the body	Left side of the body
Emocional functions	Poditive emotions Laesions mostly lead to depressive mood Recognition of emotions	Negative emotions – laesions lead to euphoria Expression of emotions
Constructive functions	Abstraction, rational, reasoning	Factual, intuitive,
Meaning	Me in the word	The word inside of me

Disorders of symbolic functions

Disorders of higher nervous functions

1. Dysphasias (disordered usage of symbols)

Aphasia (speech)

Agrafia (handwriting, printed text)

Alexia (reading) Acalculia (calculations)

2. Agnosias (disordered perception of the body and the world outside)

3. Dyspraxia (disordered execution of motor programs)

Disorders of speech

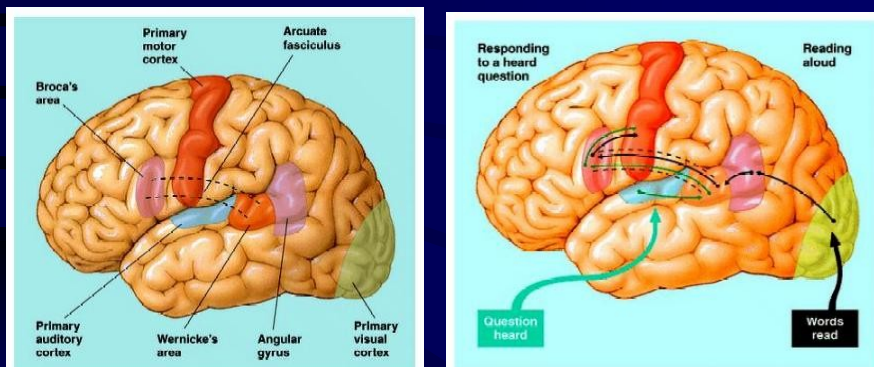
- **Aphasia (dysphasia)** - spontaneous production, understanding and reproduction of read or heard words
- **Disorders of speech content and fluency**
 - Paraphasia (verbal, literary) - erroneous speech (syllables, words)
 - Paralexia (verbal, literary) - erroneous reading (syllables, words)
 - Neologisms - new nonsense words instead of proper naming
 - Circumlotio - description instead of proper name
 - Telegraphic speech - fragmentation and reduction of speech
 - Echolalia - automatic repetition, usually without comprehension, of all or part of what someone has just said (children when learning speech)
 - Glossolalia - rapid, fluent burst of speech, usually unintelligible
 - Stuttering or stammering -
 - Cluttering - uncontrolled speed of speech

Aphasia (dysphasia) - I

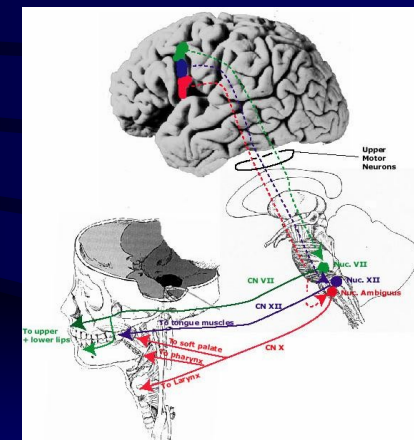
Main types

1. **Expressive, motor, Broca's** - posterior-inferior frontal lobe
speech fragmented; seeking for common words, names, terms; understand to listened speech; reading & writing skills little impaired
2. **Receptive, sensory, Wernicke's** - posterior-superior temporal lobe
speech fluent but full of agrammatisms & neologisms; misunderstanding of listened speech; reading & writing impaired + **anosognosia** (do not realize the defect)
3. **Global sensoric-motor** - frontal & temporal lobes (occlusion a. cerebri media sin., a. carotis interna. sin.)
speech fragmented, telegraphic, reč neplynulá, strohá (pár slov, fráz opakovaných dookola), porozumenie počutému neprítomné (ani jednoduché slová); čítanie, písanie narušené

Speech regions



Speech motoric



Aphasia - II

Other types

1. **Auditory sensoric** - temporal lobe; paths between primary and secondary auditory cortex
speech is fluent, understanding to talk is impaired
2. **Conductive** - g. supramarginalis, insula, fasc. uncinatus (path between temporal lobe and pre-motoric cortex)
speech is fluent, understanding to speech normal, impaired reproduction of heard speech
3. **Anomia** - g. angularis, gg. temporales sup. (transient hypoxia etc.)
speech is fluent, problems with isolated usage of names, terms etc.
4. **Mixed motoric and sensory**

Agnosia - I

1. **Tactile (astereognosia)** – false identification of things by touch
Amorphognosia - shape, surface
Ahylognosia – matter substance (wood, metal, liquid etc.)
Parietal association cortex
2. **Visual** – misidentifications of objects by vision (not blindness !)
Global – identification by touch, hearing and smelling preserved
Temporal-occipital-parietal lobe borderline zone
Colors – loss of colour concept (different from color blindness)
Corpus callosum, occipital lobe
3. **Auditory** - misidentification of meaningful sounds (not deafness !)
Verbal – inability to recognize sounds of speech from other sounds
Amusia – inability to recognize melodies, music from other sounds
Temporal-parietal borderline zone

Other phatic disorders

• Graphic symbols of speech

- **Agraphia** - acquired inability to write the letters, words (literary, verbal)
- **Dysgraphia** - developmental inability to write
- **Alexia** - acquired inability to read and comprehend the text; as a part of aphasia (e.g. expressive, global, sensory, mixed) or isolated (literary, verbal, spatial),
agnosic alexia (word blindness) - unable to identify the letters and words,
aphasic alexia (visual asymbolia) - can neither read nor write alexia+ agraphia
- **Dyslexia** - developmental (social) inability to read (boys > girls)
- **Paralexia**

• Other symbolic disorders

- **Acalculia (+alexia)** - inability to manipulate with abstract numbers
- **Asymbolia (e.g.pain)** – various somatic experiences (agnosia)

Agnosia - II

4. **Asomatognosia** Parietal lobes (mostly parietal)
Autotopagnosia – wrong determination of different parts of the own body
Acoenesthesia - misidentification of the own body
Prosopagnosia – wrong identification of human faces
Anozognosia - unawareness of own illness or the deficits resulting from illness (transiently in 50% of stroke victims)
6. **Sy. of sensory extinction**
moderate form of combined tactile and visual agnosia (ignoring of perceptions from impaired part of the body)
7. **Neglect sy.** (sensory extinction, autotopagnosia, visual agnosia)
7. **Gerstman sy. (agraphia, acalculia, alexia, agnosia of fingers, „right-left“ confusion)** G. angularis of dominant hemisphere

Apraxia (dyspraxia)

A. General dyspraxias

1. **Ideative apraxia** Diffuse cortical damage
purpose of movement is unrecognized; plan and execution of movement are correct
2. **Ideomotoric apraxia** Gg. pariet. inf + tempor. sup.+ frontalis
purpose of movement is recognized ; plan of movement is missing (which separate activities are involved and what is their order)
3. **Constructive apraxia** Premotor area - frontal lobe
intention, purpose and plan of movement are correct; execution of movement is impaired (butter-fingers, clumsiness)

B. Specific dyspraxias

1. **Constructive dyspraxia** (perspective, shapes, geometry)
2. **Speech dyspraxia** (motor program of voice muscles)
3. **Mimic dyspraxia** (disorder of articulation and facial mimic)
3. **Gait apraxia** (frontal ataxia)
4. **Dyspraxia of corpus callosum** (cross - coordination of limbs)

Intellect disorders

• Definition

Intellect (mind) – complex of psychic functions defining the persons abilities to dominate in certain area; inborn and acquired mental comprehensions, knowledge, solutions, experiences + usage of this knowledge (memory, abstract thought, analysis and synthesis, creativity, motivation, judgment, vocabulary)

Intelligence – hereditary basis of intellect (individual abilities)

Talent – well developed intellect in certain (mostly) physical dispositions and activities (art, science, technical skills)

Geniality – exceptional ingenuity and creativity in certain rather abstract areas of human thinking (science)

• Disorders

1. **Mental retardation (oligophrenia, mental deficiency)** – inconsistent or incomplete development of intellect
2. **Mental degradation (dementia)** – reduction, or gradual or sudden loss of intellect after 2nd y of life

Disorders of intellect

Mental retardation

- **Characteristics:** incomplete psychomotoric development of speech, abstract thoughts, cogitation, reasoning, memories, learning disabilities incl motor skills (Psycho-motor r.), Social oligophrenia
- **Etiology:**
 - hereditary (phenylketonuria, fragile X chromosome),
 - inborn – congenital (Down sy., Klinefelter sy., Turner sy.),
 - perinatal (labor injury), postnatal (infection, intoxication),
- **Grades:**
 1. **Mental retardation** - moron, freeble-minded IQ 70-80
 2. **Mental deficiency (hypophrenia):**
 - Light (debility) IQ 50-70 (mainly abstraction)
 - Mild (imbecility) IQ 35-49 (speech)
 - Severe (idiotism) IQ 20-34 (most qualities)

Mental degradation (demencia)

Characteristics:

- extinction of mental abilities (memory), practical skills, verbal communication, social habits; retrieval of new knowledge mostly affected
- develops over time (experiences may compensate learning disabilities)
- parcial demencia vs. total demencia
 - Heller' infantile demencia (demencia occurring in childhood)
 - Pseudodemencia – mental supression - „purposeful“ (specific) deficit for certain tasks, events memories, e.g. stressful part of life (violence)

Causes: difuse organic (structural), biochemical brain changes

PA: gray matter atrophy, frontal-parietal area

Manifestation: disorder of intellect+ memory+ emotion+ action

1. Disorders of attention -> learning, retention of data
2. Disorientation in time and space, delayed thinking, loss of criticism confabulations, depressive mood, dysphoria, psychomotoric apraxia
4. Wasting of self-care practise, ethical limitations, abusiveness, irresponsibility, anosognosia

Mental degradation (dementia)

Clinical syndromes:

Organic psychosyndrome (trauma, inflammation, hypoxia, intoxication (CO), ATS, hereditary & acuire neurodegenerative diseases

Dementia syndrome - disordes of memory and thoughts prevail

- Common reasons: Alzheimer' disease, cerebrovascular disorders - multinfarction demencia, AIDS - demencia complex, Parkinson' disease, metabolic syndromes, cerebral tumors, hydrocephalus
- Rare reasons: neusyphilis, Huntington' disease, Creutzfeld-Jakob' disease, Wilson' disease,

Pseudodemencia – without organic damage, rather specific involvement

Korsakoff' syndrome – memory impairment, confabulations (trauma, intoxications, imflammations in CNS)