Introduction to studies

Learning skills, lesson 2

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Jaana Holvikivi

Contents

- Intelligence and expertise
- Learning, perception and memory
- Brain, emotion and cognition
- Creativity
- Learning styles & strategies
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Intelligence and expert performance

Problem solving by experts and novices

- Experts possessed greater domain-specific knowledge about a task that novices. Experts excelled mainly in their own domains and did not have greater knowledge or general problem-solving abilities.
- Experts perceived meaningful patterns, redefined and classified problems according to underlying principals. They organize their knowledge more hierarchically than novices.
- Experts performed quickly because they took strategic shortcuts.
- Experts spent more time in analyzing and planning.
- Experts redefined and reinterpreted the task.
- Experts monitored their performance more carefully. Good self-regulation.
- High levels of motivation.

Intuitive and formal reasoning systems

- deductive reasoning
- categorization
- analogical reasoning
- decision-making
- belief formation
- social cognition
- Western: analytical mode of thought dominant (?)
- East Asian: holistic mode of thought (?)

Contextualization in reasoning

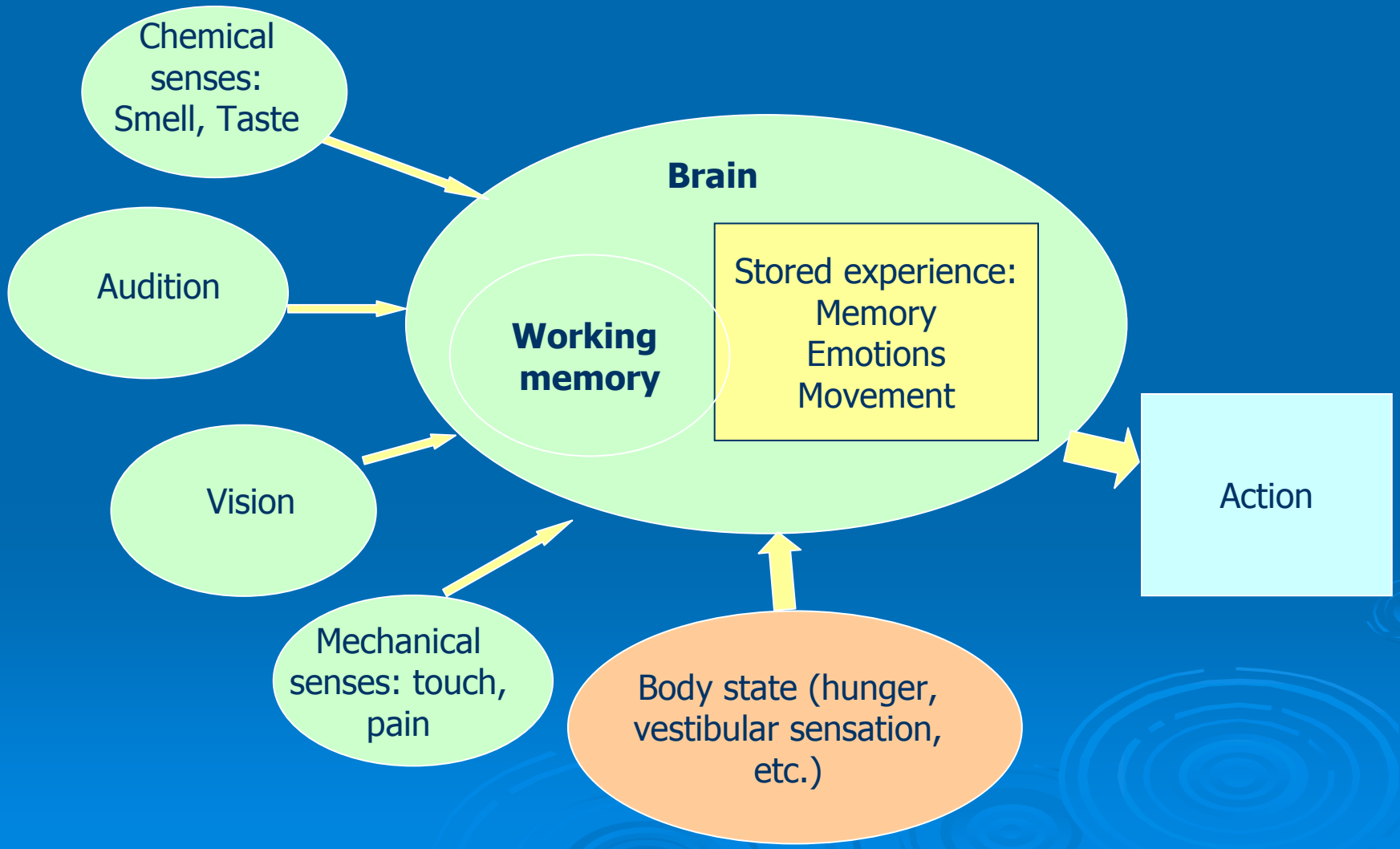
- Evolution theory:
  Environment of evolutionary adaptedness favored the tendency to contextualize a problem with as much prior knowledge as is easily accessible.
- To see deliberate design and pattern in situations that lack intentional design. (superstition)
- Seeing intentional design in random events.
  - Financial analysts tend to concoct elaborate explanations for every little fluctuation in stock market prices even though the fluctuations are mainly random.

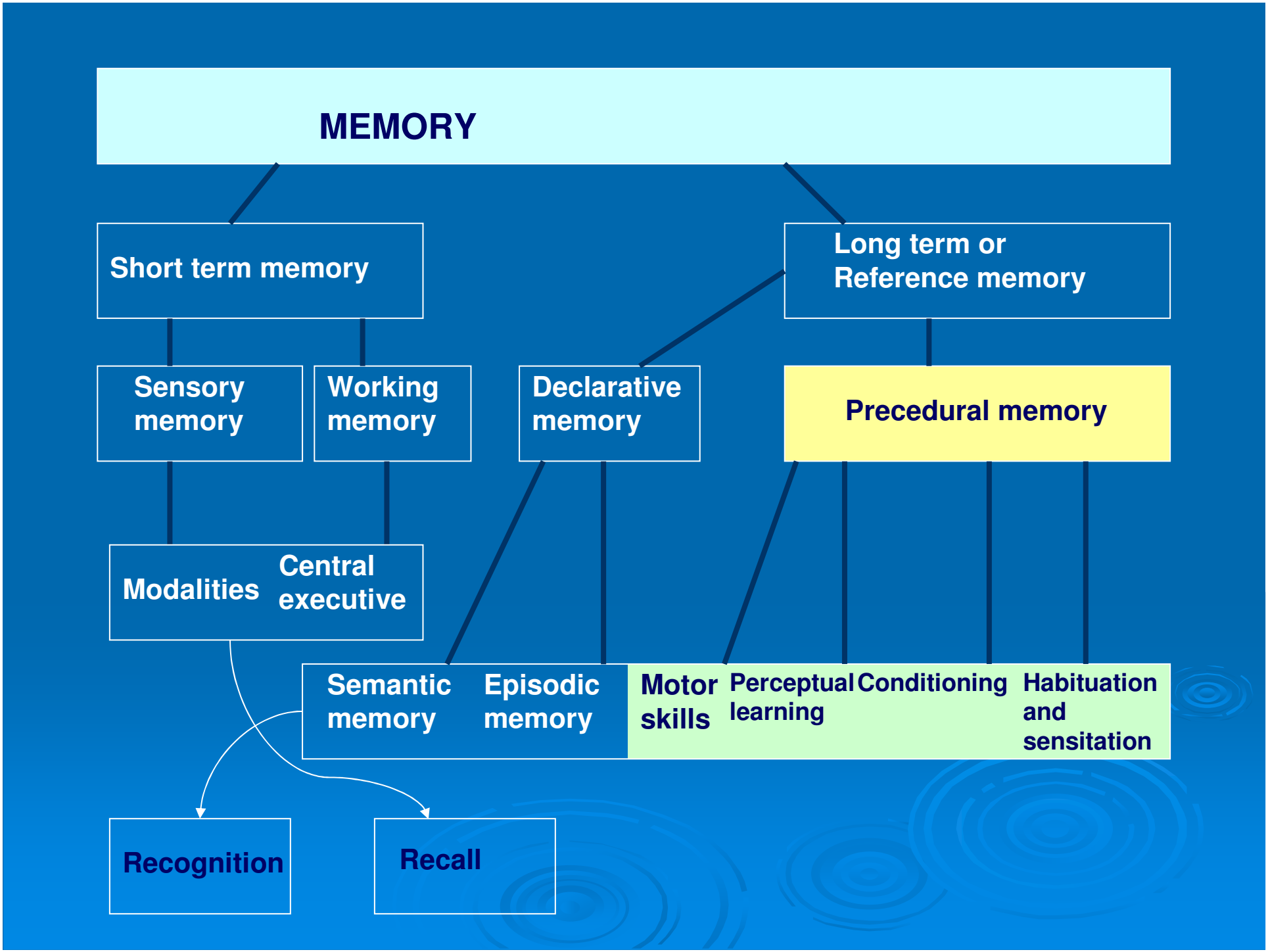
- The intentional interpreter in our brains does not automatically decouple itself from problems when it is not needed.
- The narrative mode of thought.
- The tendency to socialize problems.

Learning, perception and memory


Emotions
Memory and knowledge
Mood
Learning situation
Concentration: alertness motivation
Perception

Modalities: perception




MEMORY
Short term memory
Long term or
Reference memory
Sensory
memory
Working
memory
Declarative
memory
Precedural memory
Modalities
Central
executive
Semantic
memory
Episodic
memory
Motor
skills
Perceptual
learning
Conditioning
Habituation
and
sensitation
Recognition
Recall

Development of brain

- The process of neurogenesis populates the brain until the maximum number of neurons has been reached at age 2,
- then programmed cell death cuts the growing brain down to size.
- During adolescence the brain goes through a process of synaptic pruning.
- Frontal cortex develops last, until over 20.
- Brain plasticity decreases in time, the localization of functions stays fixed in adults.

Improving memorizing

- Timing of activities is decisive when storing information to the memory.
- In an experiment, where fruit flies were trained to avoid a particular odor, it was found that massed training, giving the flies the same number of training experiences in rapid succession, did not produce an enduring memory;
- spaced training, with session intervals of 15 minutes, did produce.
- Distributed practice works better than massed practice.
- Spreading out your study is better than cramming.
- There is a specific time interval, about six to eight hours after training, when the neural activity is particularly strong, and lasting memories are formed.

Improving memorizing

- Memory consolidation takes place while we sleep, and it takes up to a few weeks of repeated rehearsal for the molecular reactions controlling gene and protein synthesis to record long-term memories.
- If the interval between rehearsal sessions is too long, the short-term memory will have weakened too much to benefit from repetition.
- Also, having a break and relaxing after intensive working often releases creativity and yields a solution to the problem under consideration.

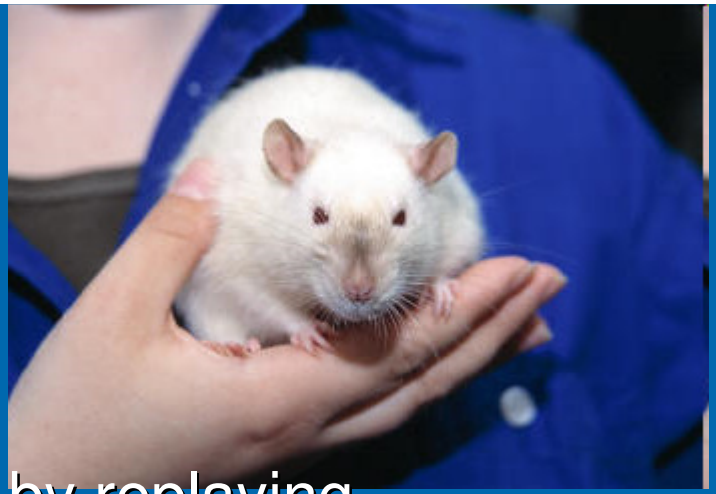
Benefits of sleep

- stores memories
- helps to attain high level of concentration
- reduces stress
- combats obesity

Multitasking

- The people who engage in media "multitasking" are those least able to do so well.
- People who routinely consume multiple media such as internet, television, and mobile phones, perform less well in tests for attention and memory.
- Distraction confuses working memory.

Memorizing



- Rats learn to navigate new spaces by replaying memories in reverse order:
- After exploring an environment such as a maze, rats typically pause to eat, groom or rub their whiskers. Electrodes in rat's hippocampus monitored so-called place neurons, which fire in specific sequence as a rat navigates a path. When various rats paused on completion of a run, the place neurons fired in reverse order from the firing that had occurred during navigation. This reverse replay occurred more frequently after walking through new mazes than familiar ones, implying that the technique plays a role in learning.

Spatial intelligence

- about half of brain cells (neurons) are specialized in motor control, movement
- about ¼ of neurons are involved in perception
- therefore, walking in nature (varied and demanding terrain) develops brain more than almost any other activity
- exercise: produces endorphins that make you feel good & helps in production of new neurons

Cognition and emotion

- Happiness and positive mood increases flexibility in problem solving.
- Affect, cognition, and motivation influence one another.

- Meaningful and emotional information is retained better in memory than purely factual information.
  - It does not necessarily indicate, however, that the memories would be accurate in relation to factual events, especially if they are connected to strong feelings.
  - Memories do change.

Cognition and emotion

- Stress weakens attention and working memory.
  - It rises levels of noradrenalin, dopamine, and cortisol in the brain, and induce neuron destruction in hippocampus. The production of new neurons in hippocampus is also reduced under stress.
- Laughing has numerous benefits for health as well as learning.
  - Laughing reduces stress because the level of cortisol is reduced and levels of epinephrine decrease.
  - Laughing improves memory: Students who watched an episode of "Friends" after studying for an exam, got 20% better grades than the control group that did not have fun.

Valuation

- Positive or negative impressions are formed in a mere "blink".
- People evaluate everything as good or bad.
- We feel before we analyze.
- Decisions made too quickly are not the best:
  - facing with complex decisions involving many factors, the best advice is to take your time - to await the intuitive result of unconscious processing

Music in brain

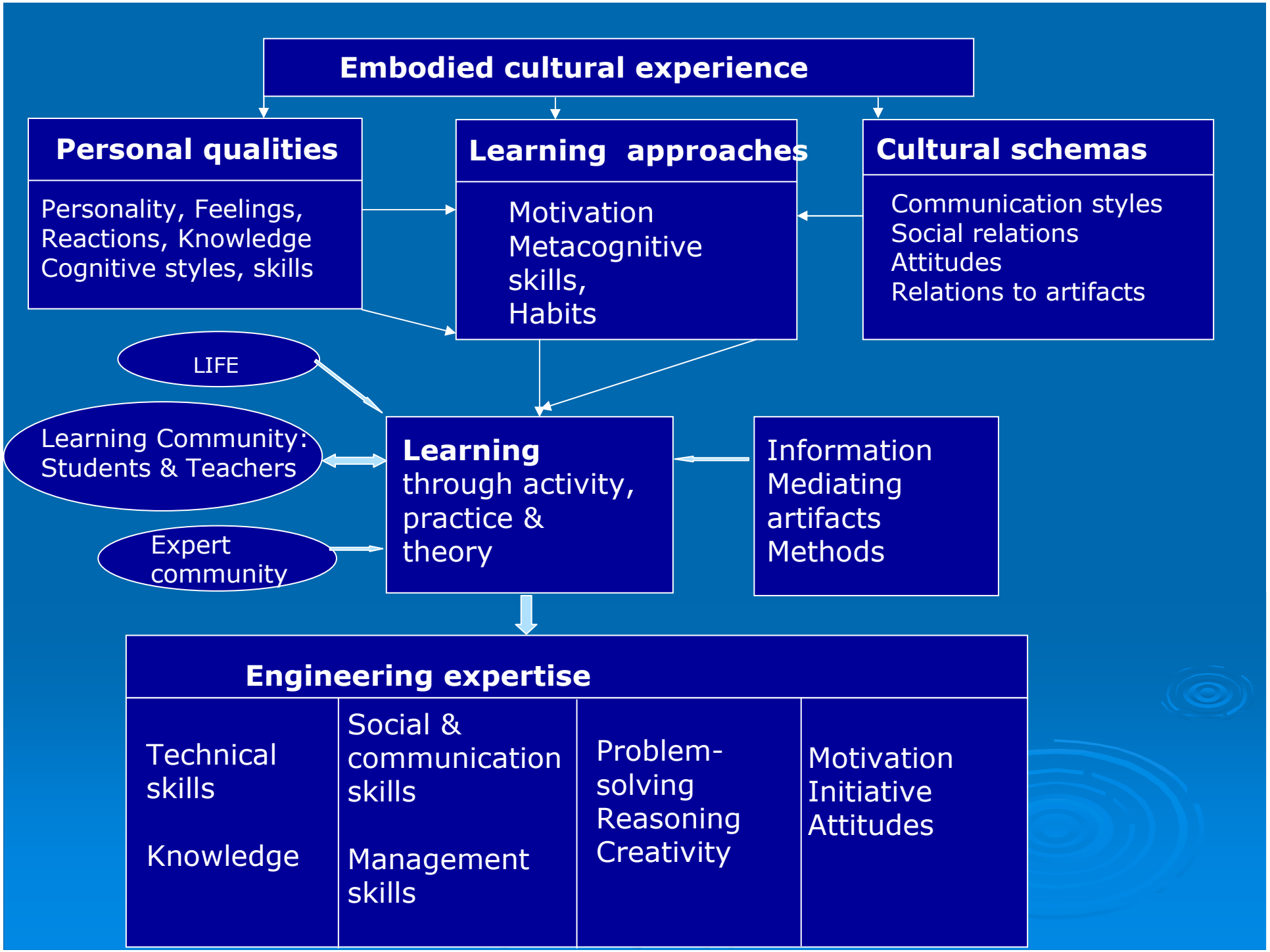
- Brain imaging studies: when people listen to music, the neural activation proceeds from the auditory system to regions related to planning, expectation and language as well as arousal, pleasure, mood and rhythmic movement.
- Music engages nearly every area of the brain.
- Music promotes cognitive development.
- Music reaches deep into the brain's most primitive structures, including the "reptilian brain" tied to motivation, reward and emotion.
- Music elevates dopamine levels.

Lying

- Pathological lying:
  liars' brains had 22 % more white matter in the prefrontal regions that govern decision making and judgment. The excessive white matter creates an abundance of connections among otherwise contradictory, compartmentalized data.
- MRI scans of people lying in real time also point to excessive activation in the prefrontal lobes.

Expatriate creativity

- a study in 2009 in France/ US
- people who had lived abroad more consistently showed innovation and creativity
  - in negotiations,
  - in the use of ordinary items,
  - in drawings.
  - http://50.insead.edu/press_releases/insead-research-shows-going-abroad-linked-creativity


Embodied cultural experience
Personal qualities
Personality, Feelings, Reactions, Knowledge
Cognitive styles, skills
Learning approaches
Motivation
Metacognitive skills,
Habits
Cultural schemas
Communication styles
Social relations
Attitudes
Relations to artifacts
LIFE
Learning Community: Students & Teachers
Expert community
Learning
through activity, practice & theory
Information
Mediating artifacts
Methods
Engineering expertise
Technical skills
Knowledge
Social & communication skills
Management skills
Problem-solving
Reasoning
Creativity
Motivation
Initiative
Attitudes

Types of intelligence and teaching

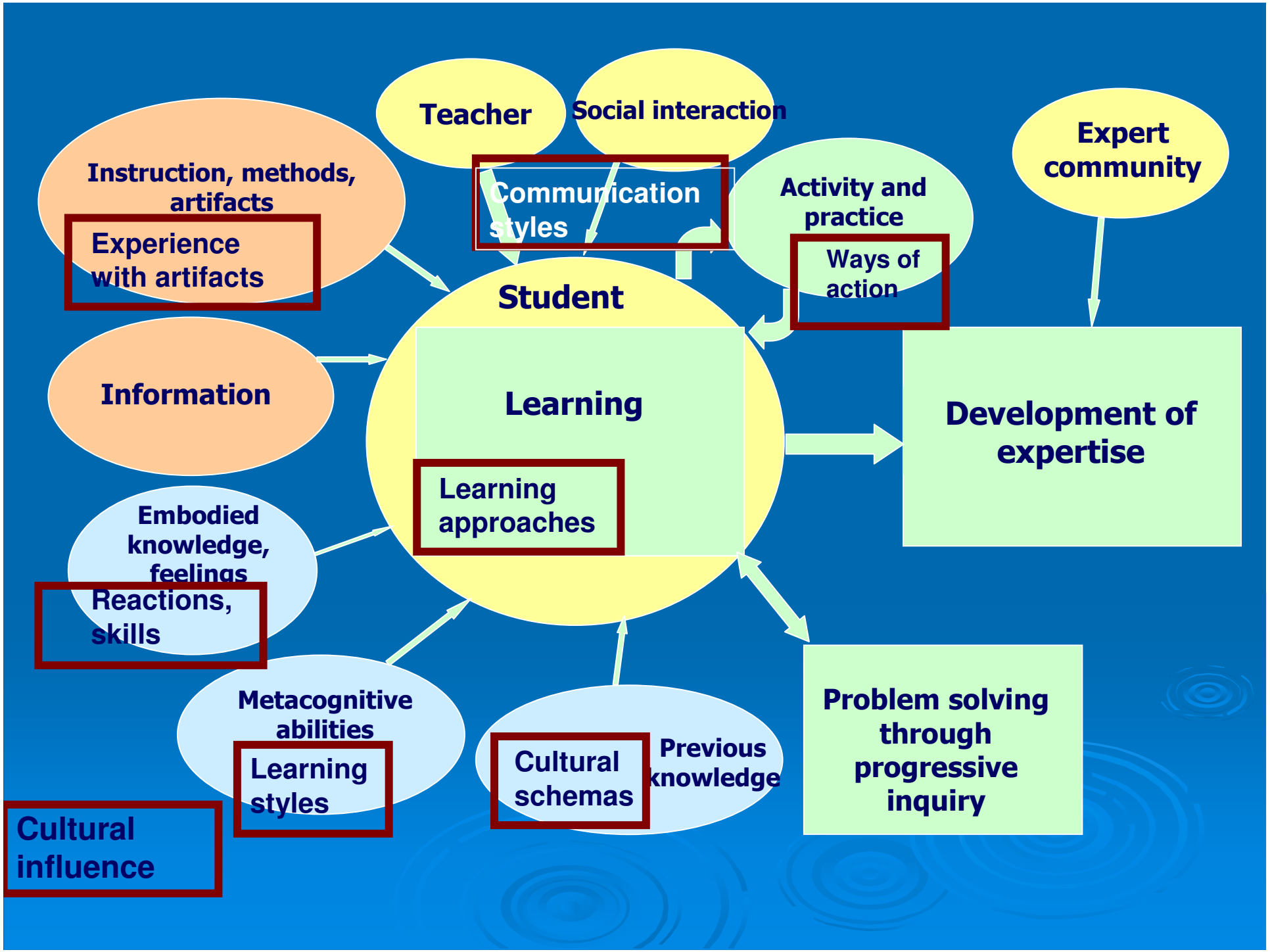
- Experiment with four methods

- One group was subjected to the "traditional" teaching method that is called *memory condition*, which includes presenting the material which students have to memorize and represent.
- In the *analytical condition*, students are asked to compare and contrast theories.
- In the *creative condition*, they are asked to formulate their own theory based on the facts.
- In the *practical condition*, they are asked to apply the theoretical knowledge in a real-life problem.

- All students were evaluated in the same way for memory, practical, analytical, and creative quality. The results confirmed that students who got instruction that matched their cognitive style, performed better than others.
- Memory condition teaching resulted in an inferior outcome than other methods.
- Students who were subjected to a multicondition teaching that included analytical, practical, and creative methods, performed best in all types of tests that included practicing analysis, creativity, and practical application,
- even in better memorization of the material than the memory condition students
- Students who were strong in analytical skills, had an advantage over others in all conditions, a consequence of the emphasis on analytical way of teaching in all school instruction.

Growth mind-set

- Focus on effort rather than on talent produces high achievers in school life.
- Attributing poor performance to a lack of ability depresses motivation and leads to a helpless attitude.
- Mistakes are problems to be solved!
- Motivation: those who place high premium on learning rather than on getting good grades, earned the best grades


Teacher
Social interaction
Instruction, methods, artifacts
Experience with artifacts
Communication styles
Activity and practice
Ways of action
Expert community
Student
Information
Learning
Learning approaches
Development of expertise
Embodied knowledge, feelings
Reactions, skills
Metacognitive abilities
Learning styles
Cultural schemas
Previous knowledge
Problem solving through progressive inquiry
Cultural influence

Possibly conflicting expectations about academic activities

Academic activity	Student's expectation	Supervisor's expectation
Learning	teacher-led	student takes responsibility for own learning
Lectures	contain the complete course; all facts and right answers are provided	should sensitize students to key issues; developing of ideas through self-study
Teacher's role in seminars	provides unquestionable facts	raises argument, stimulates discussion
Course work	Right answers should be learned and reproduced on demand	Problem solving and original approaches are valued
Dissertations	Copying and plagiarism are legitimate since the outcomes contain correct information	Critical argument, discussion, evidence, evaluation, and originality are valued; plagiarism virtually a crime
Learning	rote learning (by heart) acceptable	student develops an ability to think

British academic expectations	***Alternative academic expectations***
Individual orientation	Collective consciousness
Horizontal relations	Hierarchical relations
Active involvement	Passive participation
Verbal explicitness	Contextualized communication
Speaker/ writer responsibility	Listener/ reader responsibility
Independence of mind	Dependence on authority
Creativity, originality	Mastery, transmission
Discussion, argument, challenge	Agreement, harmony, face
Seeking alternatives in group	Single solution for pragmatic reasons
Critical evaluation	Assumed acceptance