Lecture #9

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January 30, 2006

MichiganTech

Service Processes & Systems
Dept. of Mechanical Engineering - Engineering Mechanics
Michigan Technological University

Services & People

- Clearly, relative to other processes, people are of fundamental importance to service processes
- What makes people (as processing agents or customers) different from inanimate elements?
- People have brains and use their senses to perceive the world around them.

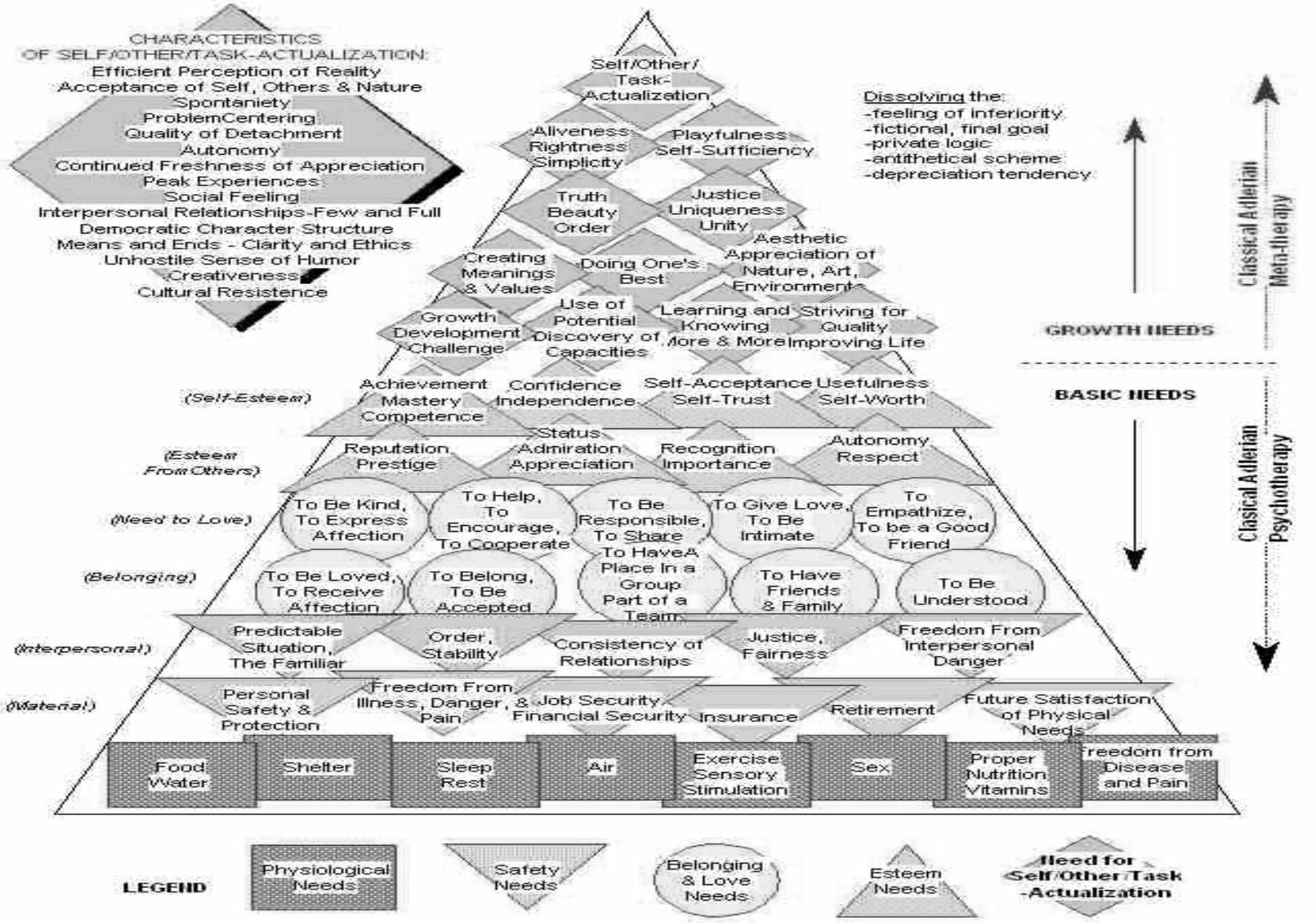
Psychology

- Plato and Aristotle tried to explain the nature of human knowledge.
- The study of mind – philosophy until the 19th century.
- Early work – laboratory methods for studying mental operations more systematically
- Behaviorism (e.g., Skinner)
- Humanism

Maslow's Hierarchy of Needs

ABRAHAM MASLOW'S HIERARCHY OF HUMAN NEEDS
Provinces of Classical Adlerian Psychotherapy and Meta-therapy

Handout for Distance Training Course DT704



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Psychology – Sub-fields

- Biological basis
- Information processing
- Development
- Interaction with others – sociology
- Mental health
- Applied psychology
  - Industrial/organization psychology
  - Human Factors

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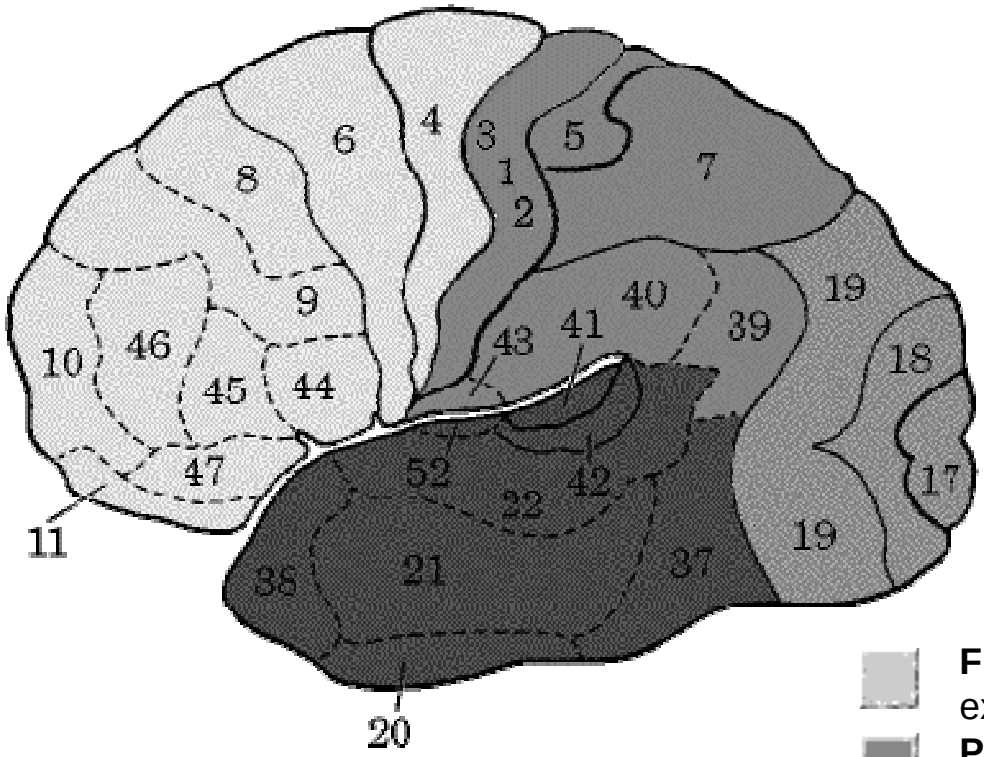


Frontal Lobe thinking, planning, & central executive functions; motor execution

Parietal Lobe somatosensory perception integration of visual & somatospatial information

Temporal Lobe language function and auditory perception involved in long term memory and emotion

Occipital Lobe visual perception and processing

Senses

- “Sense" is a means by which outside stimuli are perceived. As children - five senses. At least nine different senses in humans, and a minimum of two more observed in other organisms.
- Sense "a system that consists of a sensory cell type that respond to a specific kind of physical energy, and correspond to a region in the brain where signals are received and interpreted.“
- Sight or vision - a ability to detect electromagnetic energy within the visible range (light) by the eye and the brain to interpret the image as "sight." Disagreement as to whether this constitutes one, two or even three distinct senses. Neuroanatomists generally regard it as two senses, given that different receptors are responsible for the perception of color and brightness. Some argue that the perception of depth also constitutes a sense, but it is generally regarded that this is really a cognitive brain function.
- Hearing or audition is the sense of sound perception and results from tiny hair fibers in the inner ear detecting the motion of a membrane which vibrates in response to changes in the pressure exerted by atmospheric particles within a range of ~ 9 to 20000 Hz.

More on Senses

- Taste or gustation is one of the two main "chemical" senses. There are at least four types of taste "buds" (receptors) on the tongue. The four well-known receptors detect sweet, salt, sour, and bitter, although the receptors for sweet and bitter have not been conclusively identified. A fifth receptor, for a sensation called umami, was first theorized in 1908 and its existence confirmed in 2000 – detects the amino acid glutamate, a flavor commonly found in meat, and in artificial flavorings such as monosodium glutamate.
- Smell or olfaction is the other "chemical" sense. Unlike taste, there are hundreds of olfactory receptors, each binding to a particular molecular feature, according to current theory. The combination of features of the odor molecule makes up what we perceive as the molecule's smell. In the brain, olfaction is processed by the olfactory system.
- Somatic senses
  - Touch or tactition is the sense of pressure perception, generally in the skin. There are a variety of pressure receptors that respond to variations in pressure (firm, brushing, sustained, etc.)
  - Thermoception is the sense of heat and the absence of heat (cold), also by the skin and including internal skin passages.
  - Nociception is the perception of pain. It can be classified as from one to three senses, depending on the classification method. The three types of pain receptors are cutaneous (skin), somatic (joints and bones) and visceral (body organs).

More on Senses

- **Equilibrioception is the perception of balance and is related to cavities containing fluid in the inner ear. There is some disagreement as to whether this also includes the sense of "direction" or orientation. Generally regarded that "direction" is a cognitive process.**
- **Proprioception is the perception of body awareness and is a sense that people rely on enormously, yet are frequently not aware of. More easily demonstrated than explained, proprioception is the "unconscious" awareness of where the various regions of the body are located at any one time. (This can be demonstrated by anyone's closing the eyes and waving the hand around. Assuming proper proprioceptive function, at no time will the person lose awareness of where the hand actually is, even though it is not being detected by any of the other senses).**
- **Extra-sensory perception (also called "ESP" and the "sixth sense") is a "sense" that supposedly can pick up information that cannot be obtained through the other senses. It eludes scientific confirmation and has not been proved or disproved to exist. It is often associated with fortune-telling and "gut feelings."**

Non-human Senses

- Electroception (or "electroreception"), the most significant of the non-human senses, is the ability to detect electric fields. Several species of fish, sharks and rays have evolved the capacity to sense changes in electric fields in their immediate vicinity.
- Magnetoception (or "magnetoreception") is the ability to detect fluctuations in magnetic fields and is most commonly observed in birds, though it has also been observed in insects such as bees. Although there is no dispute that this sense exists in many avians (it is essential to the navigational abilities of migratory birds), it is not a well-understood phenomenon.
- Echolocation is the ability to determine orientation to other objects through interpretation of reflected sound (like sonar). Bats and cetaceans are noted for this ability, though some other animals use it, as well. It is most often used to navigate through poor lighting conditions or to identify and track prey. There is presently an uncertainty whether this is simply an extremely developed post-sensory interpretation of auditory perceptions or it actually constitutes a separate sense.

Cognitive Science

- Cognitive science is “interdisciplinary study of mind and intelligence, embracing philosophy, psychology, artificial intelligence, neuroscience, linguistics, and anthropology.”
- Origins are in the mid-1950s – researchers in several fields began to develop theories of mind based on complex representations and computational procedures.

More History – Mental Ops.

- Numerous studies have shown that the capacity of human thinking is limited, with short-term memory, for example, limited to around seven items.
- Memory limitations can be overcome by recoding information into chunks, mental representations that require mental procedures for encoding and decoding the information.

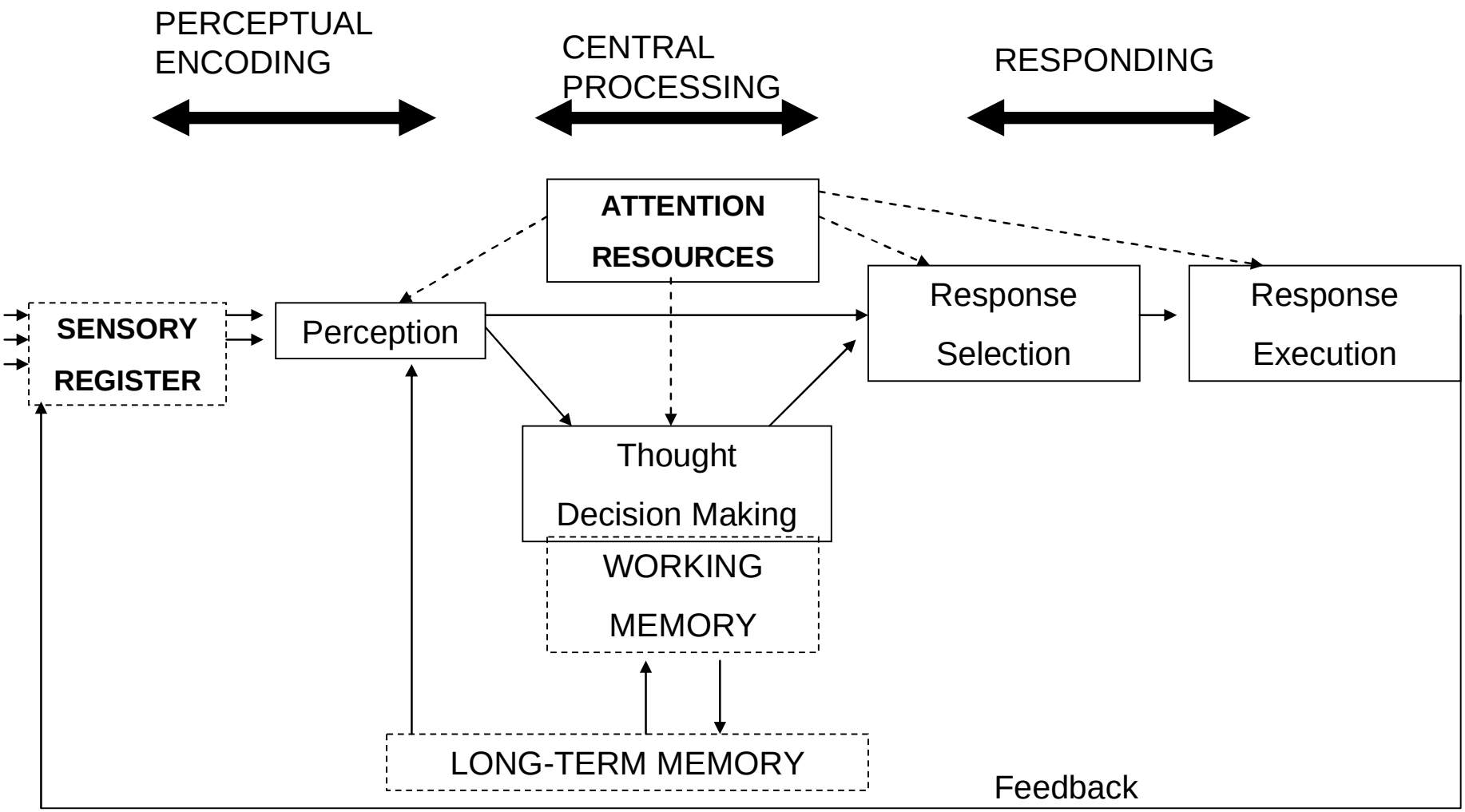
More History – Mental Ops.

- In the 50's primitive computers had been around for only a few years, but pioneers founded the field of artificial intelligence.
- The behaviorist assumptions about language (a learned habit) were rejected – researchers proposed instead that language comprehension could be explained in terms of mental grammars consisting of rules.

Human-information processing system

- It is represented by the following stages at which information gets transformed:
  - Perception of information about the environment
  - Central processing or transforming that information
  - Responding to that information
- The first two stages are the processes involved in cognition.

Information Processing Models



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Selective Attention

- Does not guarantee perception, but it is usually considered necessary to achieve it.
- We normally look at things we perceive and perceive the things we look at.
- Attention is driven by 4 factors:
  - Salience
  - Effort
  - Expectancy
  - Value

Perception

- **"The most direct consequence of selective attention selection is perception, which involves the extraction of meaning from an array (visual) or sequence (auditory) of information processed by the senses."**

Emotion

- Various theories of how emotion works
  - James-Lange: emotion is our interpretation of a physiological response to a stimuli
  - Cannon: emotion is a psychological response to a stimuli
  - Schacter-Singer: emotion is the result of our evaluation of our physiological responses, in the light of the whole situation we are in
- Emotion involves both cognitive and physical responses to stimuli

Emotion (cont.)

- The biological response to physical stimuli is called affect
- Affect influences how we respond to situations
  - positive → creative problem solving
  - negative → narrow thinking
  - "Negative affect can make it harder to do even easy tasks; positive affect can make it easier to do difficult tasks"
    - (Donald Norman)