Islamic University of Technology (IUT)

Lecture 2 - Tutorial 1

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0.1 Question

Suppose you want to analyze driver fatigue which can manifest both physically and psychologically. Physical manifestations demonstrated as general feeling of tiredness, nodding off, inadvertent napping, slowed reaction, irresistible need to sleep and so on. Whereas mental manifestations demonstrated as difficulties in memorizing information, lack of concentration, slow understanding, and poor decisions and so on. Draw a model of human information processing using the modules given in the Figure below to analyze driver fatigue. Your model should follow stages of information processing with justified sequence of the modules, appropriate links and relationships. List the fatigue manifestations for each of your designed stages of information processing.
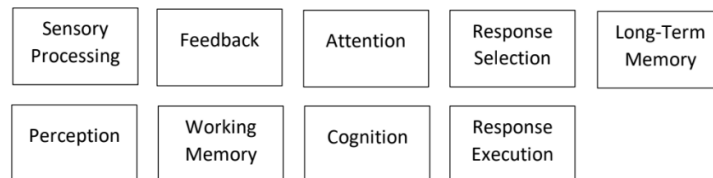
0.1.1 Model

This is a model of human information processing using the modules given in the Question to analyze driver fatigue following stages of information processing:
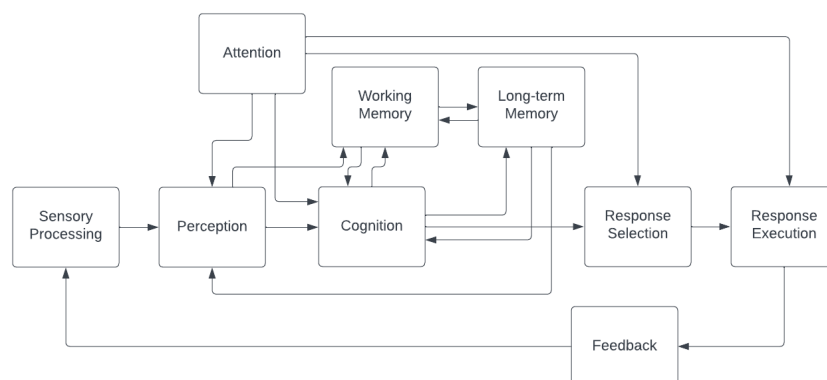

Figure 1: Model of human information processing

0.1.2 Model Justification

In the sensory processing stage the driver receives sensory input from the environment such as visual, auditory, tactile, and olfactory stimuli.Then the sensory input is interpreted and constructed a meaningful representation of the situation, like recognizing shapes, colors, and distant objects, speeds of the cars etc. He selects and give attention on the relevant information and filters out the irrelevant or distracting information.The driver temporarily stores and manipulates the attended information in a limited-capacity system.The driver recalls the previous driving experiences, the learned skills and strategies for that he retrieves the stored information from long-term memory. In the cognition stage, evaluating the available information he chooses the best action like speeding up, slowing down, changing lanes etc.In response selection stage, The driver selects the appropriate motor commands to execute the chosen action.The driver performs the selected action and produces the desired outcome, then according to his executed action he gets the feedback.

0.2 The fatigue manifestations

0.2.1 Sensory Processing stage

Reduced Sensory Acuity:

- Blurred vision,

- Impaired hearing,

- Decreased sensitivity,

- Altered smell due to fatigue

These may result in missing or misinterpreting crucial sensory cues and signals.

0.2.2 Perception Stage

Impaired Information Interpretation:

- Due to fatigue difficulty in recognizing and understanding the meaning of perceived information,

- May lead to inaccurate or incomplete situational awareness and mental models

0.2.3 Attention Stage

Disturbed Attentional Focus:

- Difficulty in maintaining and switching attention between relevant and irrelevant information.

- Results in increased cognitive load, reduced vigilance, and alertness.

0.2.4 Working Memory Stage

Limited Working Memory Capacity:

Difficulty in storing and manipulating attended information in short-term memory. Leads to

- forgetting or confusing current relevant information,

- reducing the ability to plan and monitor actions.

0.2.5 Long-Term Memory Stage

Challenged Long-term Memory Retrieval:

Difficulty accessing and retrieving stored information from long-term memory. Results in

- reliance on inappropriate or outdated information,

- hindering adaptation to changing driving conditions.

0.2.6 Cognition Stage

Suboptimal Decision Making:

Difficulty evaluating and choosing the best course of action. May lead to

- hasty, irrational, or risky decisions,

- reducing the ability to anticipate and cope with driving challenges.

0.2.7 Response Selection Stage

Delayed Motor Response Selection:

Difficulty selecting appropriate motor commands for chosen actions. Results in

- the selection of wrong or

- suboptimal commands,

- compromising coordination and control.

0.2.8 Response Execution Stage

Slowed Execution of Responses:

Difficulty performing selected actions and achieving desired outcomes.May lead to

- delayed or weak execution,

- impacting the ability to meet driving goals and standards.

0.2.9 Feedback Stage

Reduced Feedback Processing Speed:

- May slow down the processing speed of feedback

- delays in adjusting their behavior based on feedback, impacting the timely correction of actions or decisions.