

Method: Affective Computing

... is an interdisciplinary field, embracing psychology, affective neuroscience and computer science.
... deals with the recognition and synthesis of emotions
... provides models for **action selection** based on emotions

One of many goals: **Creating agents that display realistic, life-like behavior**

As a sudden experience of usually short duration, emotions give life its **urgency**, a **condition of immediate readiness to act**

Domain: Traffic Simulations

... are concerned with the simulation of vehicles in traffic situations
... are used for exploring phenomena such as traffic jams
... are used as testbeds for driving assistants which are used in real cars

Problem: Human Emotions are Ignored

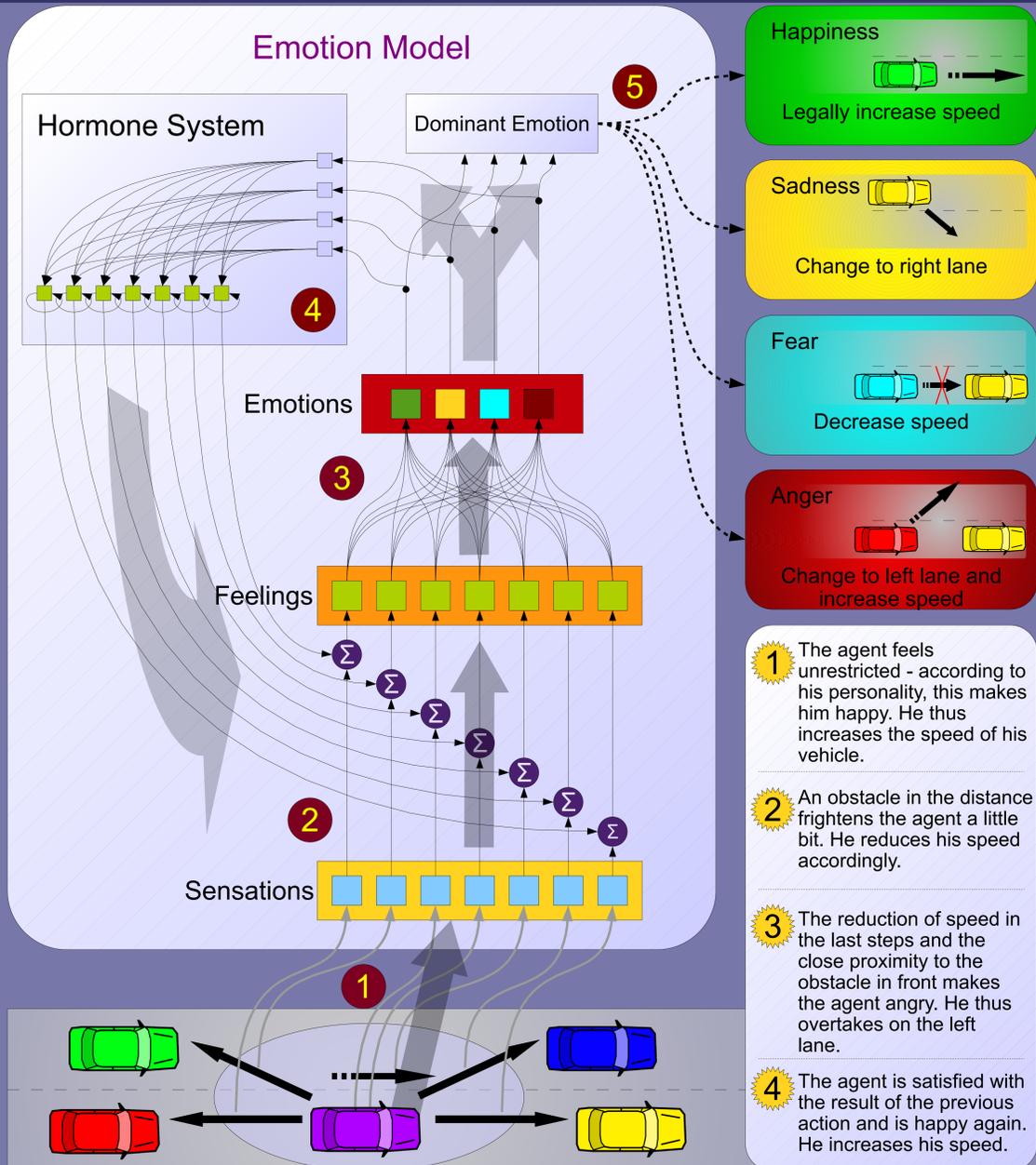
Some models, e.g., the intelligent driver model (IDM), include an agent-like concept of a human driver, however **human emotions are ignored**

Goal: Simulation of Affective Drivers - SAD

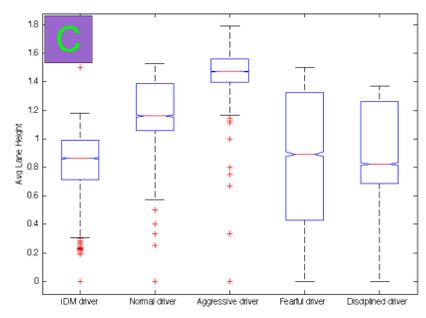
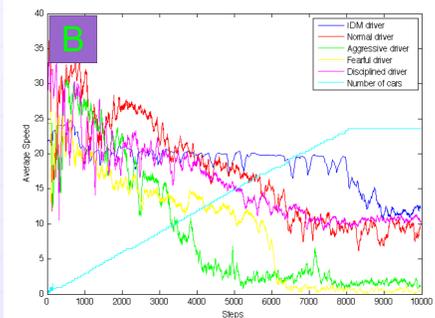
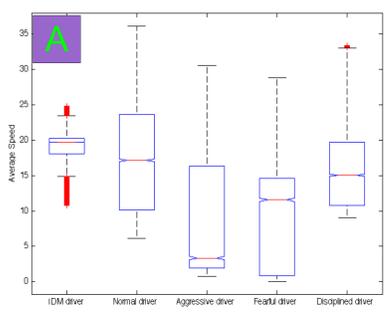
- Insight: driving is a highly emotional task
- Simulation allows for intuitive exploration of synthetic emotions
- Implements classical IDM and affective (emotional) drivers
- Affective drivers are entirely controlled by an emotion system
- Different personalities can be defined using emotional weightings

Emotion Elicitation

- 1 The agent **senses** various parameters from his **surroundings**, such as proximity to the front vehicle, unrestrictedness, speed and acceleration.
- 2 Each of the agent's external **sensations** is **combined** with its corresponding **hormone level**, resulting in a feelings.
- 3 **Personality weightings** define the influence of feelings to specific emotions. E.g., a vehicle in front strongly leads to fear and anger, and reduces happiness. An unrestricted lane on the left side would add to fear, but could reduce anger.
- 4 Following the somatic markers hypothesis, emotions have an influence on the feelings' hormone levels. This is again achieved with the personality weightings.
- 5 The emotion with the highest intensity is selected as the **dominant emotion**. This, and only this, leads to the **selection of an action** to be performed.



Approaching an obstacle



Results

Four hand-crafted characters (normal, aggressive, fearful, disciplined) were separately tested in comparison with IDM drivers.

- A** Emotional drivers exhibit a higher variability in speed
- B** Emotional driving is obstructive in high traffic density situations
 - Drivers with a normal or disciplined personality perform surprisingly well
 - Uncooperative (aggressive) driving does not pay off
- C** As one would intuitively expect, aggressive drivers claim the leftmost lane

Simulation of 100 Disciplined Drivers on a 2 km Circular Highway with SAD

