

Human-Robot Interaction

Module 5: Emotion

Lecture 1: The roles of emotions in interaction

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Topics

- Emotion, mood, and affect
- Human emotions
- Incorrectly interpreting emotion

The roles of emotions in interaction

- Taking emotions into account in the design of a robot can help improve the **intuitiveness** of the human-robot interaction
- Emotions can **motivate** and **modulate** behavior
 - They are a necessary component of human cognition and human behavior
- Social robots are often designed
 - To **interpret** human emotion
 - To **express** emotions
 - To have some some form of synthetic emotion **drive their behavior**

Emotions, Mood, Affect

Emotions arise as an appraisal of a person's situation

- Prepare the body for behavioral responses
- Help in decision—making
- Facilitate interpersonal interaction
- Evoke empathetic responses from others:
emotions help modulate the behaviors of others in an interaction
- Triggered by an identifiable source
- Often externalized and directed at a specific object or person

Emotions, Mood, Affect

Moods are more diffuse and internal

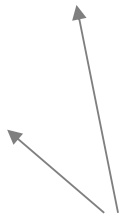
- Often lack a clear cause and object
- Are the result of an interaction between
 - Environmental
 - Incidental, and
 - Cognitive processes

Emotions, Mood, Affect

Affect is the term used to encompass all forms of emotion and mood

- Quick, sub-conscious **emotional** responses triggered by external circumstances
- ...
- Longer-lasting **moods**

Affect makes a distinction between **emotion**
and **mood**



Emotions, Mood, Affect

Emotions are a universal communication channel

Communication our internal affective state to others

1. Convey information about the agent and its future actions (look of anger, fear, desire, ...)
2. Convey information about the environment (look of fear or peace, ...)

In both cases, emotion provides an incentive for others to take action

Emotions, Mood, Affect

Emotions are a universal communication channel

Successful communication of emotions

- Enhances the chances of survival
- Enhances social bonds
- Minimizes the chances of social rejection and social interpersonal physical aggression

Human Emotions

There are many different emotions

- Anger
- Sadness
- Happiness
- Love
- Mildness
- Pride
- Relief
- Satisfaction
- Sensory pleasure
- Shame
- ...

14 according to Aristotle

15 according to Ekman (1999)

6 basic emotions according to Ekman & Friesen (1975)
anger, surprise, disgust, enjoyment, fear, and sadness.

Human Emotions

Primary vs. Secondary Emotions

- No consensus on whether this is a valid distinction or, if it is, which to assign to which category
- Possible primary emotions are **quick**, gut-level responses:
 - Amusement
 - Anger
 - Surprise
 - Disgust
 - Fear
- Possible secondary emotions are **reflective** and differ across cultures:
 - Pride
 - Remorse
 - Guilt

Human Emotions

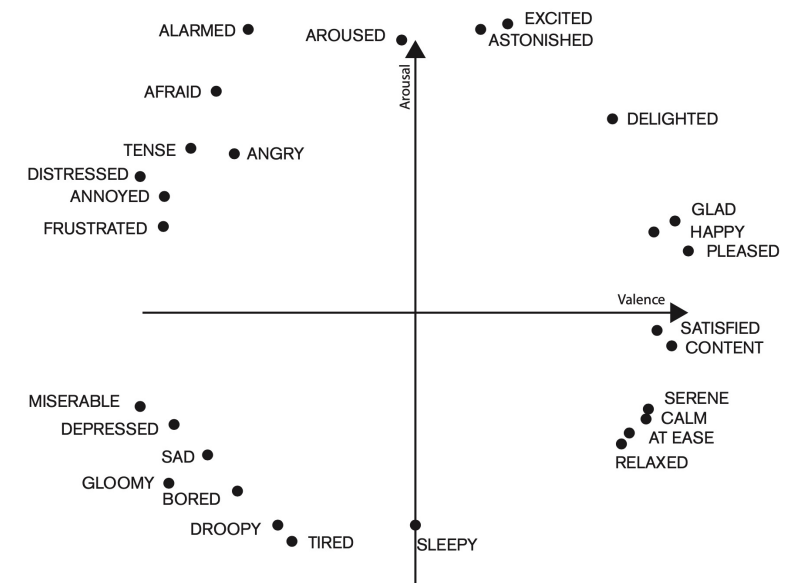
Alternative view:

Emotions are the cognitive interpretations of sensations that result from two independent neurophysiological systems

- Arousal
- Valence

This model holds across many cultures and languages

But it does not accommodate all affective states



Russel's circumplex model of affect (Russel 1980)

Incorrectly Interpreting Emotions

- **Misinterpreting** emotions can have serious consequences giving rise to **misunderstandings**
- Some people have great difficulty interpreting displays of emotion
 - People on the Autism Spectrum Disorder (ASD)
 - Cannot understand the affective needs of the interaction partners
 - Often resulting in inappropriate responses
- Some people are physically incapable of expressing emotion
 - e.g. people with impaired facial muscle control after a stroke
 - Significantly impacting ability to provide or respond to emotional cues during interaction

Incorrectly Interpreting Emotions

Social interactions with robots may be more difficult if the robot is unable to express and interpret emotional states

Reading

Bartneck, C., Belpaeme, T., Eyssele, F., Kanda, T., Keijsers, M., Sabanovic, S. (2020). Human-Robot Interaction - An Introduction, Cambridge University Press.

Chapter 8 – Emotion, pp. 114-117.