

# Dialogue systems

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# Dialogue Systems and Emotions

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Emotions

Emotions Marking

- Computers working with emotions – computers able to express, to recognize and to control its behaviour according user's emotions.
- Ability to detect user emotional state – dialogue strategy customization:
  - calm user vs. user in a hurry
  - calm user vs. upset user
  - increasing voice tension
  - ...
- Emotional state affects prosody.
  - TTS can model emotions using a prosody.
  - Speech recognition can detect emotions using prosody processing.

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## Emotions usage in DS

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- IS Dialogue Interfaces – satisfaction/dissatisfaction, rush,  
...
- Educational DS – boring user, user in tension, tired user,  
...
- Artificial (computer) empathy.
- Automotive systems.
- Systems in fighter aircraft, helicopters, military operation  
simulation.
- ...

# What are emotions?

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- This is a very tough question, that has produced significant amounts of headaches to scientists in the past ...
- ... many researchers have opted to study systematically phenomena that most consider emotional. (Laval University Quebec)
- René Descartes: „Only mathematics is certain, so all must be based on mathematics“
  - Emotions division:
    - Primary (basic) – exists at all people and some kind of animals.
    - Secondary (higher) – can be intellectual, moral and aesthetic; different culture may have different secondary emotions.
  - Big six – anger, disappointment, joy, sadness, fear, surprise.

# Emotions

Next authors

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- Arnold – anger, aversion, courage, dejection, desire, despair, fear, hate, hope, love, sadness.
- Ekman, Friesen, and Ellsworth – anger, resistance, fear, joy, sadness, surprise.
- Frijda – desire, luck, interest, surprise, astonishment, grief.
- Gray – rage, terror, desire, joy.
- Izard – anger, disregard, resistance, upset, fear, guilt, interest, pleasure, shame, surprise.
- James – fear, sorrow, love, rage.
- Panksepp – expectation, fear, rage, panic.

# Emotions

## Research Centres

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- University of Geneva (Klaus Scherer)
- Laval University, Quebec (Arvid Kappas)
- Queen's University, Belfast (R. Cowie)
- MIT Media Laboratory (R. W. Picard)
- IBM (Almanden Labs)
- University of California, Berkeley.

# Emotions Detection

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- Can be done using:
  - skin galvanic properties changes (skin resistance change):



- Blood pressure and heartbeats changes:



# Emotions Detection

cont.

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- Can be done using:
  - Respiration changes:



- Brain electric activity changes:





# Emotions Detections

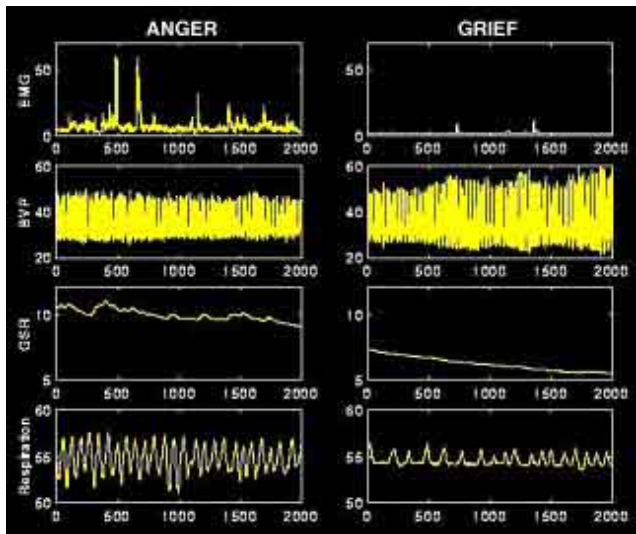
## Anger/Grief Characteristics Differences

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# Emotions Detection

IBM Blue Eyes Project

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- To detect emotions uses:
  - camera:



- emotional mouse:



# Facial Expressions - Yale Face Database

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## ■ Happiness:



## ■ Sadness:



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## ■ Drowsiness:



## ■ Surprise:



# Emotions Marking

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- Standard EmotionML
- Used to mark-up emotions for computer processing:
  - speech recognition
  - speech synthesis
  - semantic analysis
- Mark-up may be done either automatically or semi-automatically or manually.
- See multimodal dialogue systems (later in semester).