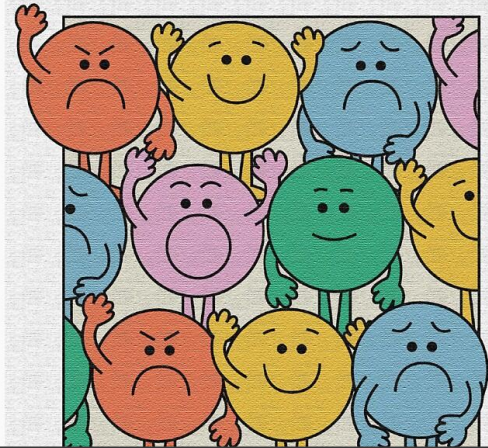


# Emotions

Methods to bring the human in the loop  
Aline Oliveira Mombach  
Lucía Segrelles Montero

**EMOTIONS  
MAKE US  
HUMAN**





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OI

Introduction

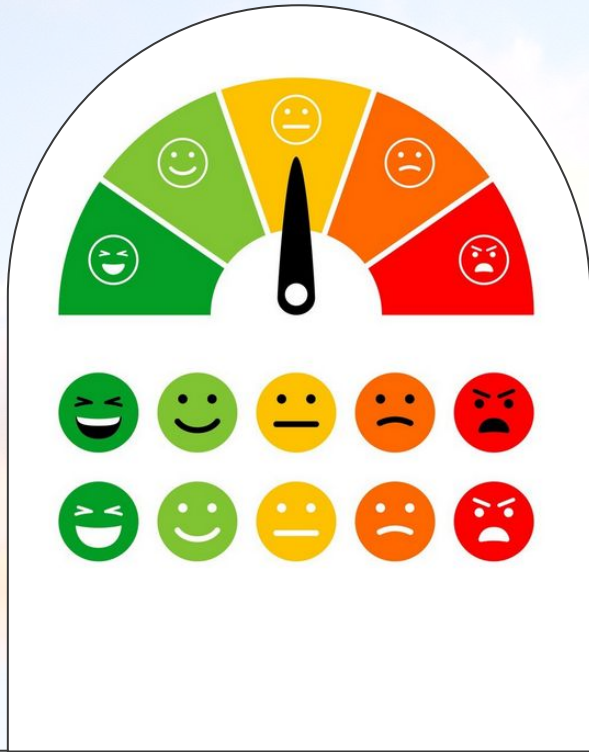


# Introduction



# 02

## Explanation of Measuring Methods





# Cognitive Components



*The Semantic  
Differential Scale*



*The Self-Assessment  
Manikin*



*Geneva Emotion  
Wheel*



*The PANAS Scales*



# The semantic differential scale



Set of 18 bipolar adjective pairs that are each rated along -4 to +4

Difficulties:

- \* Time and effort
- \* Results require statistical expertise for resolution
- \* Verbal rating to non-English speaking cultures



*Factor Loadings of Each of the 18 Bipolar Adjective Pairs in the Semantic Differential for Picture Ratings*

|                                   | Factor 1<br>"Pleasure" | Factor 2<br>"Arousal" | Factor 3<br>"Dominance" |
|-----------------------------------|------------------------|-----------------------|-------------------------|
| Unhappy–Happy                     | 0.914                  | 0.063                 | 0.148                   |
| Annoyed–Pleased                   | 0.883                  | 0.068                 | 0.158                   |
| Unsatisfied–Satisfied             | 0.868                  | 0.144                 | 0.114                   |
| Melancholic–Contented             | 0.725                  | 0.095                 | 0.056                   |
| Despairing–Hopeful                | 0.858                  | 0.063                 | 0.078                   |
| Bored–Relaxed                     | 0.580                  | 0.372                 | 0.234                   |
| Relaxed–Stimulated                | -0.211                 | 0.774                 | 0.052                   |
| Calm–Excited                      | -0.181                 | 0.793                 | 0.056                   |
| Sluggish–Frenzied                 | 0.268                  | 0.771                 | 0.005                   |
| Dull–Jittery                      | -0.211                 | 0.793                 | 0.121                   |
| Sleepy–Wide awake                 | -0.046                 | 0.810                 | 0.047                   |
| Unaroused–Aroused                 | 0.051                  | 0.827                 | 0.127                   |
| Controlled–Controlling            | 0.262                  | 0.192                 | -0.673                  |
| Influenced–Influential            | 0.292                  | 0.089                 | -0.618                  |
| Cared for–In control              | -0.090                 | 0.198                 | -0.626                  |
| Awed–Important                    | 0.199                  | -0.040                | -0.301                  |
| Submissive–Dominant               | 0.195                  | 0.306                 | -0.695                  |
| Guided–Autonomous                 | 0.161                  | -0.100                | -0.479                  |
| Amount of variance accounted for: | 24.6                   | 23.12                 | 12.18                   |

# The self-assessment manikin

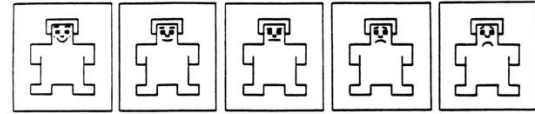


Measures **pleasure, arousal** and **dominance** associated with a person's affective reaction to a wide variety of stimuli

- \* Picture-oriented instrument
- \* Place a 'x' over figures

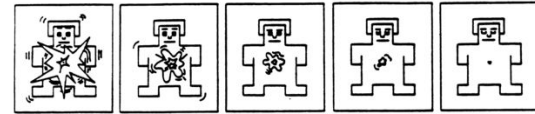


Happy



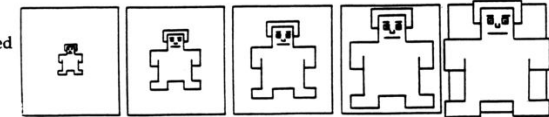
Unhappy

Excited



Calm

Controlled



In Control



# Geneva Emotion Wheel



It is a circle divided into different segments, each representing a basic emotion category. Each segment is associated with an emotional state, a set of behavioral activation or inhibition tendencies, and a typical physiological arousal pattern.



# The PANAS Scales



The PANAS (Positive and Negative Affect Schedule) is a psychological tool used to measure an individual's emotional state or mood. It consists of two 10-item scales: one for positive affect (PA) and one for negative affect (NA). PA assesses current positive emotions like joy and happiness, while NA assesses current negative emotions like sadness and anxiety.



| PANAS descriptor | Loading on      |                 |
|------------------|-----------------|-----------------|
|                  | Positive Affect | Negative Affect |
| Enthusiastic     | .75             | -.12            |
| Interested       | .73             | -.07            |
| Determined       | .70             | -.01            |
| Excited          | .68             | .00             |
| Inspired         | .67             | -.02            |
| Alert            | .63             | -.10            |
| Active           | .61             | -.07            |
| Strong           | .60             | -.15            |
| Proud            | .57             | -.10            |
| Attentive        | .52             | -.05            |
| Scared           | .01             | .74             |
| Afraid           | .01             | .70             |
| Upset            | -.12            | .67             |
| Distressed       | -.16            | .67             |
| Jittery          | .00             | .60             |
| Nervous          | -.04            | .60             |
| Ashamed          | -.12            | .59             |
| Guilty           | -.06            | .55             |
| Irritable        | -.14            | .55             |
| Hostile          | -.07            | .52             |

| Time instructions | n     | PANAS PA Scale |     | PANAS NA Scale |     |
|-------------------|-------|----------------|-----|----------------|-----|
|                   |       | M              | SD  | M              | SD  |
| Moment            | 660   | 29.7           | 7.9 | 14.8           | 5.4 |
| Today             | 657   | 29.1           | 8.3 | 16.3           | 6.4 |
| Past few days     | 1,002 | 33.3           | 7.2 | 17.4           | 6.2 |
| Past few weeks    | 586   | 32.0           | 7.0 | 19.5           | 7.0 |
| Year              | 649   | 36.2           | 6.3 | 22.1           | 6.4 |
| General           | 663   | 35.0           | 6.4 | 18.1           | 5.9 |

Note. PA = Positive Affect. NA = Negative Affect.



# Behavioral or physiological change



*FACS*

Facial Action Coding System



*GSR*

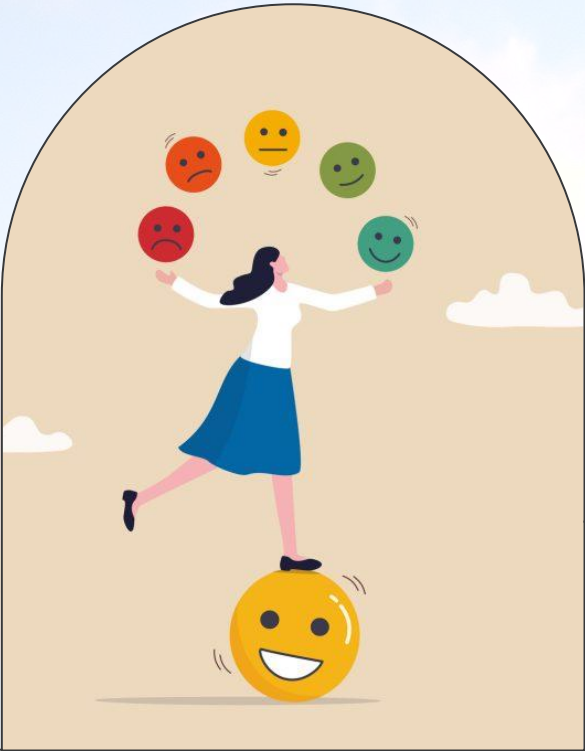
Galvanic Skin Response



*Facial Expression*

EmotionKit Based un FACS





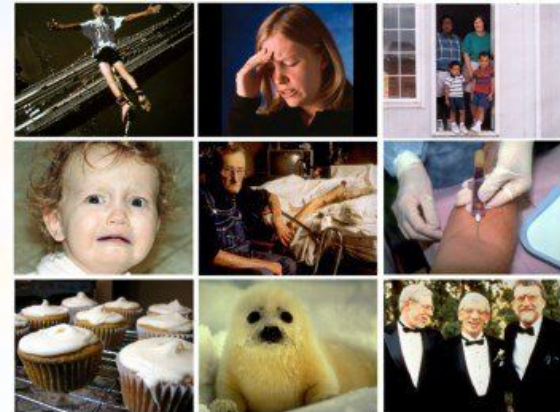
03

Demonstration

# Experiment procedure



- \* Slide projector that project each picture for a certain time
- \* The subject makes all ratings for each picture
  - The semantic differential scale
  - The self-assessment manikin
  - Galvanic Skin Response



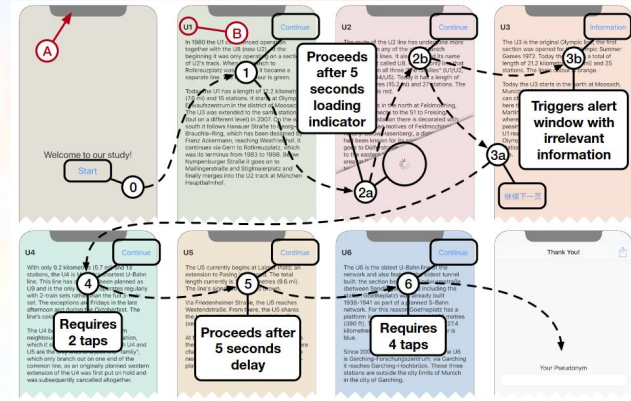
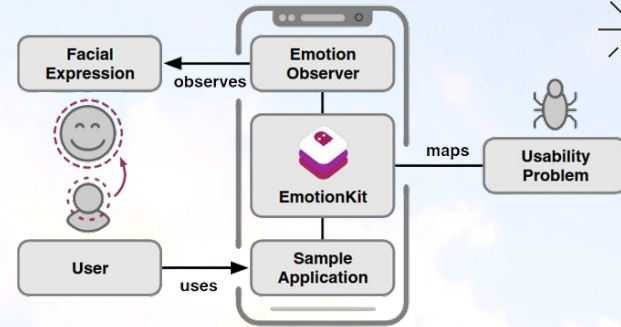
# Facial Expression - EmotionKit



A framework for deriving user emotions and relating them to user interface event

Stages:

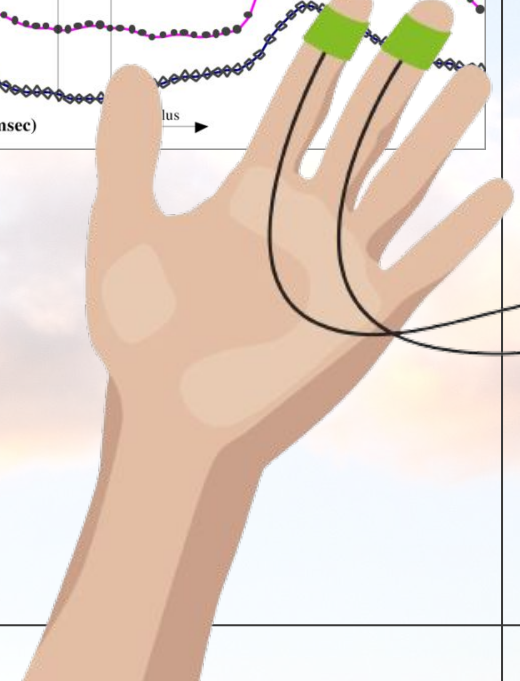
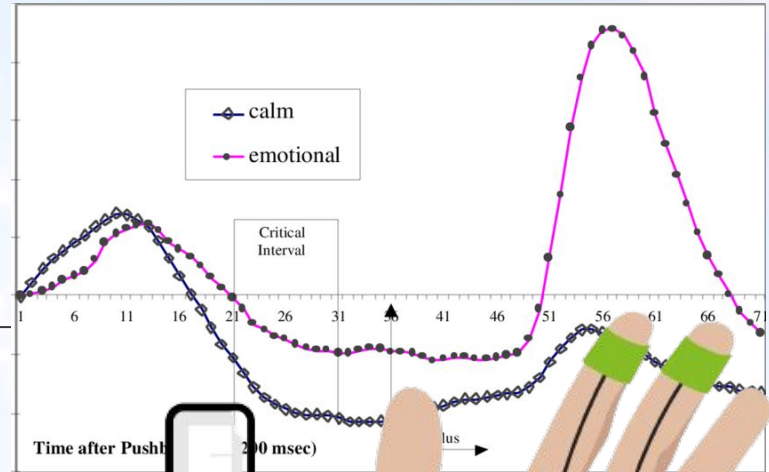
1. Extracting facial expressions from ARKit
2. Conversion to FACS Action Units
3. Conversion to Emotions following EMFACS



# Galvanic Skin Response (GSR)



Galvanic Skin Response (GSR), also known as Electrodermal Activity (EDA) or Skin Conductance, measures skin's electrical conductance to measure emotional and physiological responses like stress or excitement.





# 04

## Benefits and Drawbacks





# Measuring Emotions



| <i>The semantic differential scale</i>                          | <i>The self-assessment manikin</i>                                |
|---|---|
| <b>Rich Descriptions</b><br>Versatility<br>18 different ratings | <b>Picture-oriented</b><br>Simplicity<br>Non-Verbal               |
| Time<br><b>Language Dependence</b><br>Cognitive Effort          | <b>Limited Expressiveness</b><br>Subjective<br>3 simple judgments |



# Measuring Emotions



| <i>Geneva Emotion Wheel</i>   | <i>The PANAS Scales</i>  |
|---|--|
| Structured Emotion Description<br>Comprehensive<br>Useful in Research<br>Clinical Application:<br>Enhanced Emotional Vocabulary | Quick and Easy to Administer<br>Assessment of Positive and Negative Affect<br>Versatile<br>Normative Data<br>Quantitative Data |
| Simplification<br>Overlapping Emotions<br>Cultural Differences<br>Limited Context<br>Inherent Subjectivity                      | Subjective Nature<br>Limited in Scope<br>Situational Factor<br>Social Desirability Bias<br>Language and Cultural Differences   |



# Facial expression



## *Benefits*

Explicit Feedback Accuracy  
Developer Support  
Automatic



## *Drawbacks*










Inconsistent User Reactions  
Errors because of external stimuli  
Psychological Knowledge



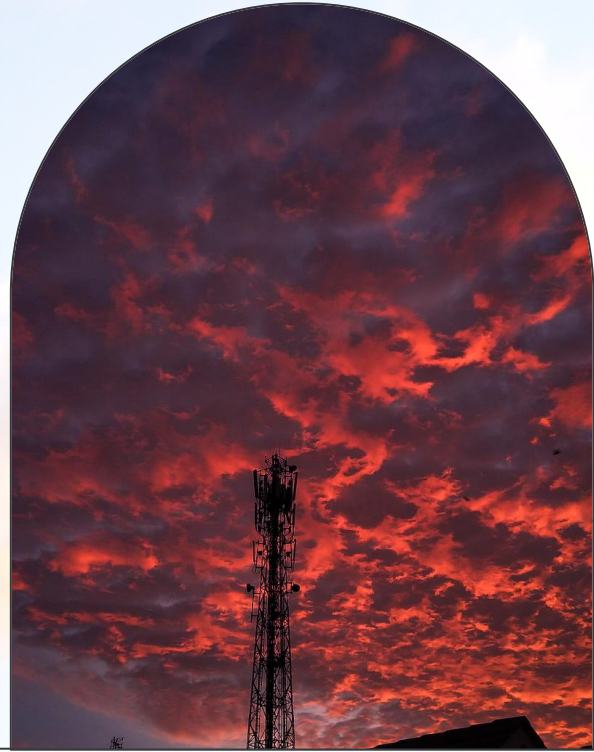


# Galvanic Skin Response



| <i>Benefits</i>   | <i>Drawbacks</i>   |
|---|--|
| Non-Invasive           | Limited Specificity     |
| Real-time Monitoring   | Variability             |
| Objective Measurement  | Individual Differences  |
| Diverse Applications   | Equipment Sensitivity   |
|   | Participant Awareness   |





# 05

## Conclusion



# Conclusion



- There is no perfect method to do it
- Emotions can significantly impact humans performance
- Promote positive emotions and mitigate negative ones.





06

Sources





# Resources



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# Thanks!



Do you have any questions?



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