Emotional Coupling/Decoupling Between Critical Audience and Speaker

Christopher Blank

Advisor: Prof. Ioannis Thomas Pavlidis

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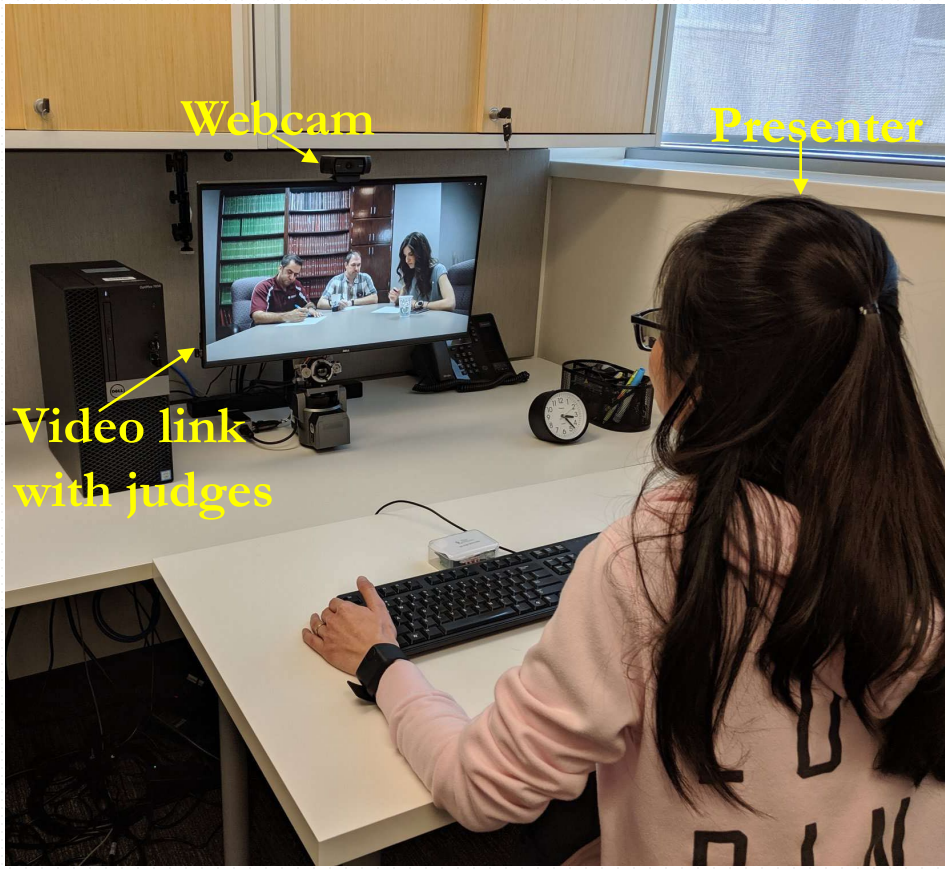
Motivation

- **Public speaking**
  - stresses inexperienced presenters
  - degrades the quality of presentations
  - + hostile audience = looming disaster

- **Understand speaker-audience interactions**
  - first step to design an interventional system

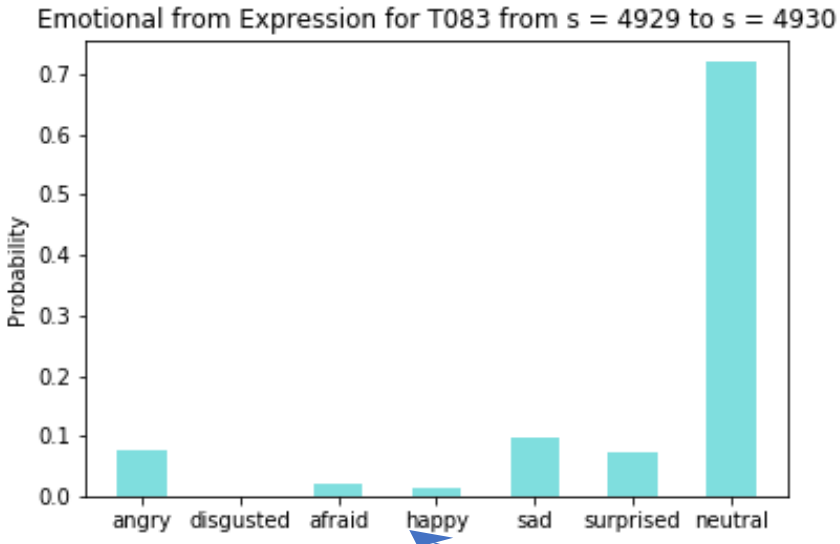
Objective

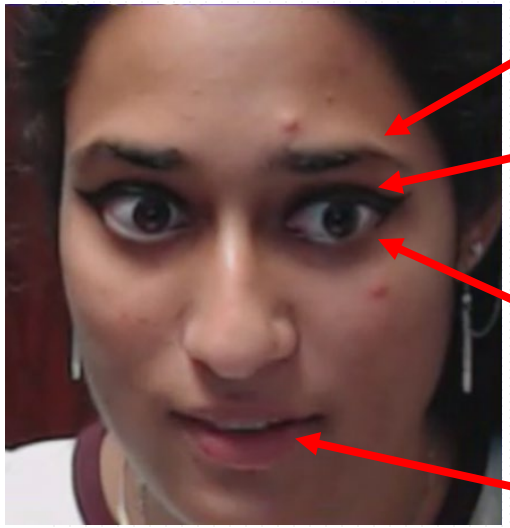
- **Multimodal analysis of emotional interactions** between science speakers and a panel of judges
  - n = 26 undergraduate students each wrote a report and presented key findings to three discouraging judges



Method 1 for Extracting Emotions

- **Facial expressions → Emotions**
  - via Tensorflow
  - based on Facial Action Coding System





2C Outer brow raise

5D Upper lid raise

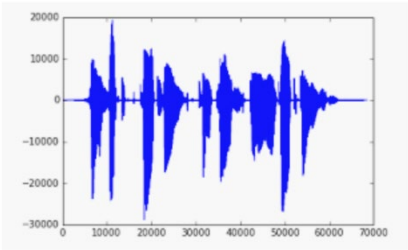
7B Lower lid tighten

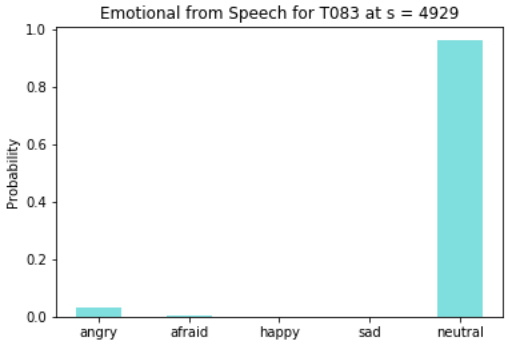
26B Jaw drop

[tensorflow-101] Serengil, S. (2019, February 23) TensorFlow 101: Introduction to Deep Learning. Retrieved June 2019 from github.com

Method 2 for Extracting Emotions

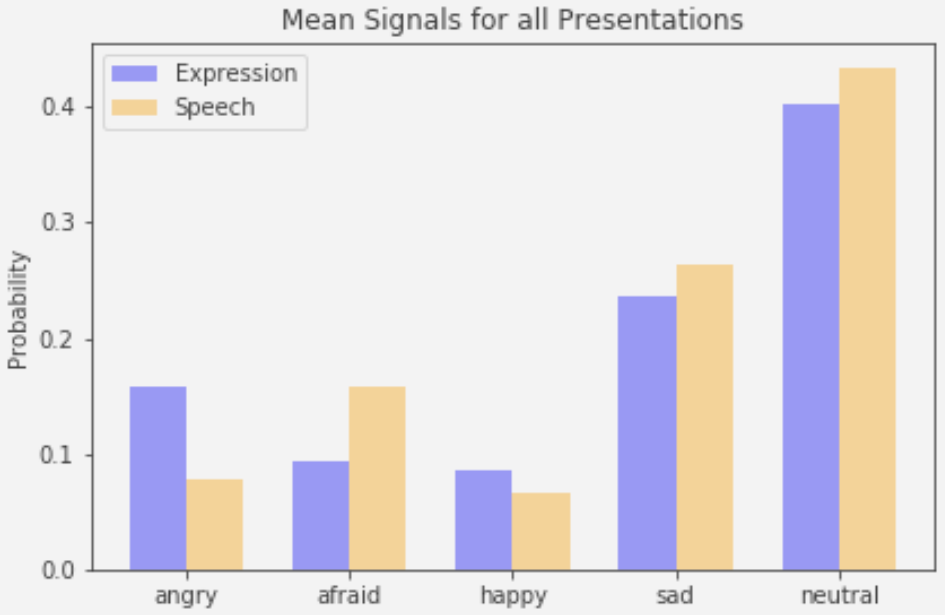
- ✯ **Speech delivery →**
  → Emotions
  - ☆ via OpenVokaturi
    - ✦ based on Praat





Spectral analysis
Pitch analysis
Formant analysis
Intensity analysis
Jitter, shimmer
Cochleagram
Excitation patter

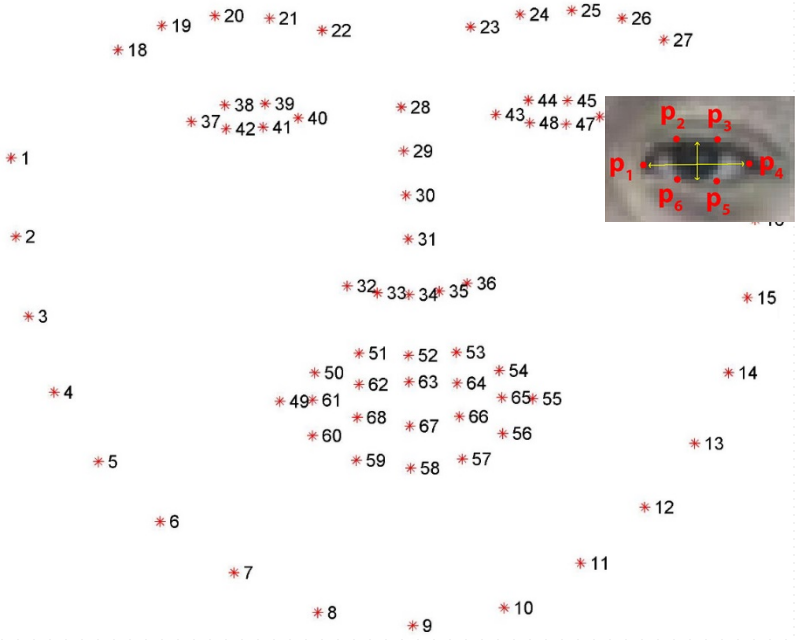
- ✯ **Cross-validates with emotions from expressions**

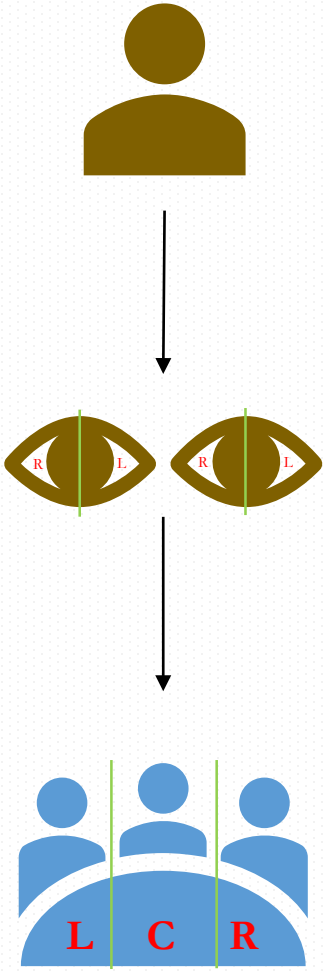


[OpenVokaturi] Vokaturi Developers. (2019, June 2). OpenVokaturi. Retrieved July 2019 from vokaturi.com

Method for Sourcing Emotions

- **Tracking presenter's gaze to determine stimulus**
  - via OpenFace
  - using facial landmarks

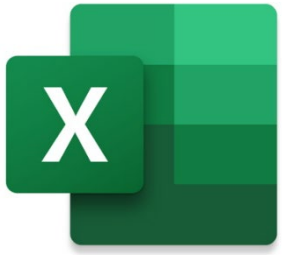


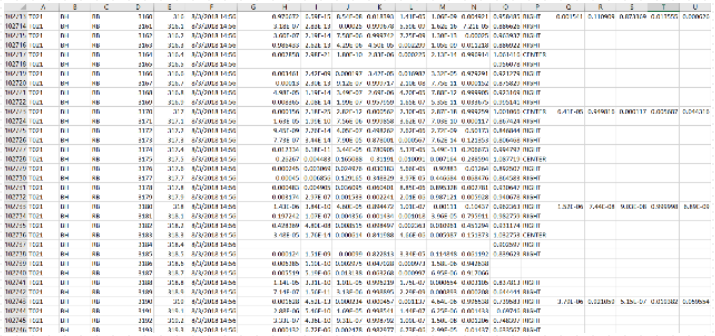


[gaze_controlled_keyboard] Canu, S. (2019, January 7) Eye Gaze detection 2. Retrieved July 2019 from pysource.com

Method for Establishing Timeline

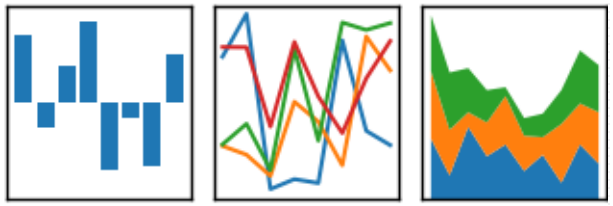
- Emotional-physiological-voice signal registration
  - via python/pandas
  - using preexisting data and visual analysis



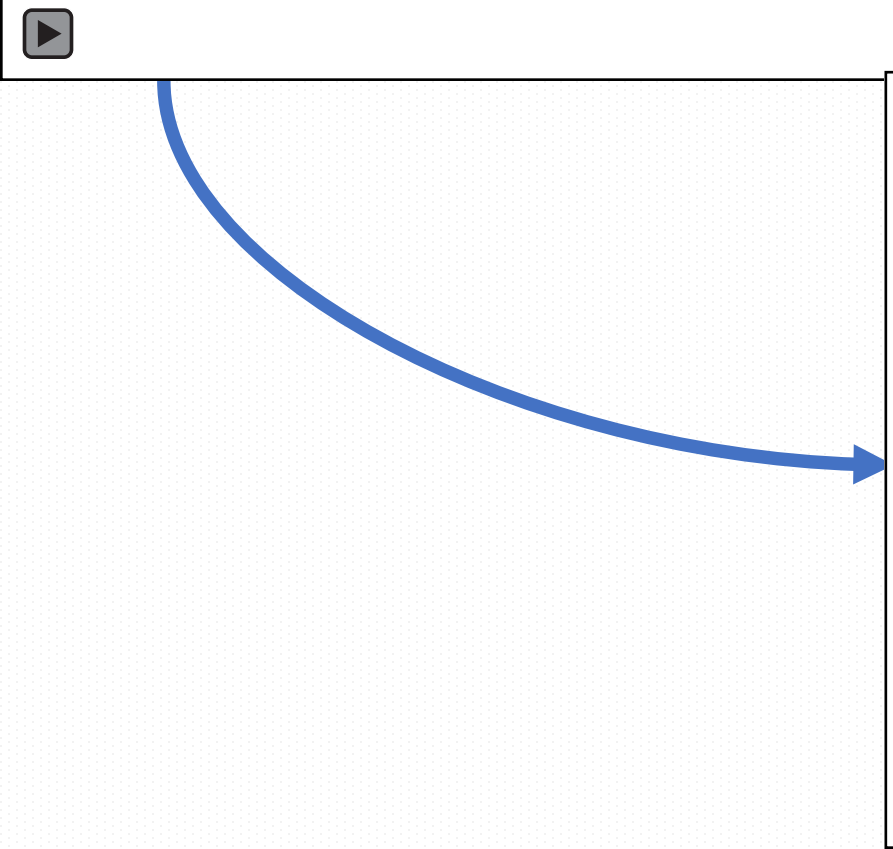


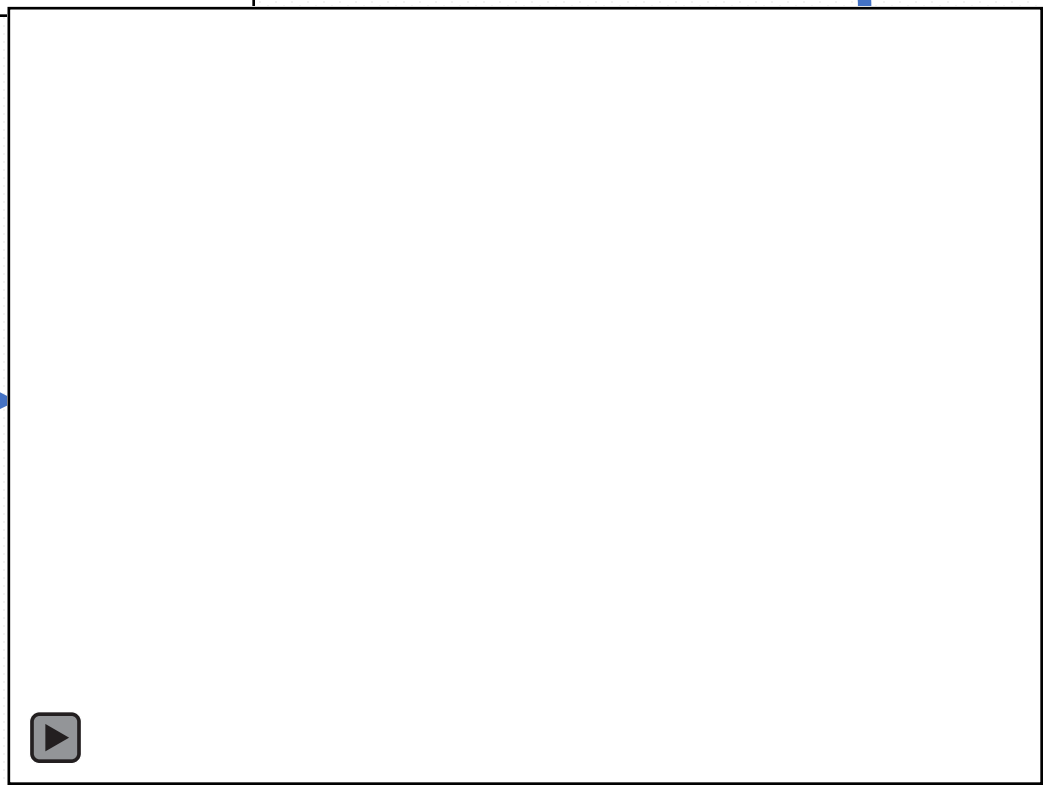
pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



Results

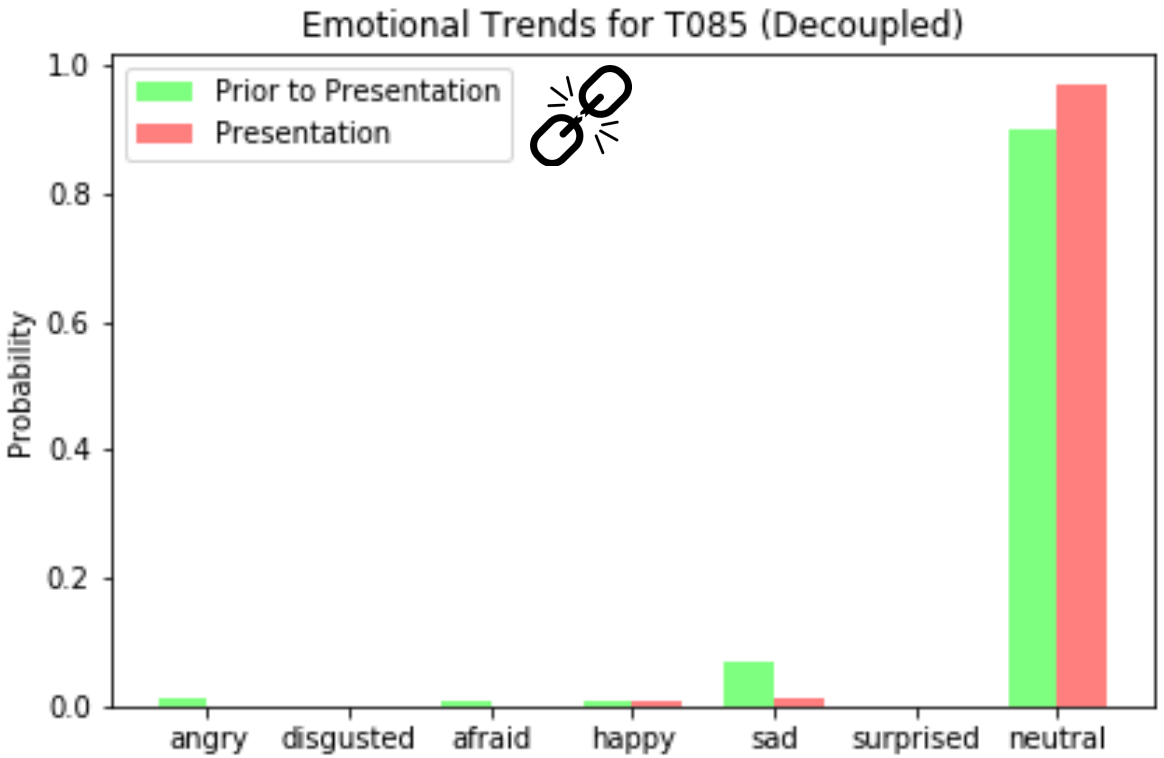




Exploratory Analytics – Data Stories

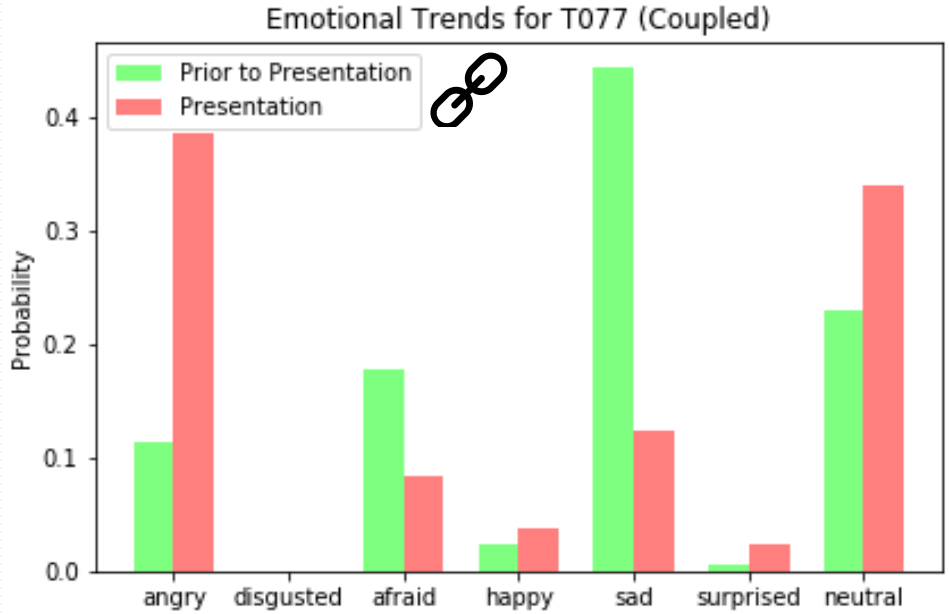
- **Two scales of exploratory analysis**
  - Long-term Emotional Coupling/Decoupling
    - Emotion **trends** before vs. during presentation
  - Transient Emotional Coupling/Decoupling
    - **Instantaneous** action-reaction in presentation

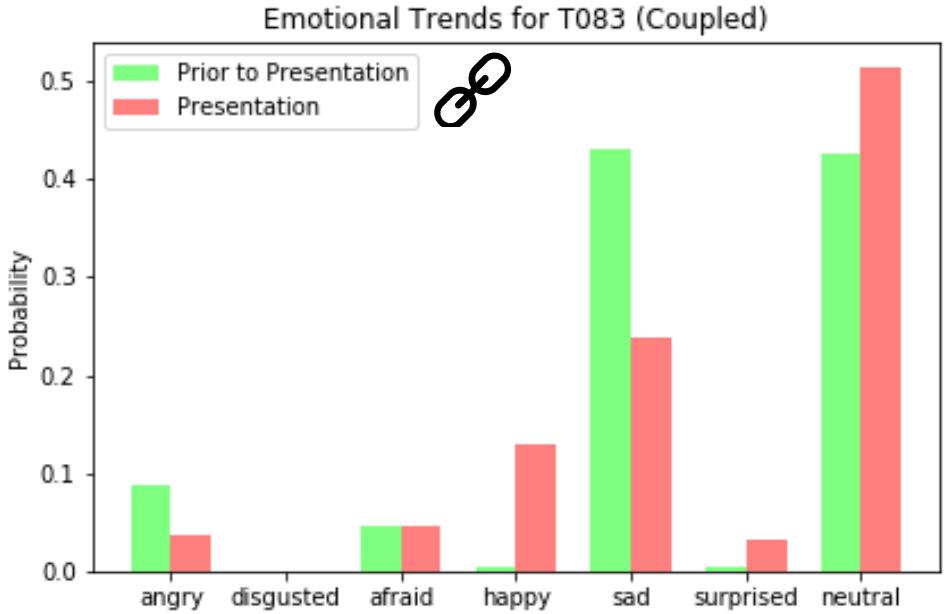
- **Coupling** refers to emotional responsiveness
- **Decoupling** refers to emotional stability

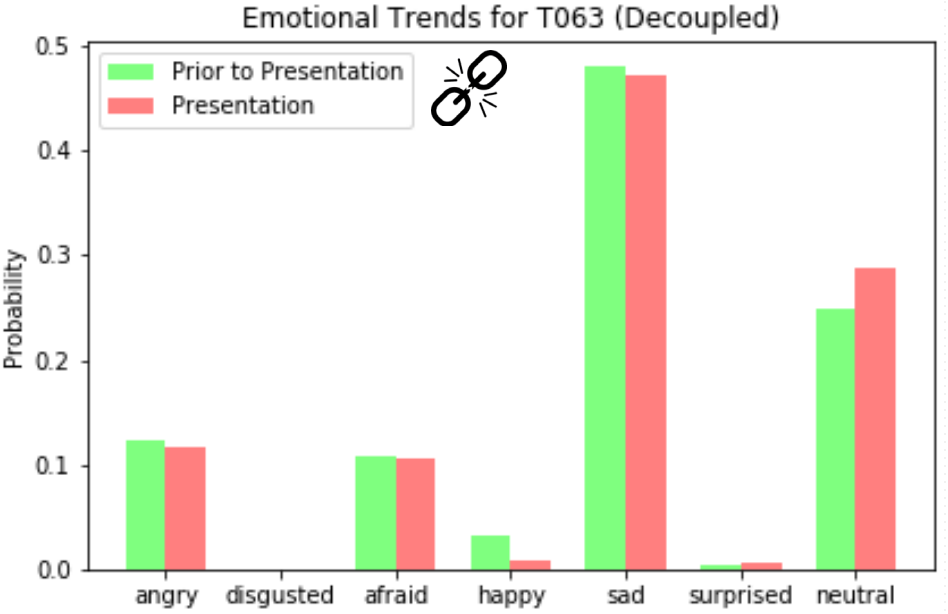


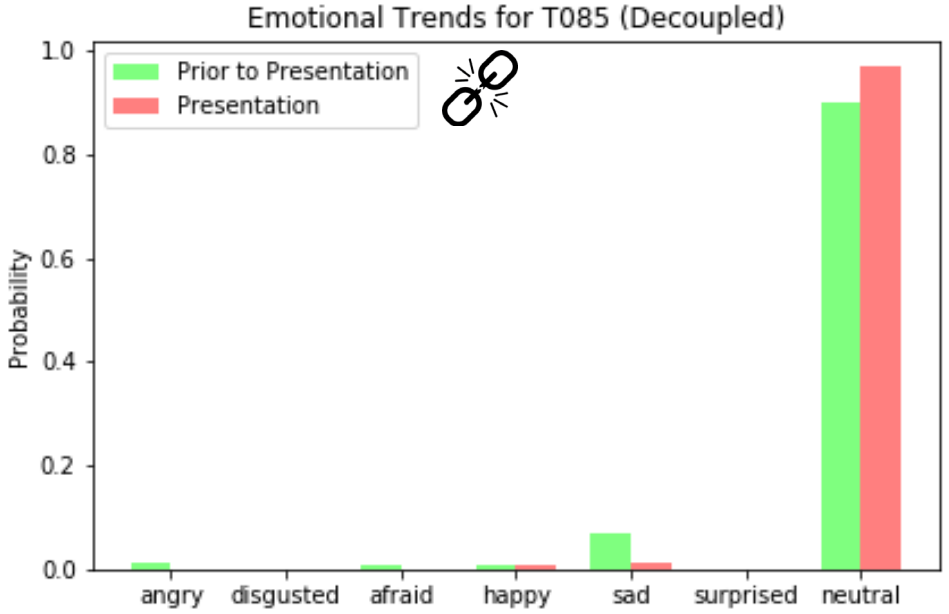
- Participant T085 remains unexpressive before and during the presentation, appearing emotionally decoupled from the judges

Emotional Trends of Participants

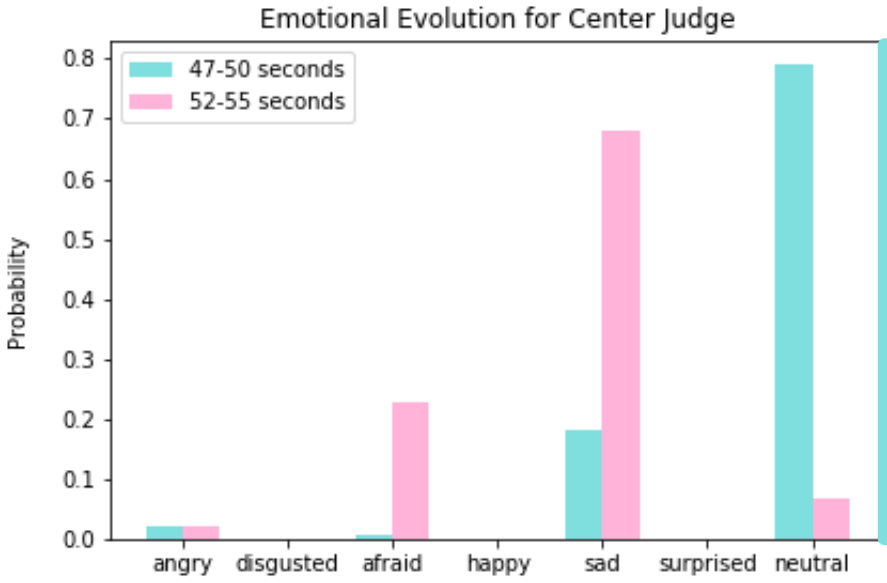


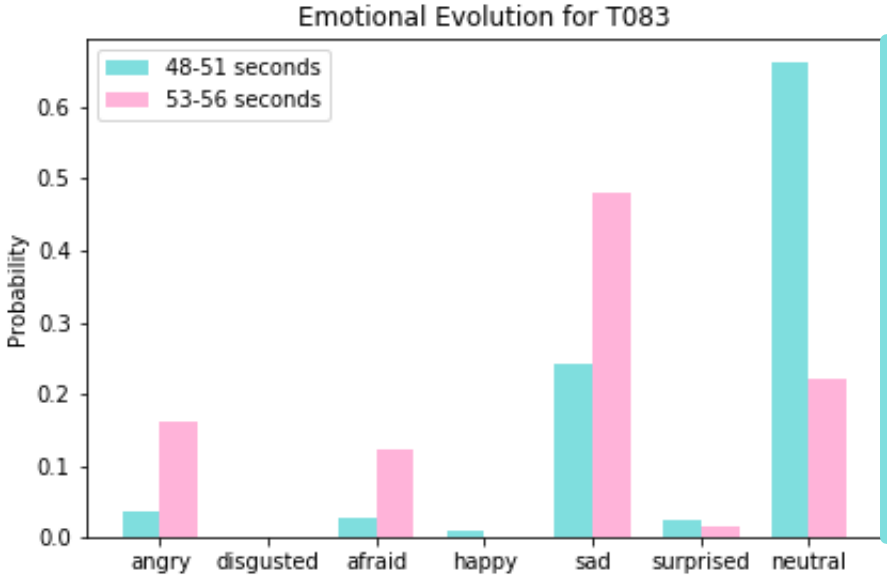






Instantaneous Interactions





Conclusions

- Negative reception affects presenters differently
  - Some remain unaffected - **no response**
  - Others respond by trying to maintain composure (**neutral increase**), while expressing frustration (**angry increase**)

- With the presented method, emotional reactivity can be analyzed for use in **presenter training** or **affective interventions**

Future Work

- ☆ Perform quantitative analysis
- ☆ Examine the effect of emotional coupling/decoupling on performance

Open Science and Big Data Science

- Processed over 3,000 hours of participant recordings and produced as many hours of annotated video
- Generated 1,263,918 rows of data
  - Ten rows per second
  - 21 columns: 7 expression-emotion values, 5 speech-emotion values, gaze ratio and direction, the current experimental treatment, the participant's current task, the participant's experimental group, frame number, second number, and absolute timestamp
  - File size: 189,568 KB
- Data and videos available on OSF

Acknowledgements

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