# Emotional Coupling/Decoupling Between Critical Audience and Speaker

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### Motivation

### **★** Public speaking

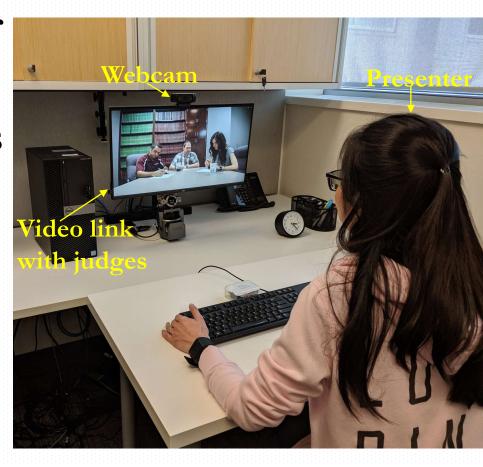
- ☆ stresses inexperienced presenters
- ☆ degrades the quality of presentations
- $\Rightarrow$  + hostile audience = looming disaster

#### **★** 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



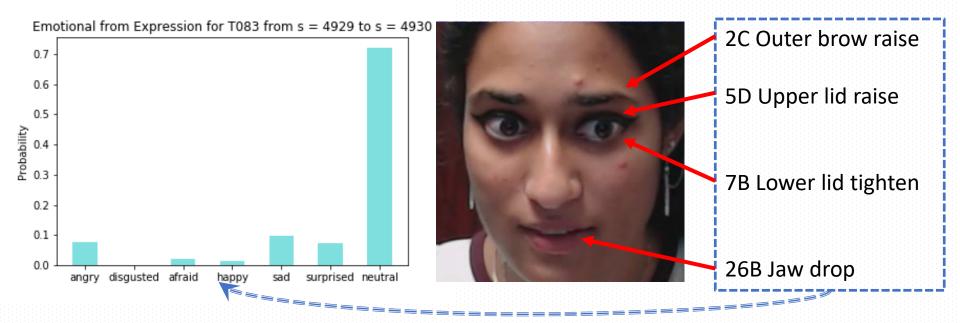
# Method 1 for Extracting Emotions



#### **★** Facial expressions → Emotions

via Tensorflow

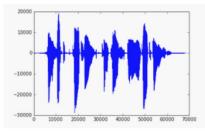
based on Facial Action Coding System



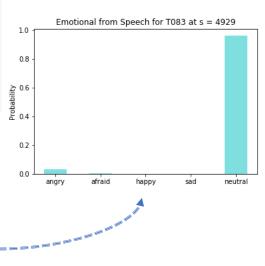
[tensorflow-101] Serengil, S. (2019, February 23) TensorFlow 101: Introduction to Deep Learning. Retrieved June 2019 from github.com

# Method 2 for Extracting Emotions

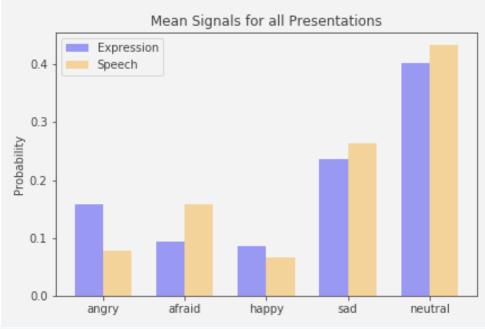
- ★ Speech delivery →→ Emotions
  - ☆ via OpenVokaturi
    - ♦ based on Praat



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.

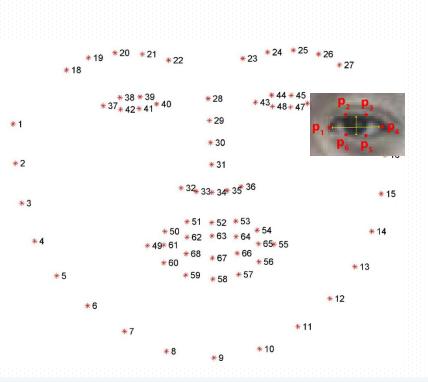
Retrieved July 2019 from vokaturi.com

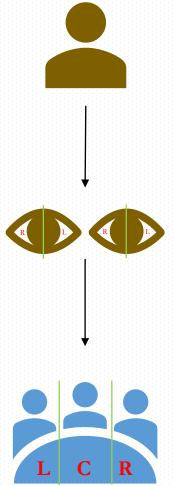
# Method for Sourcing Emotions

\* Tracking presenter's gaze to determine stimulus

☆ via OpenFace

structure 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

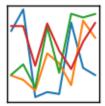
structure using preexisting data and visual analysis

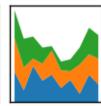


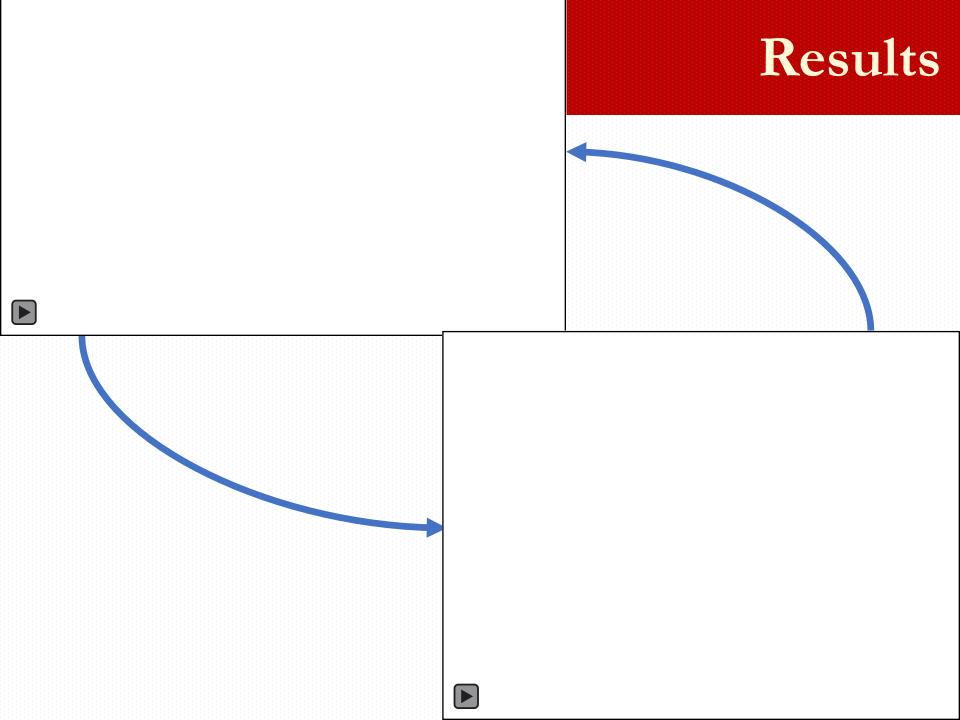
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102732 T021	84	88	3179	317.9	8/3/2018 14:56	0.003174	2.97E 07	0.001533	0.002241	2,016.03	0.987121	0.005528	0.940678	RIGHT					
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102748 1001	uı	HB	3190	310	6/3/10161456	0.001608	4.521-13	0.000234	0.000467	0.000137	4,640-06	0.995538	0.739683	0000	3.701-06	0,021050	5.150-07	0.019382	0.06565
102244 T024	RH	RR	1191	319.1	8/3/2018 14:56	2.885-06	3.40E-10	1.095-05	0.998541	1.100-02	6258-00	0.001433	0.09745	BIGHT					
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102246 T024	RH	SB.	3193	310.3	8/3/2018 14:56	0.000132	6.230.03	0.002478	0.0033577	6.735.63	2.000.05	0.01432	A 5335577	DESIGN					





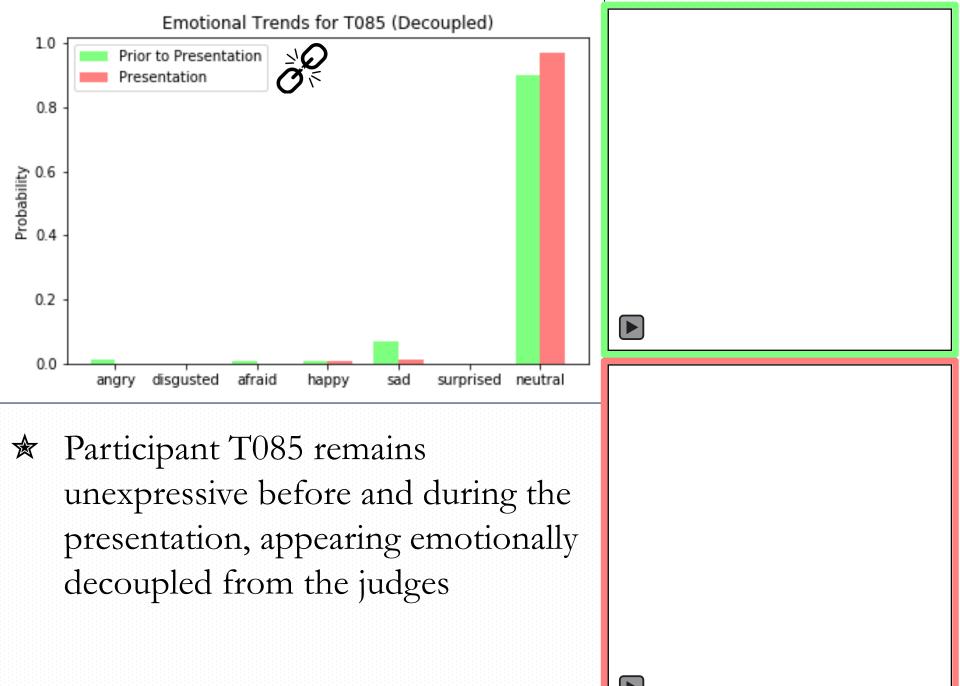




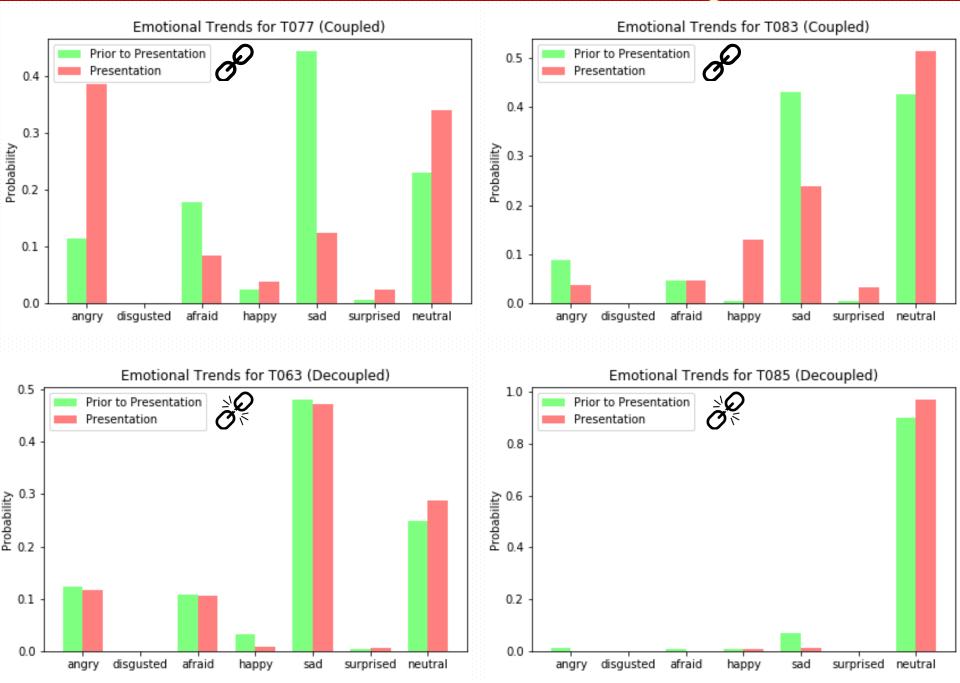


### Exploratory Analytics – Data Stories

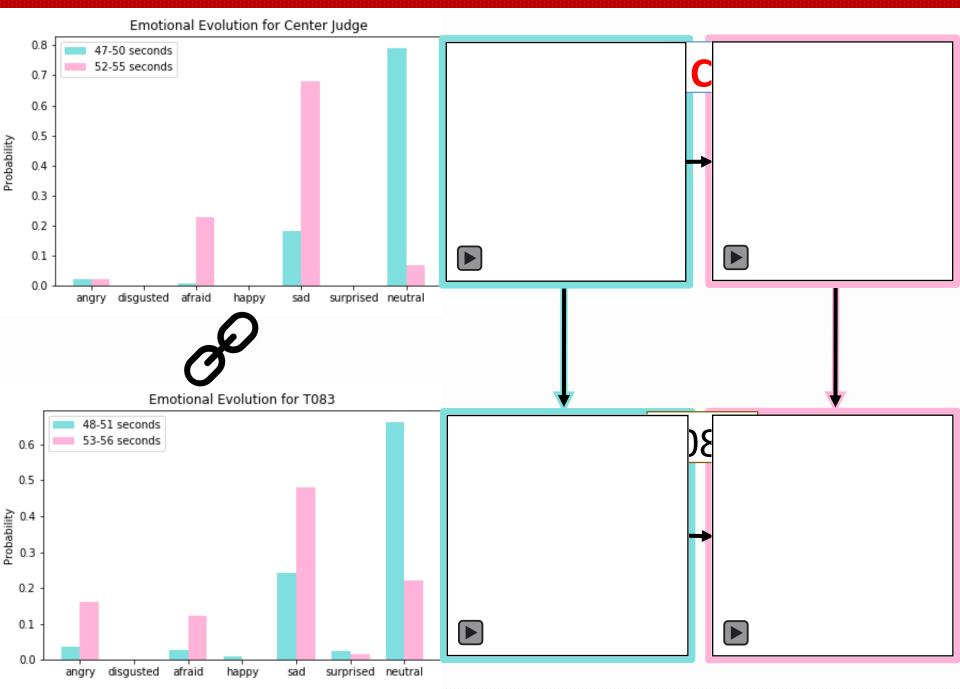
- **★** Two scales of exploratory analysis
  - ☆ Long-term Emotional Coupling/Decoupling
    - ♦ Emotion **trends** before vs. during presentation
  - ☆ Transient Emotional Coupling/Decoupling
    - **◆ Instantaneous** action-reaction in presentation
- **★ Coupling** refers to emotional responsiveness
- **★ Decoupling** refers to emotional stability



#### **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 Office Tasks 2019 A Multimodal Dataset
  - 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 and will not be rendered. To view this file



### Acknowledgements

**★ NSF grant CHS # IIS-1704682 [PI: Pavlidis]** 



**★ UH Computational Physiology Lab** 

