Audio Subtitling: Measuring Emotional Arousal in Users Through Psychophysiological Measures

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Table of Contents

- Audio subtitling (AST)
- Multilingual contents
- Effects: voice-over and dubbing
- The measurement of emotional arousal
- The experiments
  - Objectives: Experiment 1 and Experiment 2
  - Stimuli
  - Instruments
    - Self-report
    - Psychophysiology
    - Participants: Experiment 1 and Experiment 2
- Results
- Conclusions
Audio Subtitling (AST)

Where?

- Countries with bigger subtitling tradition (TV broadcasting)
- Countries with a dubbing tradition -> multilingual content
  - Main language -> dubbed
  - Secondary languages -> subtitled
- Also: other text on screen
Multilingual Contents

- Original content
- Different languages
  - Multiplicity of outputs
  - Aural and visual
  - Various channels
    - Simultaneously
- Different languages
  - Single output
  - Aural or visual
  - Single channel
    - Simultaneously
- Adapted content
Effects: Voice-over and Dubbing

Audio allows for different combinations -> different forms of AST

(Iturregui-Gallardo, 2018)

Dubbing effect

• Acted (prefabricated orality)
  
  (Baños & Chaume, 2009; Sánchez Mompeán, 2016)

• Original is not heard

• Synchronised

Voice-over effect

• Read (less changes in prosodic features)

• AST superimposed (original can be heard)

• AST before/after (imperfect isochrony)
The Measurement of Emotional Arousal

- Media as entertainment
- Flow and presence
- Emotion
- Psychophysiology
- Valence Arousal
- Discrete/Dimensional approach
The Experiments: Objectives

- **Experiment 1:**
  Comparison of dubbing and voice-over effect in audio subtitled contents
  - Self-report measurements (T-SAM questionnaire)
  - Psychophysiological measurements
    - EDA
    - HR

- **Experiment 2:**
  Comparison of results from blind and partially sighted participants to sighted participants
  - Self-report measurements (T-SAM questionnaire)
  - Psychophysiological measurements
    - EDA
    - HR
The Experiments: Stimuli

Series

**Wojenne dziewczyny**
[War Girls] (TVP1, 2017)

- Clips (3)
  - ≅ 3 min scenes
  - Unit
  - Validated online
  - Fear, anger, neutral
Instruments: Self-report (T-SAM questionnaire)

Valence

Arousal

(Iturregui-Gallardo & Méndez-Ulrich, forthcoming)
Instruments: Psychophysiology

- EDA (Electrodermal Activity)
- HR (Heart Rate)
Experiment 1: Participants

42 participants:

- Blind (13) and partially sighted (29)
- 17 ♀
- 25 ♂
- Mean=38 years old
Experiment 2: Participants

42 participants:

- Sighted participants
- 27 ♀
- 15 ♂
- Mean=30 years old
Conclusions: Self-report Questionnaire (T-SAM)

- Emotions targeted were induced
- Results are consistent (Experiments 1 and 2) and differences are significant.
  - **Fear**: low valence/high arousal
  - **Sadness**: very low valence/medium arousal
- T-SAM proved effective (more research)
- Experiment 1: **Conditions** (effects) not significant, only in **Valence** for **Fear**
  - **Dubbing** effect was rated with lower valence
Results: Experiment 1
Self-report Instrument: T-SAM

Valence ratings for emotion and effect conditions

Emotion: $(F(2, 120) = 9.356; p = <.001)$ || Effect: $(F(1, 120) = 0.918; p = 0.34)$
Results: Experiment 1
Self-report Instrument: T-SAM

Arousal ratings for emotion and effect conditions

Sadness
Fear
Neutral

Dubbing
VO

Emotion: \( (F(2, 120) = 20.578; p = < .001) \)
Effect: \( (F(1, 120) = 0.183; p = 0.67) \)
### Post hoc test with Bonferroni correction: Valence

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Emotion</th>
<th>t</th>
<th>$p_{\text{bonf}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sadness</td>
<td>Neutral</td>
<td>-3.75</td>
<td>&lt; .001</td>
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<tr>
<td>Sadness</td>
<td>Fear</td>
<td>-0.02</td>
<td>1.000</td>
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<tr>
<td>Neutral</td>
<td>Fear</td>
<td>3.73</td>
<td>&lt; .001</td>
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### Post hoc test with Bonferroni correction: Arousal

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<tbody>
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<td>Sadness</td>
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<td>1.48</td>
<td>0.427</td>
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<tr>
<td>Sadness</td>
<td>Fear</td>
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<tr>
<td>Neutral</td>
<td>Fear</td>
<td>-6.15</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>
Results: Experiment 2
Self-report Instrument: T-SAM

Valence ratings for emotion conditions

Sadness | Fear | Neutral
---|---|---
3.6 (0.39) | 3.86 (0.66) | 6.34 (0.34)

\(F (2, 84) = 68.576; p = <.000\)
Arousal ratings for emotion conditions

Sadness: 4.2 (0.71)
Fear: 6.27 (0.56)
Neutral: 3.39 (0.46)

\( F(2, 82) = 59.289; p = <.000 \)
### Post hoc test with Bonferroni correction: Valence

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<td>Sadness</td>
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<td>Sadness</td>
<td>Fear</td>
<td>-0.83</td>
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<tr>
<td>Neutral</td>
<td>Fear</td>
<td>-9.87</td>
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### Post hoc test with Bonferroni correction: Arousal

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<td>Sadness</td>
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<td>-8.01</td>
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<tr>
<td>Neutral</td>
<td>Fear</td>
<td>-10.98</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Conclusions: Psychophysiology (EDA and HR)

Experiment 1:

- EDA results not significant

- HR results significant (Emotion and Effect)
  - Fear causes more activation
  - Voice-over effect causes more heart acceleration
  - Dubbing effect causes deceleration
    - Attention processes (Tremayne & Barry, 2001; Thomas et al., 2012; Graham, 1992)
Results: Experiment 1
Psychophysiology

EDA values for emotion and effect conditions

Sadness | Fear | Neutral
---|---|---
-0.26 (0.09) | -0.1 (0.11) | -0.22 (0.10)
-0.2 (0.11) | -0.05 (0.10) | -0.11 (0.10)

Emotion: \( F(2, 93) = 1.084; p = 0.34 \) || Effect: \( F(1, 93) = 0.15; p = 0.7 \)
Results: Experiment 1
Psychophysiology

HR values for emotion and effect conditions

<table>
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<tr>
<th>Emotion</th>
<th>Effect</th>
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<tbody>
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<td>Sadness</td>
<td>-3.14</td>
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<tr>
<td>Fear</td>
<td>-3.22</td>
</tr>
<tr>
<td>Neutral</td>
<td>-3.09</td>
</tr>
</tbody>
</table>

Emotion: $(F(2, 98) = 3.62; p = 0.03)$ || Effect: $(F(1, 98) = 4.862; p = 0.03)$
### Post hoc test with Bonferroni correction: EDA

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<tr>
<td>Sadness</td>
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<td>1.000</td>
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<tr>
<td>Sadness</td>
<td>Fear</td>
<td>-1.45</td>
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<tr>
<td>Neutral</td>
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<td>-0.92</td>
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### Post hoc test with Bonferroni correction: HR

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<td>Sadness</td>
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<td>-1.28</td>
<td>0.606</td>
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<tr>
<td>Sadness</td>
<td>Fear</td>
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<tr>
<td>Neutral</td>
<td>Fear</td>
<td>-1.38</td>
<td>0.506</td>
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</tbody>
</table>
Conclusions: Psychophysiology (EDA and HR)

Experiment 2:

- EDA not significant
- HR not significant
  - Trend: higher activation for Fear
    - Relates to Experiment 1 results
Results: Experiment 2

Psychophysiology

EDA values for emotion conditions

Sadness: -1.19 (0.77)
Fear: -1.07 (0.77)
Neutral: -0.98 (0.77)

\[(F(2,105) = 0.02; \ p = 0.981)\]
Results: Experiment 2
Psychophysiology

HR values for emotion conditions

Sadness  | Fear  | Neutral
---|---|---
-4.65 (1.40)  | -2.59 (1.40)  | -5.02 (1.42)

(F(2, 92) = 0.87; p = 0.423)
### Post hoc test with Bonferroni correction: EDA

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<td>Sadness</td>
<td>Fear</td>
<td>-0.11</td>
<td>1.000</td>
</tr>
<tr>
<td>Neutral</td>
<td>Fear</td>
<td>0.08</td>
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### Post hoc test with Bonferroni correction: HR

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<td>1.000</td>
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<tr>
<td>Sadness</td>
<td>Fear</td>
<td>-1.04</td>
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<tr>
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<td>Fear</td>
<td>-1.22</td>
<td>0.679</td>
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</table>
References


References


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