

Languages & the Media – Berlin – 3-5 October

Audio Subtitling: Measuring Emotional Arousal in Users Through Psychophysiological Measures

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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

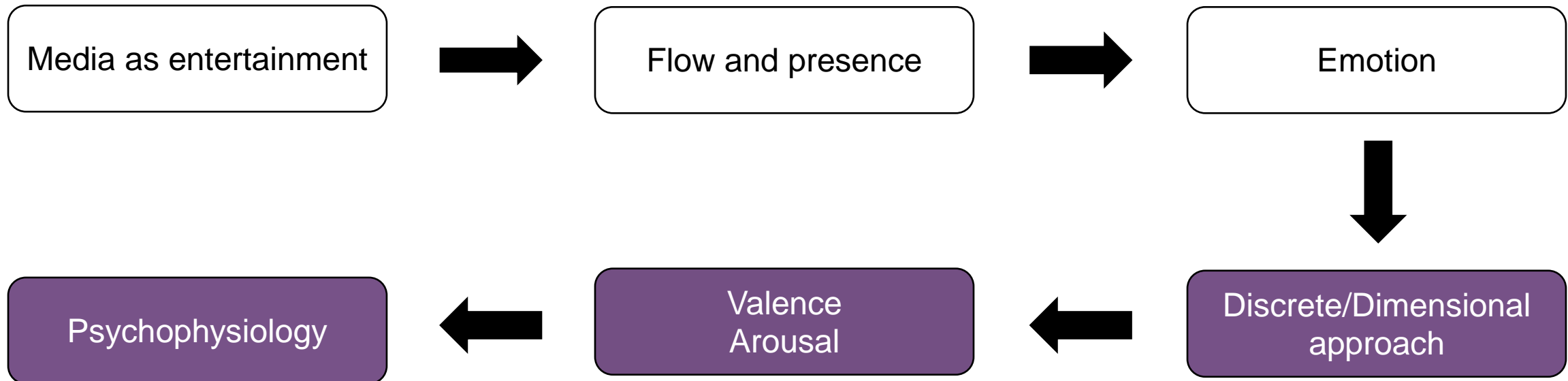


Voice-over effect

- Read (less changes in prosodic features)
- AST superimposed (original can be heard)
- AST before/after (imperfect isochrony)



The Measurement of Emotional Arousal



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

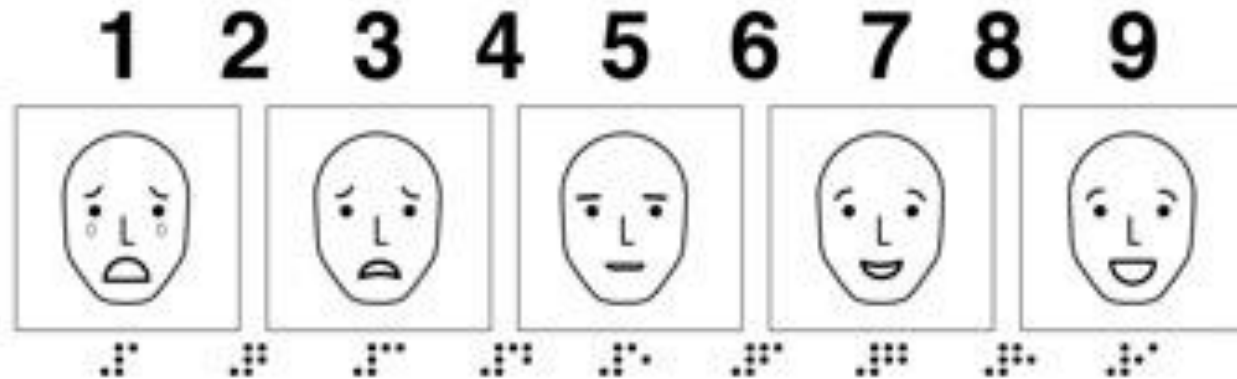
Wojenne dziewczyny [War Girls] (TVP1, 2017)

- Clips (3)
 - \cong 3 min scenes
 - Unit
 - Validated online
 - Fear, anger, neutral

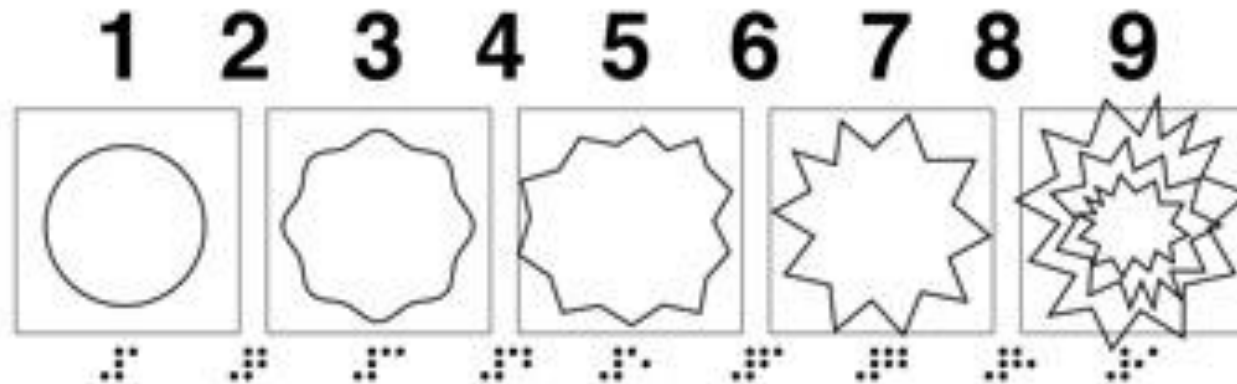


Instruments: Self-report (T-SAM questionnaire)

Valence



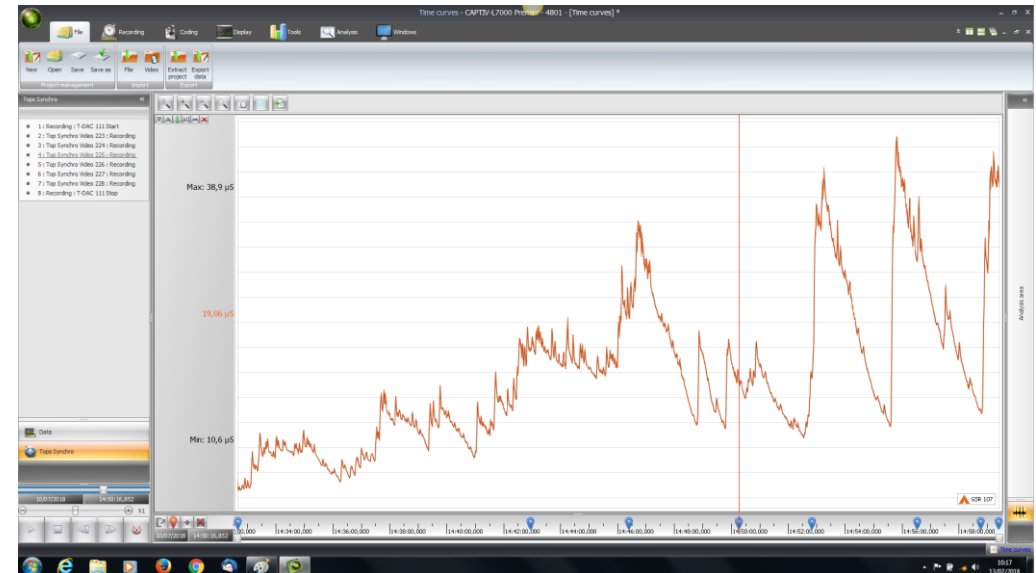
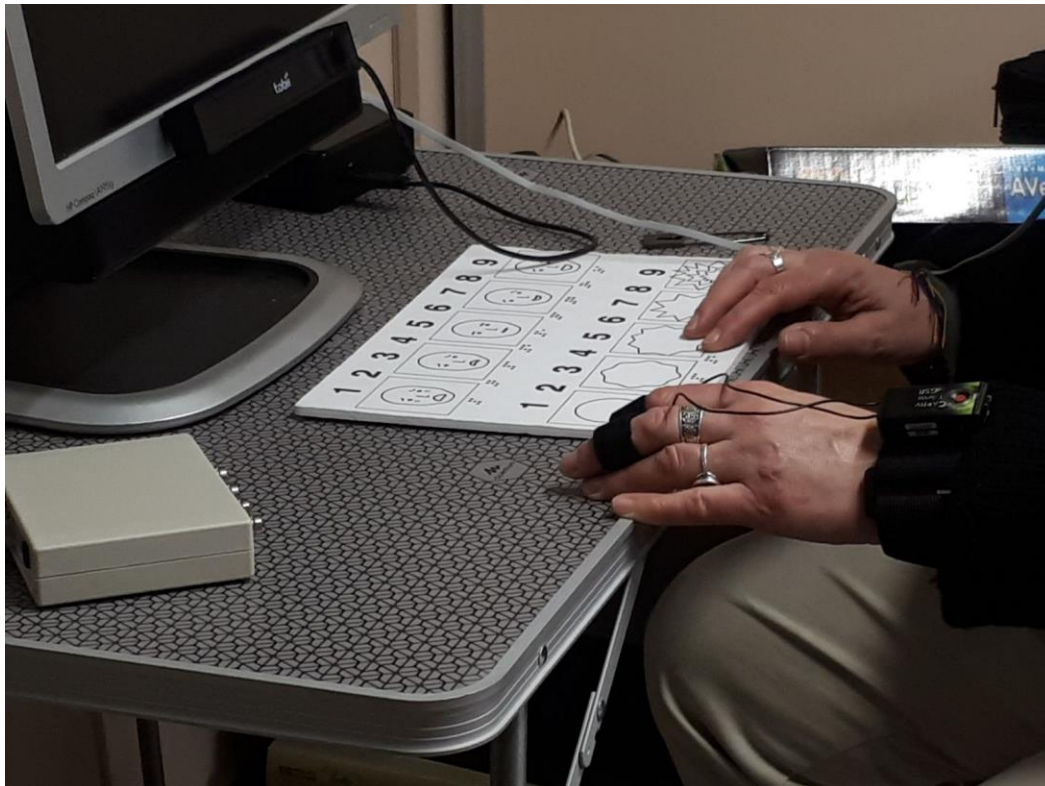
Arousal



(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

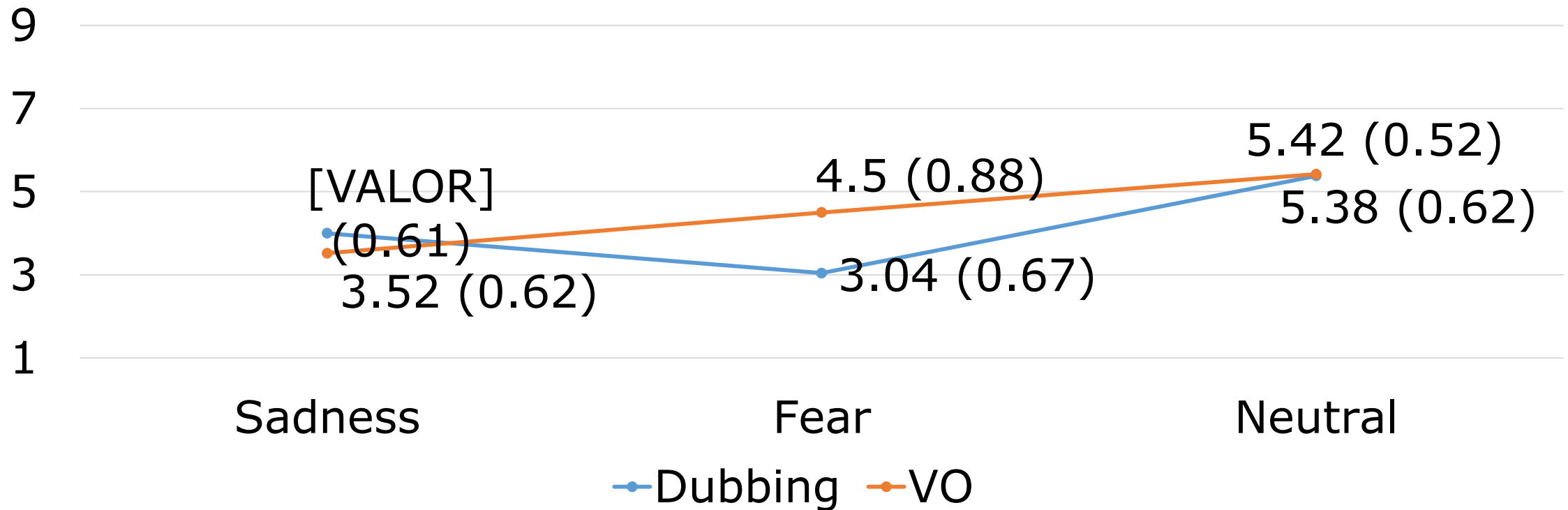
Conclusions: Self-report Questionnaire (T-SAM)

- 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

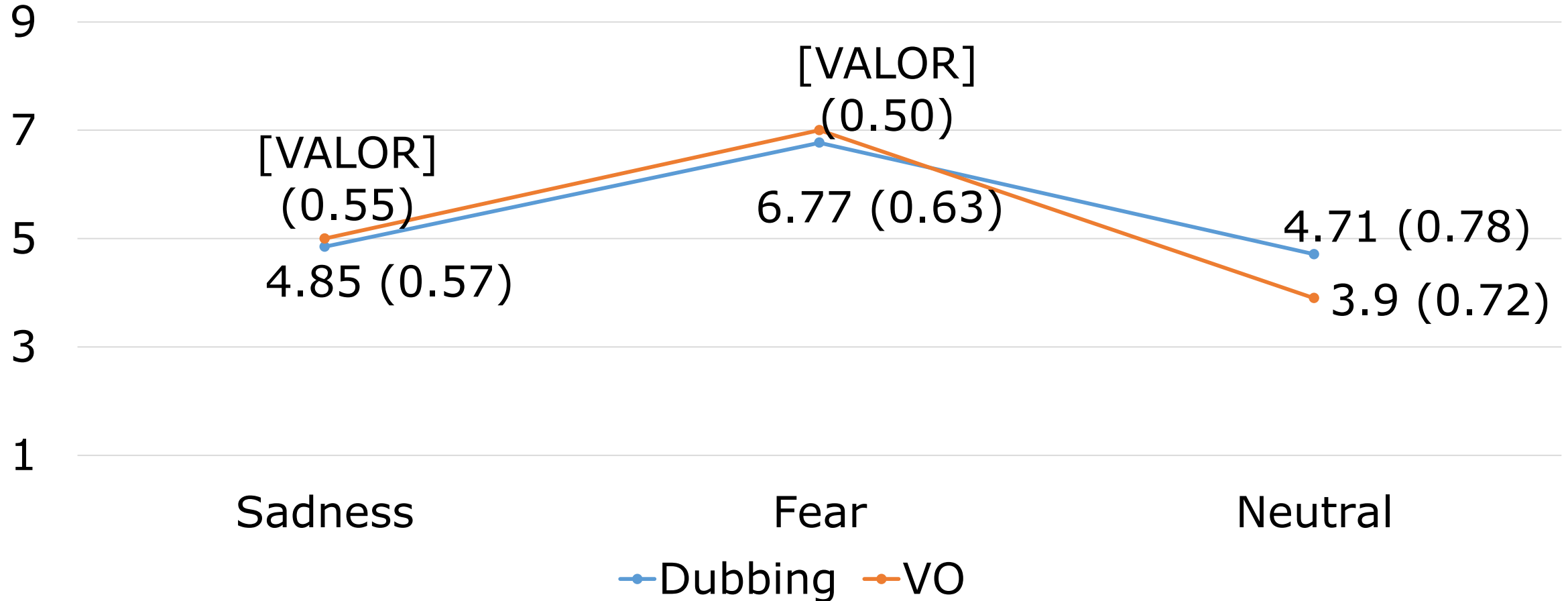


Emotion: ($F(2, 120) = 9.356; p = <.001$) || Effect: ($F(1, 120) = 0.918; p = 0.34$)

Results: Experiment 1

Self-report Instrument: T-SAM

Arousal ratings for emotion and effect conditions



Emotion: ($F(2, 120) = 20.578; p = < .001$) || Effect: ($F(1, 120) = 0.183; p = 0.67$)

Post hoc test with Bonferroni correction: Valence

Emotion		t	p_{bonf}
Sadness	Neutral	-3.75	<.001
Sadness	Fear	-0.02	1.000
Neutral	Fear	3.73	<.001

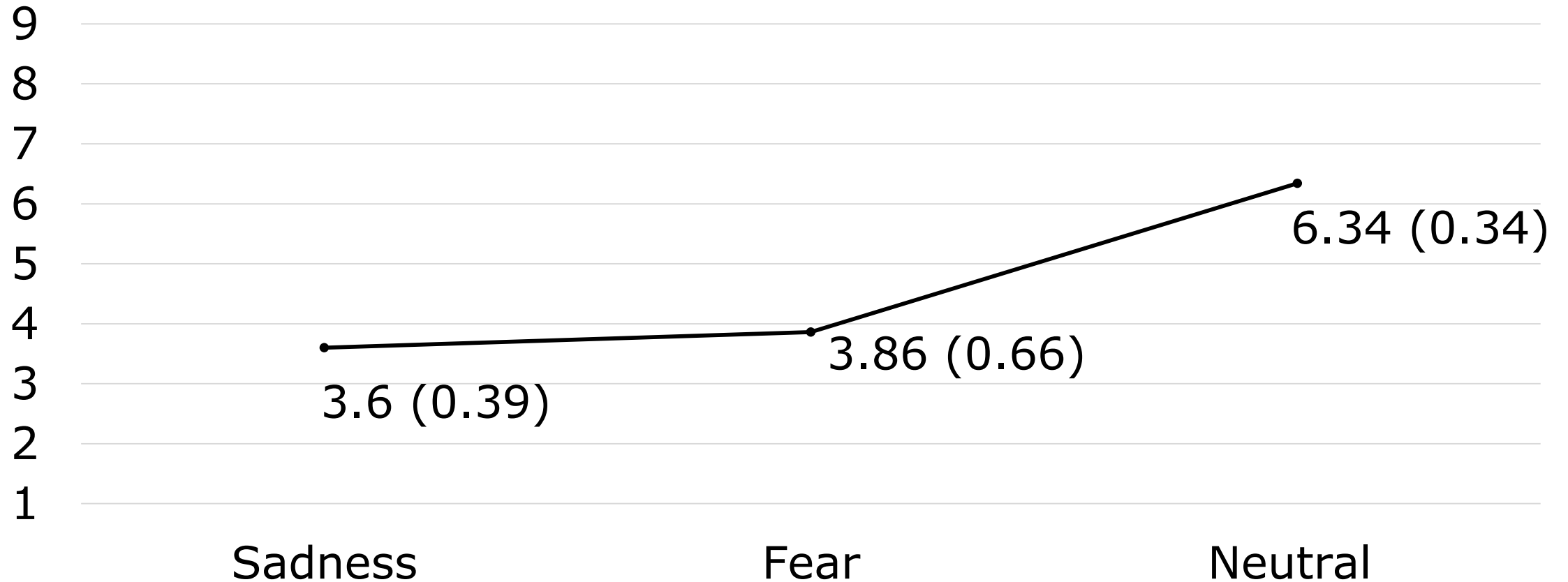
Post hoc test with Bonferroni correction: Arousal

Emotion		t	p_{bonf}
Sadness	Neutral	1.48	0.427
Sadness	Fear	-4.67	<.001
Neutral	Fear	-6.15	<.001

Results: Experiment 2

Self-report Instrument: T-SAM

Valence ratings for emotion conditions

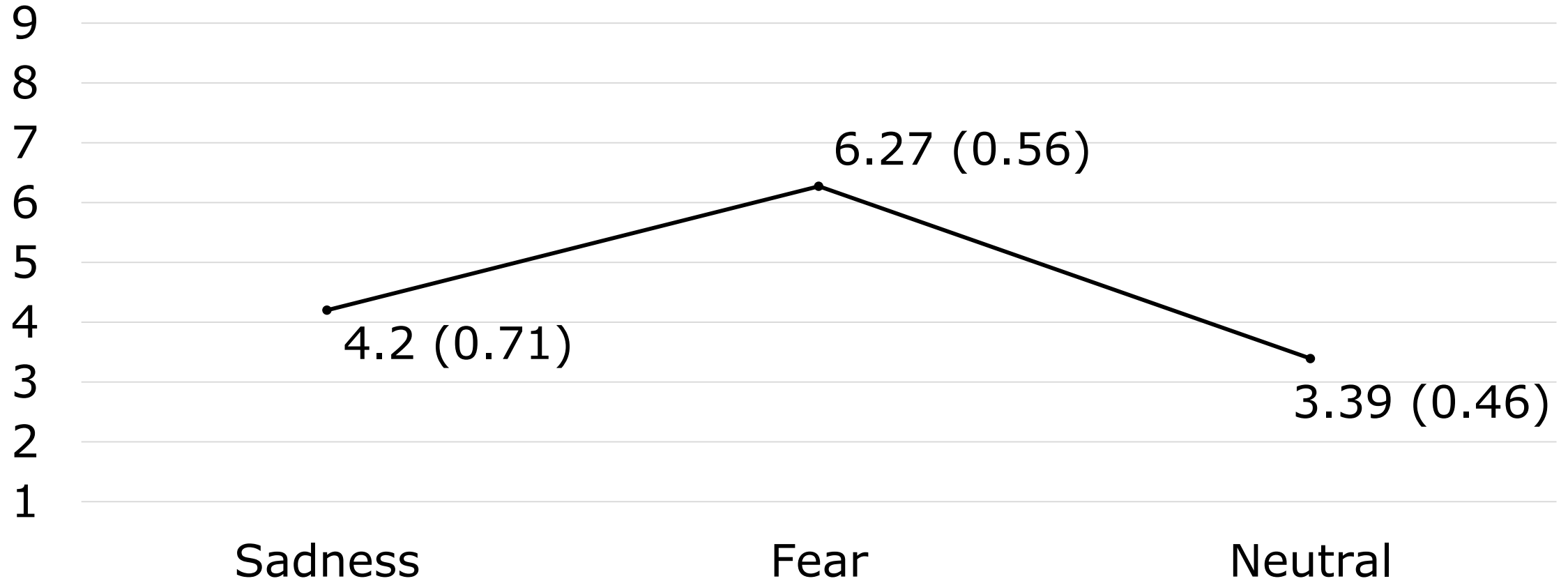


$(F(2, 84) = 68.576; p = <.000)$

Results: Experiment 2

Self-report Instrument: T-SAM

Arousal ratings for emotion conditions



$(F(2, 82) = 59.289; p = <.000)$

Post hoc test with Bonferroni correction: Valence

Emotion		t	p_{bonf}
Sadness	Neutral	-13.19	<.000
Sadness	Fear	-0.83	1.000
Neutral	Fear	-9.87	<.000

Post hoc test with Bonferroni correction: Arousal

Emotion		t	p_{bonf}
Sadness	Neutral	2.88	0.019
Sadness	Fear	-8.01	<.001
Neutral	Fear	-10.98	<.001

Conclusions: Psychophysiology (EDA and HR)

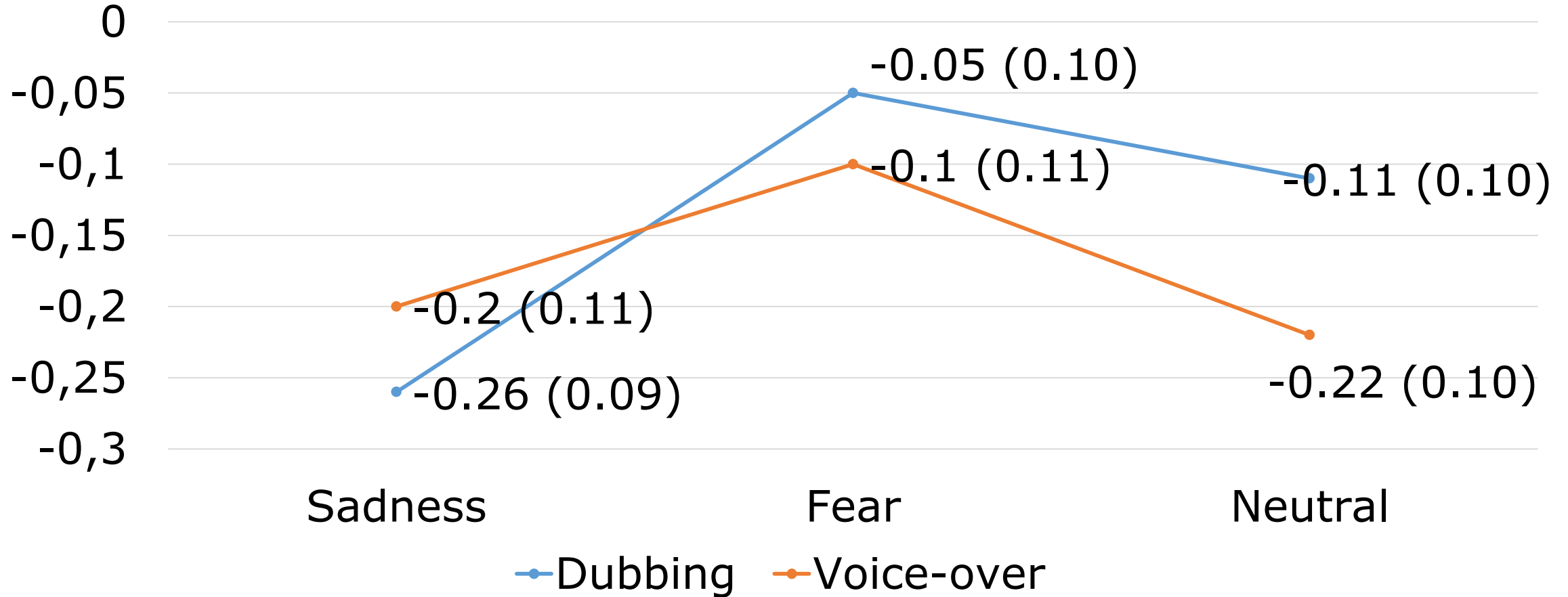
Experiment 1:

- 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

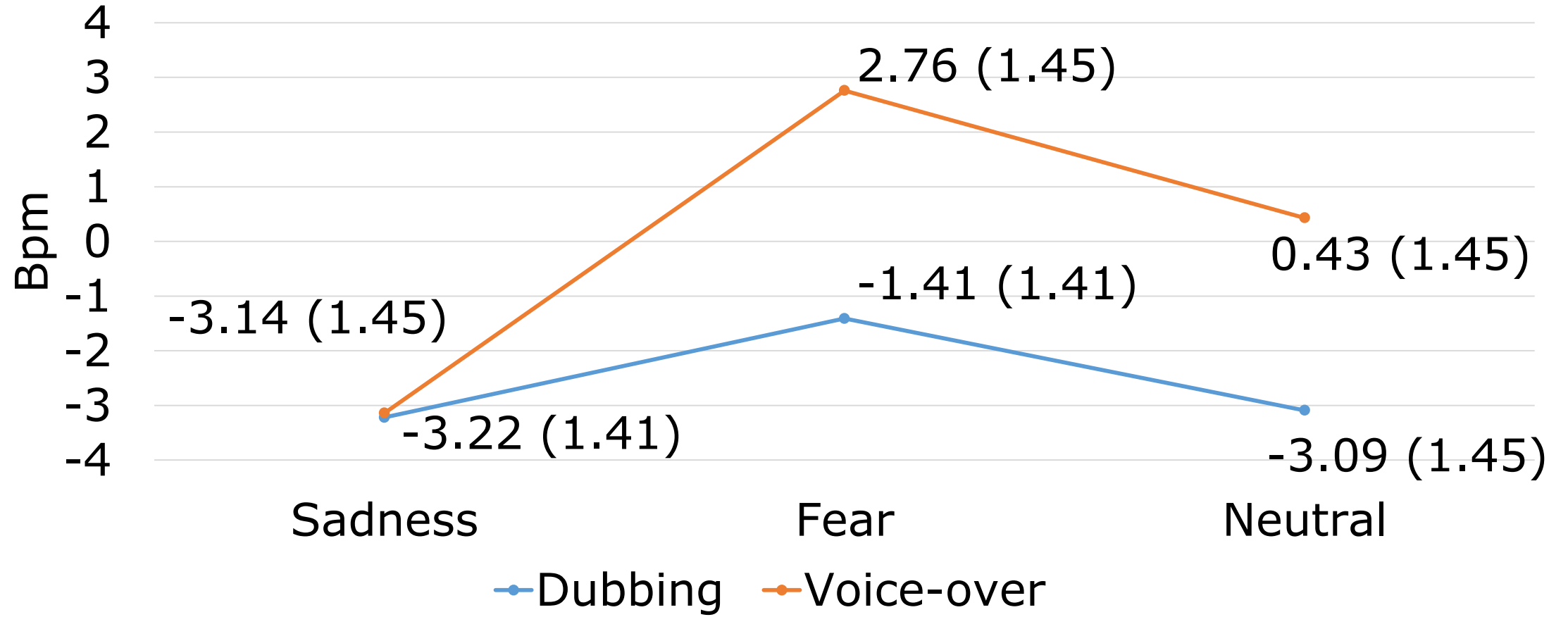


Emotion: ($F(2, 93) = 1.084; p = 0.34$) || Effect: ($F(1, 93) = 0.15; p = 0.7$)

Results: Experiment 1

Psychophysiology

HR values for emotion and effect conditions



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

Emotion		t	p_{bonf}
Sadness	Neutral	-0.54	1.000
Sadness	Fear	-1.45	0.372
Neutral	Fear	-0.92	1.000

Post hoc test with Bonferroni correction: HR

Emotion		t	p_{bonf}
Sadness	Neutral	-1.28	0.606
Sadness	Fear	-2.69	0.025
Neutral	Fear	-1.38	0.506

Conclusions: Psychophysiology (EDA and HR)

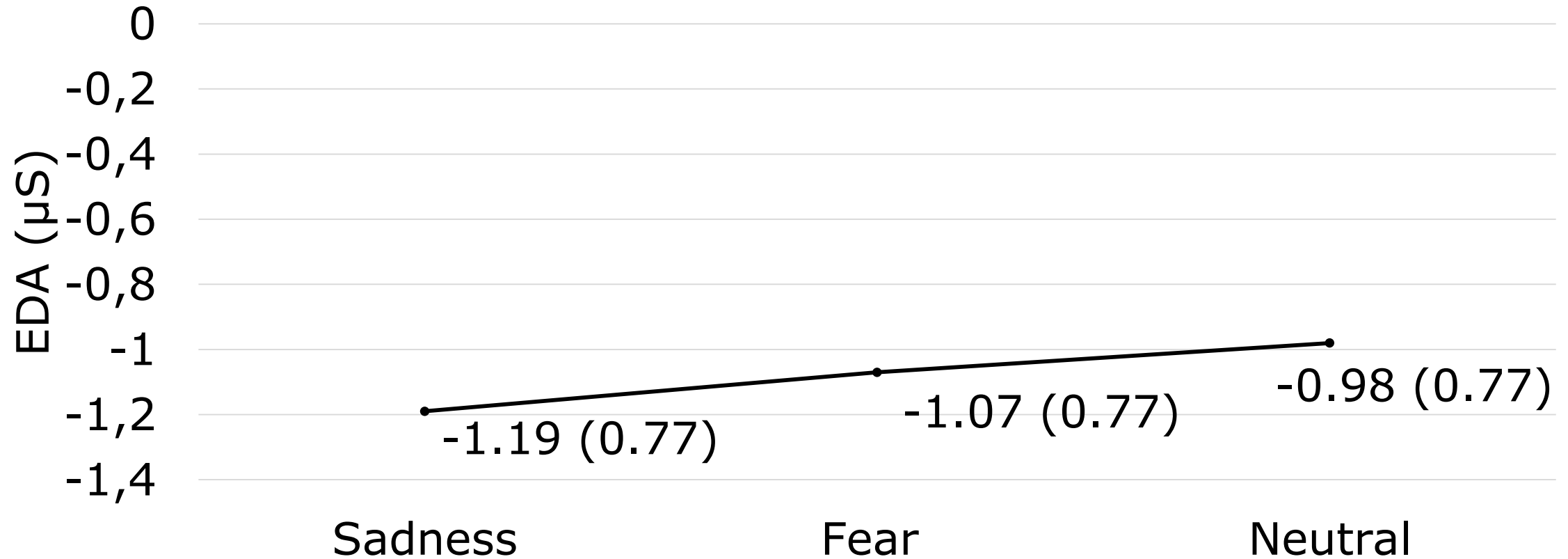
Experiment 2:

- 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

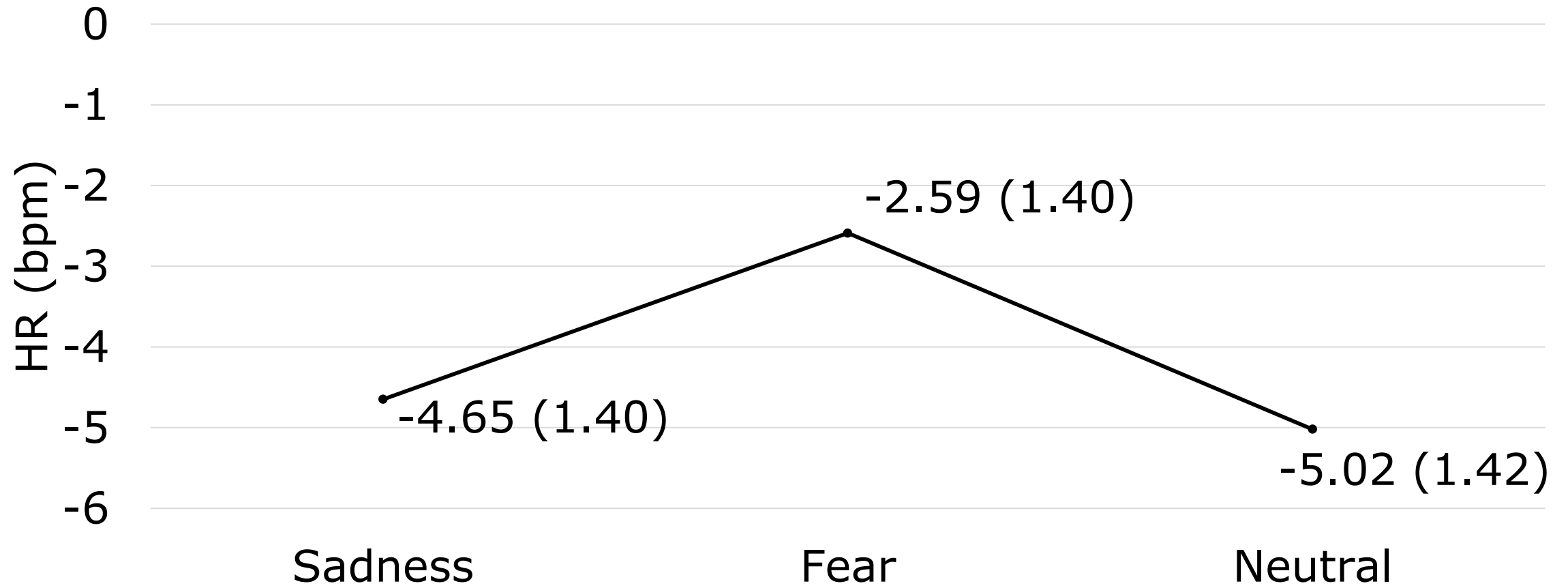


$(F(2,105) = 0.02; p = 0.981)$

Results: Experiment 2

Psychophysiology

HR values for emotion conditions



$(F(2, 92) = 0.87; p = 0.423)$

Post hoc test with Bonferroni correction: EDA

Emotion		t	p_{bonf}
Sadness	Neutral	-0.19	1.000
Sadness	Fear	-0.11	1.000
Neutral	Fear	0.08	1.000

Post hoc test with Bonferroni correction: HR

Emotion		t	p_{bonf}
Sadness	Neutral	-0.19	1.000
Sadness	Fear	-1.04	0.903
Neutral	Fear	-1.22	0.679

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[https://doi.org/10.1016/S0167-8760\(00\)00175-6](https://doi.org/10.1016/S0167-8760(00)00175-6)

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TransMedia Catalonia is a research group funded by the Secretariat for Universities and Research (Catalan Government), reference code 2017SGR113.

The project NEA (Nuevos Enfoques sobre Accesibilidad/New Approaches to Accessibility) has received funding from the Ministry of Economy, Industry and Competitiveness (Spanish Government), grant agreement No FF12015-64038-P, MINECO/FEDER.

Iturregui-Gallardo is an FI grantholder awarded by the Agency for Management of University and Research Grants of the Catalan Government, reference code 2016FI_B 00012.

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