

Tactile Emotions

Multimodal Affective Captioning with Haptics Improves Narrative Engagement for d/Deaf and Hard-of-Hearing Viewers

RIT

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Bob shook her head. "I know it sounds lovely, darling, but to get a caravan? It would cost at least fifty pounds to buy, and if we had one, Daddy couldn't get away this summer. No, let's keep our minds to do without a holiday this year; but I'll tell you what: we'll all go to Southend for the day, as we did last year, and have a picnic and tea with us and have a splendid picnic."

"Then we can bathe again," said Bob; "but, oh! I do wish I could go and ride," he added unexpectedly. "You don't know how I love to ride," he continued, sighing deeply as he remembered the blissful days when a friend let him share his little Dartmoor pony and ride occasionally. "Southend is nothing but houses and people," cried Phyllis; "it's not like this place; and oh! Mummie, I do so *long* for fields and flowers," she added piteously; and she shook her long brown hair and wiped the tears in her eyes.

"Never mind, darling, you shall have them one day," answered Mummie with easy vagueness.

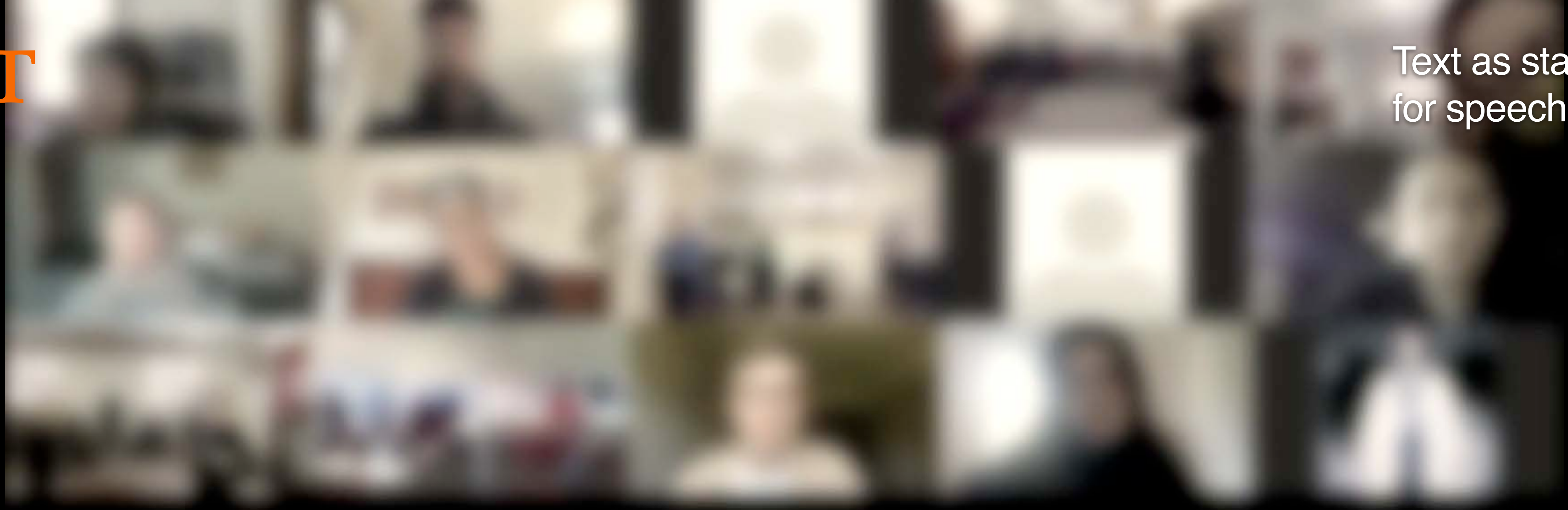
This really was not very comforting, and it was the most fortunate thing that at that moment a car stopped at the door.

"Uncle Edward!" shouted Bob, rushing from the room. Phyllis ran so hastily from her eyes that she arrived at the front door just as he did, and both flung themselves on the tall, kindly-looking man who stood beside the car.

"Uncle Edward! Uncle Edward!" they cried. "You've come!"

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Text as stand-in
for speech



A^ma^ar ou o^di^aa^ar ou tu^do
ou na^ada^a
O meⁱo te^rmo é que
A al^ma tem d'e-
não po^de se^er
star so^bressaⁱtada p'ra o nos^so
ba^arro se sentⁱr vive^er
Não é uma
Meta-
cru^z a que não for pes^aada
de de um praze^r nã^o é é
um praze^er E quem quise^r
a vida sosse^gaada Fu^ja
da vidaa^a e dei^xe-se morre^er



de Lacerda Pataca, C., Watkins, M., Peiris, R., Lee, S., & Huenerfauth, M. (2023, April). Visualization of Speech Prosody and Emotion in Captions: Accessibility for Deaf and Hard-of-Hearing Users. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (pp. 1-15).

Wölfel, M., Schlippe, T., & Stitz, A. (2015, October). Voice driven type design. In 2015 international conference on speech technology and human-computer dialogue (SpeD) (pp. 1-9). IEEE.



Diaz carries the ball
Touchdown

Rosenberger, T., & MacNeil, R. L. (1999, May). Prosodic font: translating speech into graphics. In CHI'99 Extended Abstracts on Human Factors in Computing Systems (pp. 252-253).



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Affective
Captions
example

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Valence ->
Font-color

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Arousal ->
Font-size &
Font-weight



1

Design space of haptic
signal

How to depict arousal
levels in speech through
haptic feedback in a
clear and comfortable
way?

2

Changes to Narrative
Engagement

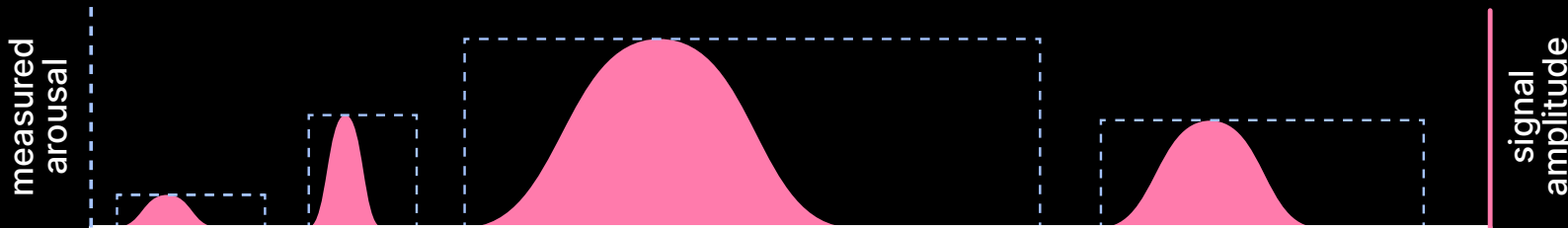
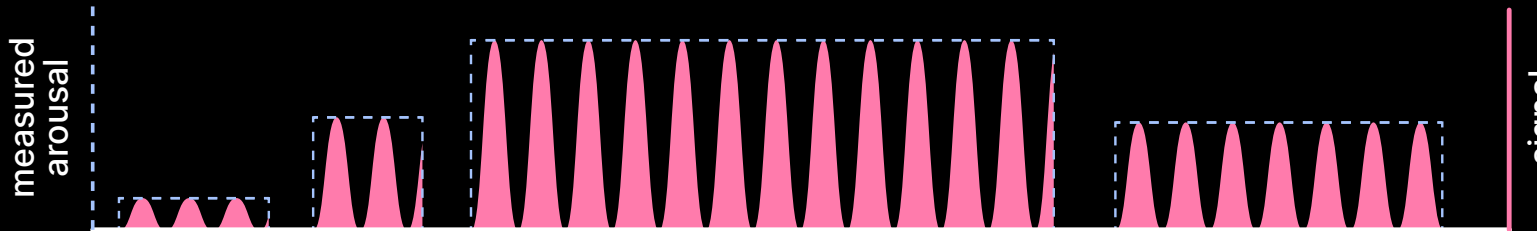


Intensity ->
Carrier signal

Rhythm

Frequency

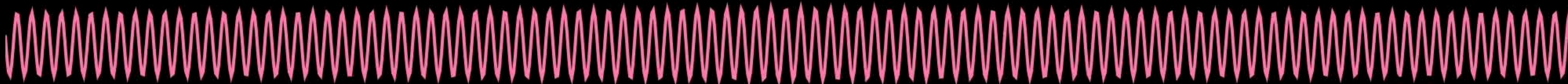




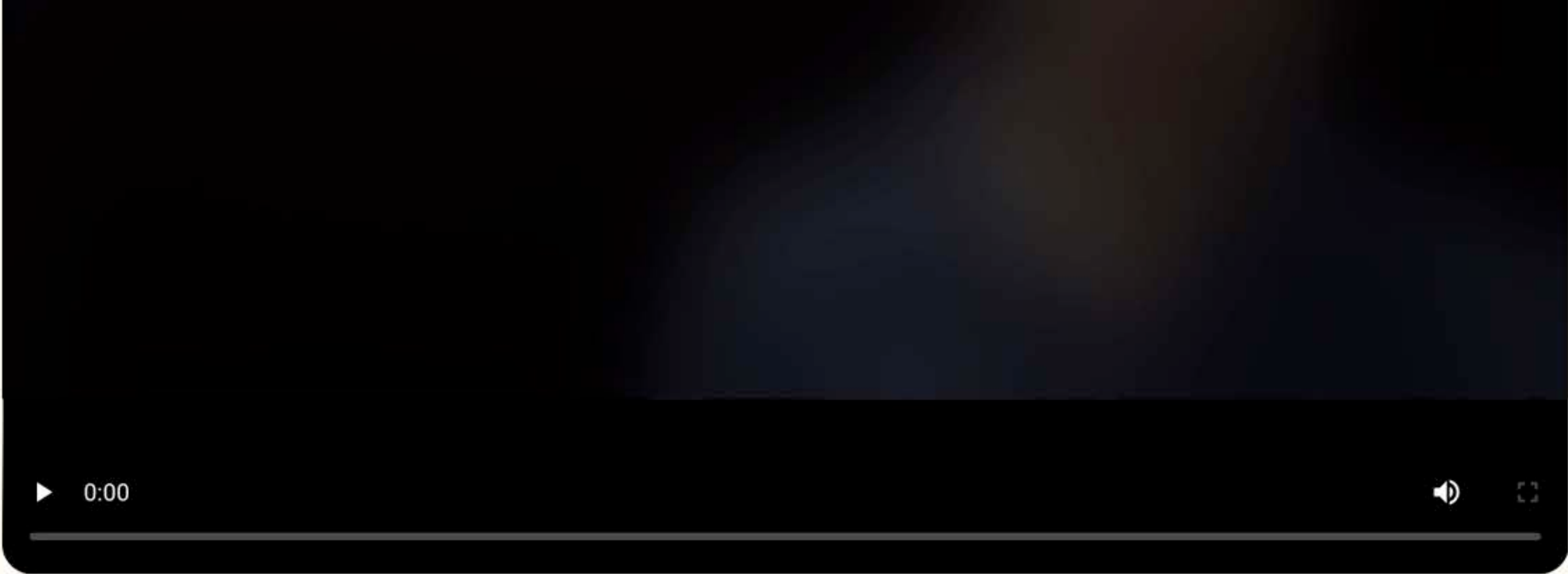
Low frequency · 75 Hz



High frequency · 250 Hz



	Long-pulse LP	Multiple short-pulses MSP	Single short-pulse SSP
75 Hz	?	?	?
250 Hz	?	?	?



Select this as the worst pattern

Select this as the best pattern

Pattern #6



	Long-pulse LP	Multiple short-pulses MSP	Single short-pulse SSP
75 Hz	X	X	✓
250 Hz	X	X	X

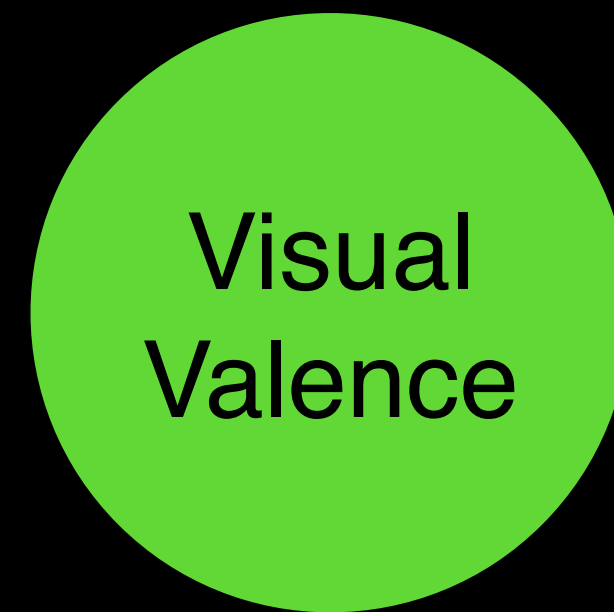
1

Design space of haptic
signal

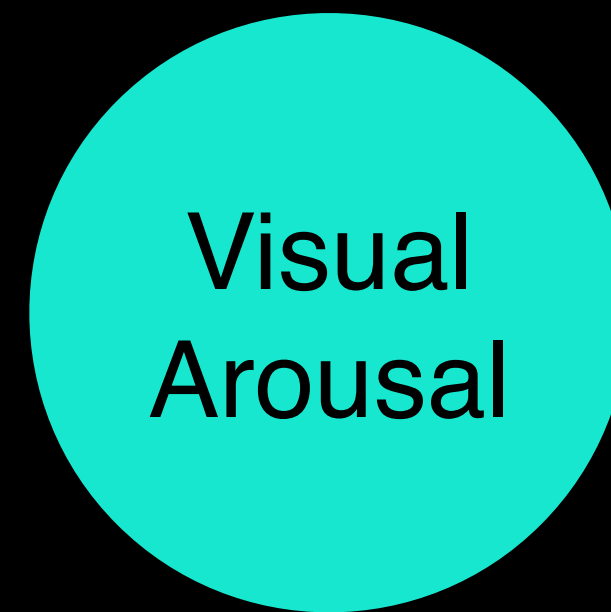
2

Changes to Narrative
Engagement

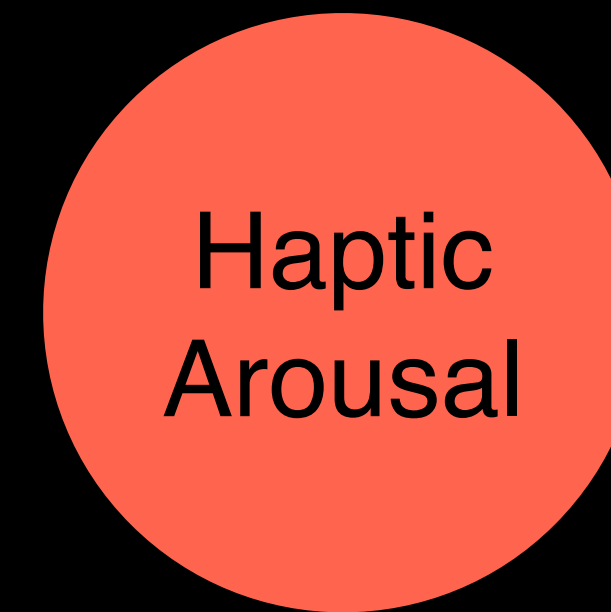
Do combinations of
haptics and visuals
improve engagement
with audiovisual
content?



Font-color

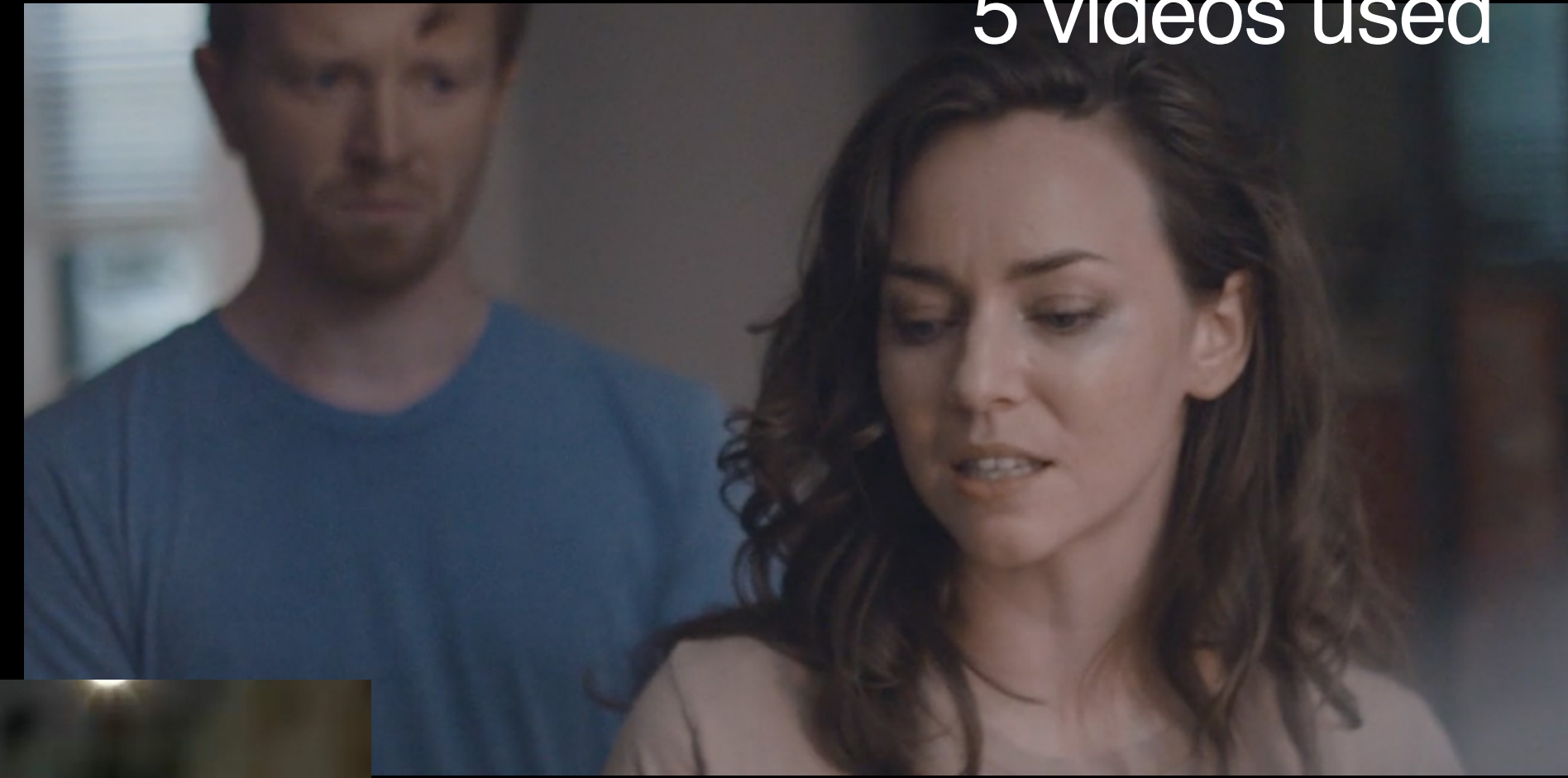


Font-weight



Vibrations ->
SSP 75 Hz

	Visual Valence Font color	Visual Arousal Font weight	Haptic Arousal SSP 75 Hz
Condition 1 Baseline			
Condition 2			
Condition 3			
Condition 4			
Condition 5			



Narrative understanding

How well are viewers making sense of the story?

Narrative presence

A feeling of being present in the story

Emotional engagement

Do viewers share emotions with the characters in the story?

Attentional focus

How focused the viewers are on the content?

Video 1 out of 5

Please watch the video to the end and then answer the questions below about your experience.



laugh. We did get on. He definitely found me funny. He should be here.
Thanks. Sorry. It's okay. Do you want me to get you a new coffee?

2

Pause video

Rewind

	Visual Valence Font color	Visual Arousal Font weight	Haptic Arousal SSP 75 Hz	Narrative Engagement
Condition 1 Baseline	X	X	X	51
Condition 2	✓	✓	X	55
Condition 3	✓	X	✓	54
Condition 4	✓	✓	✓	62
Condition 5	✓	X	X	60

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Tactile Emotions

We're on the job market!



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