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## Emotions can alter kinesthetic acuity

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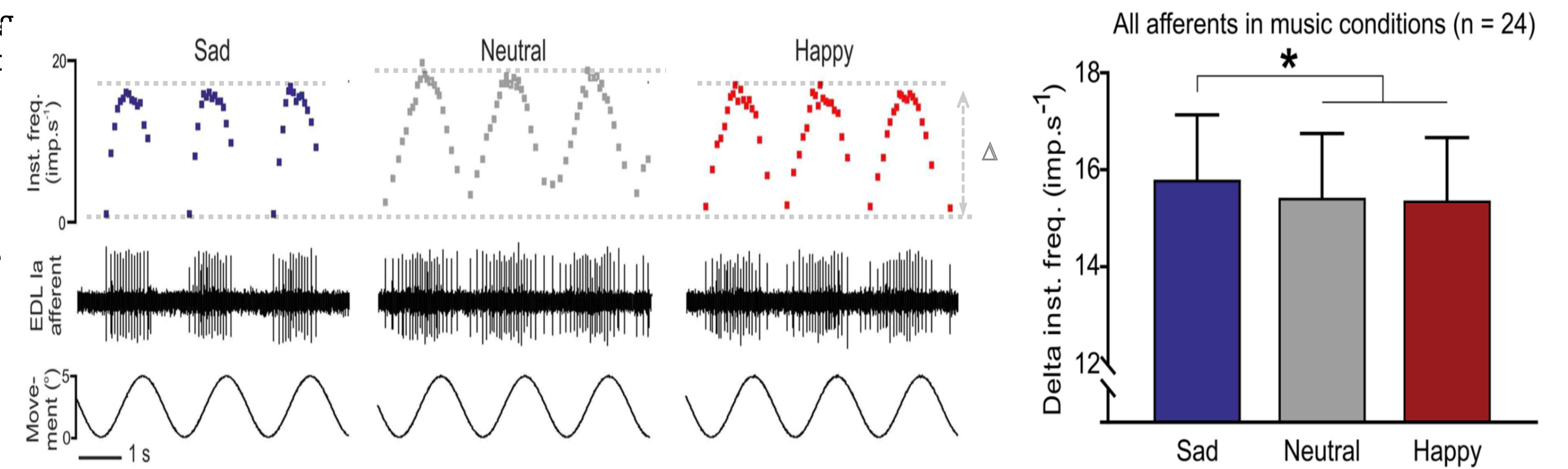


## Introduction

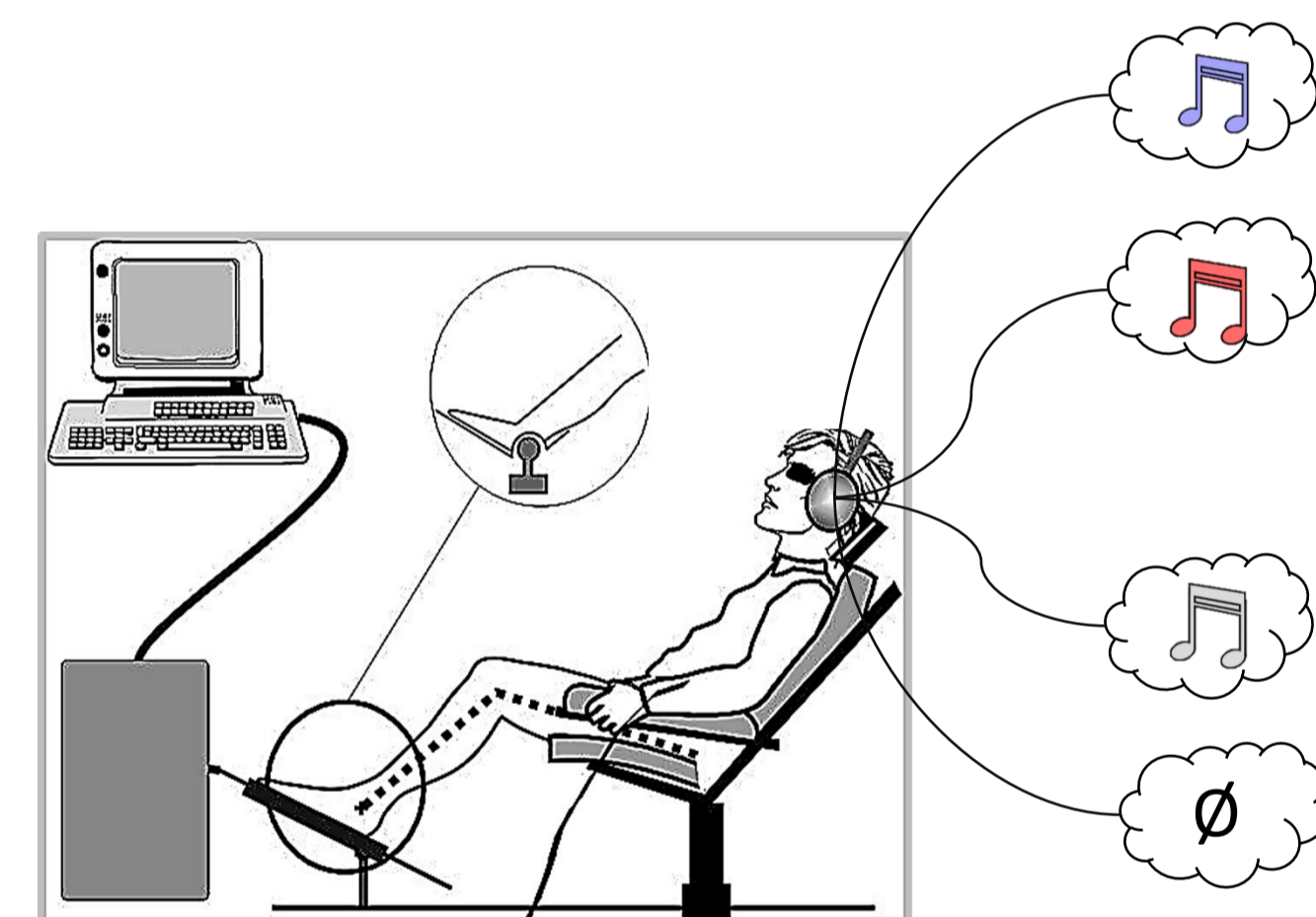
Kinesthesia, the perception of our own movements, relies on the integration of proprioceptive information arising mostly from sensory receptors located in the muscle belly, namely, muscle spindles. These receptors exhibit static and dynamic sensitivity, i.e., they encode both muscle length and its changes. The sensitivity of muscle afferents is modulated by specific motoneurons, the  $\gamma$  fusimotor system, to fit the requirements of a task.

Recently, we showed that this proprioceptive feedback changes with the emotional context. Using microneurography, we recorded the unitary activity of muscle spindle afferents in healthy subjects during passive movements of the foot, while they listened to evocative classical music, to induce sad, neutral, or happy emotions. The sad condition was associated with a decreased activity during muscle shortenings, which suggests a larger dynamic sensitivity.

After these neurophysiological findings, we sought to investigate here whether the changes in proprioceptive feedback associated with emotional context may affect our perception of limb movements, i.e., kinesthetic acuity.

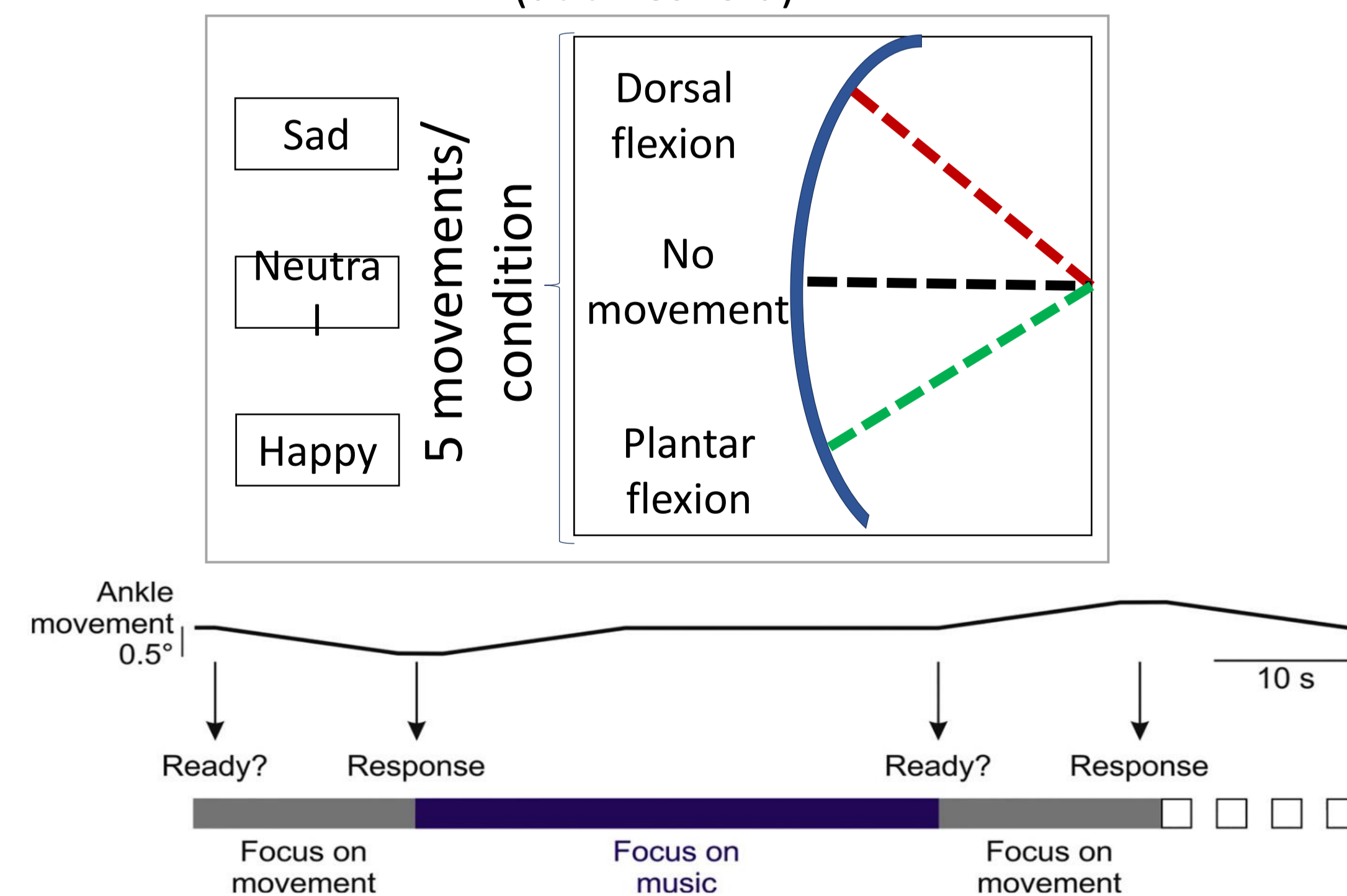


## Methods



- Participant had to:
- Close their eyes
  - Relax
  - No movement

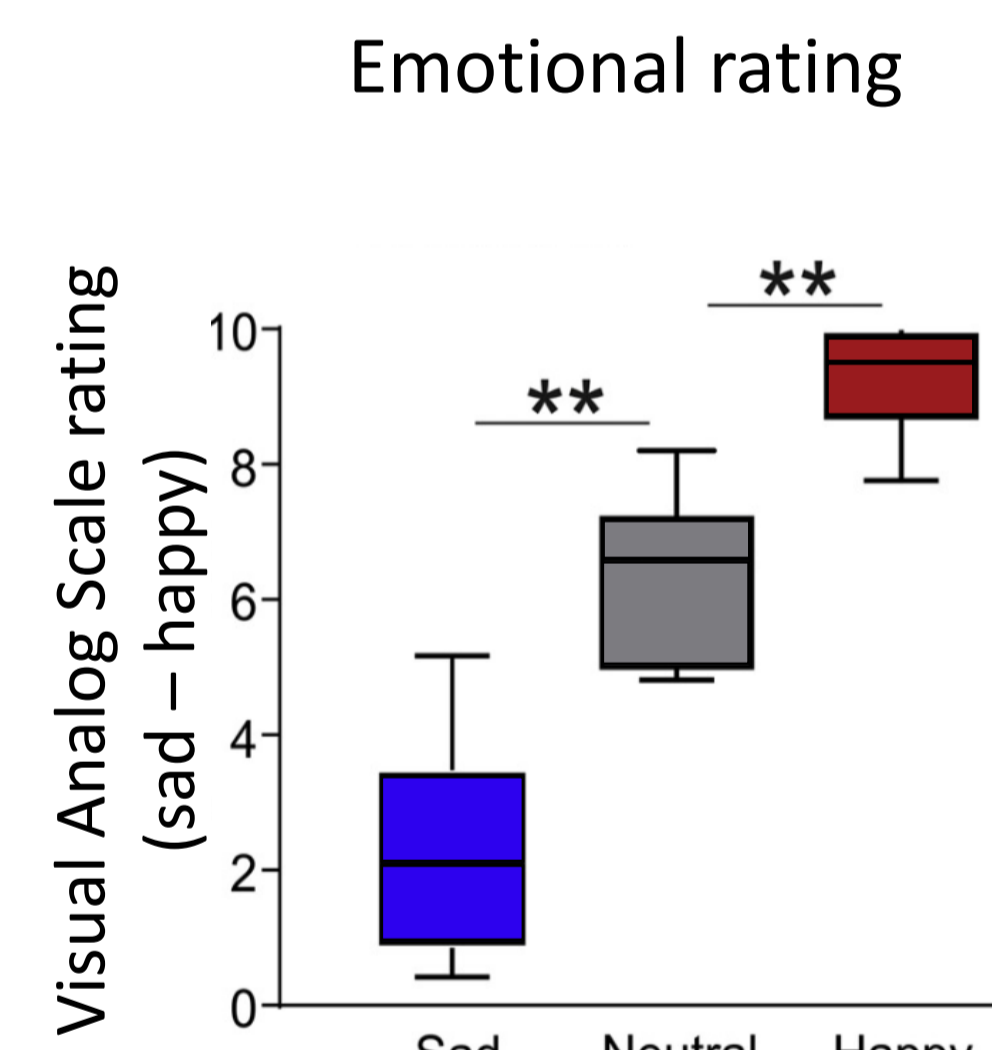
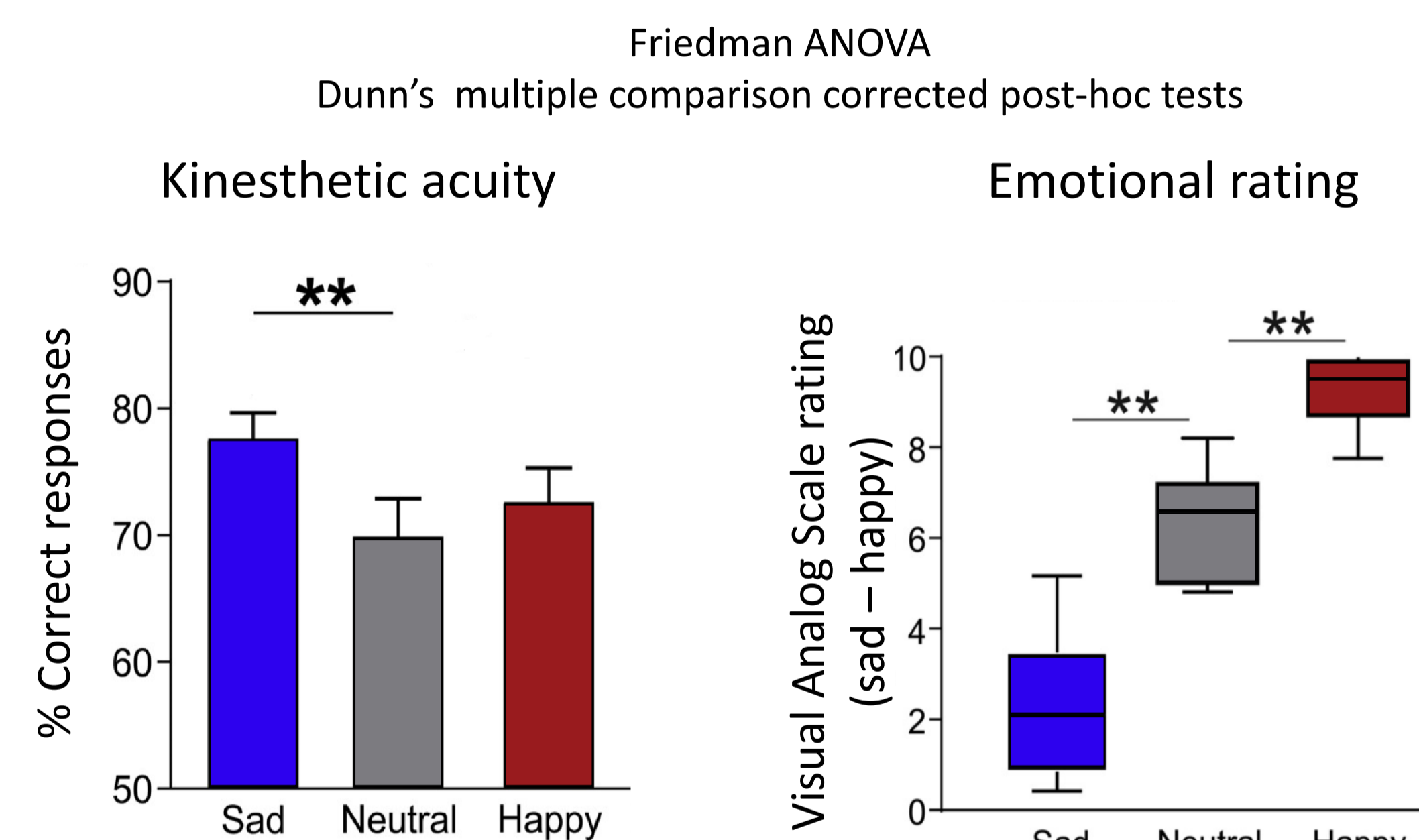
### Kinesthetic acuity (at threshold)



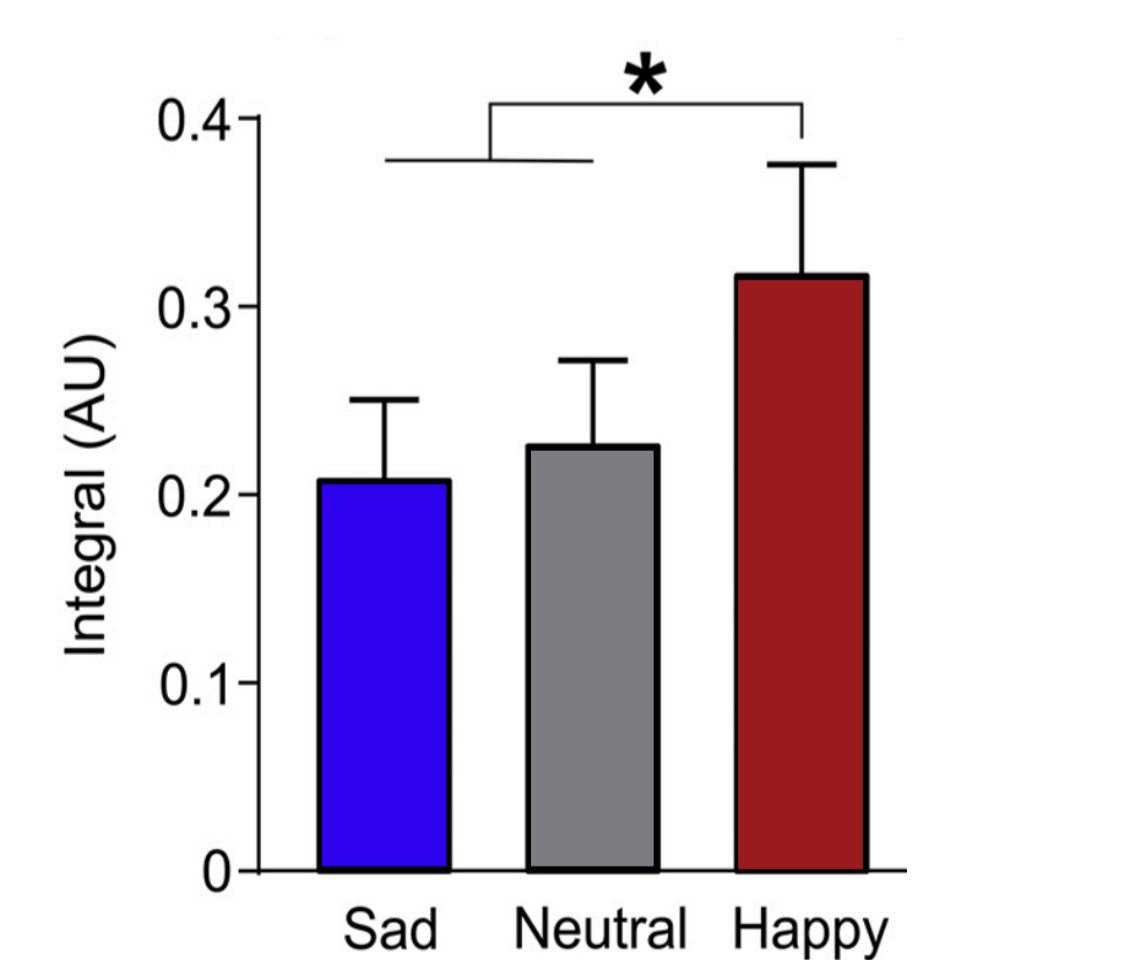
## Results

N= 20

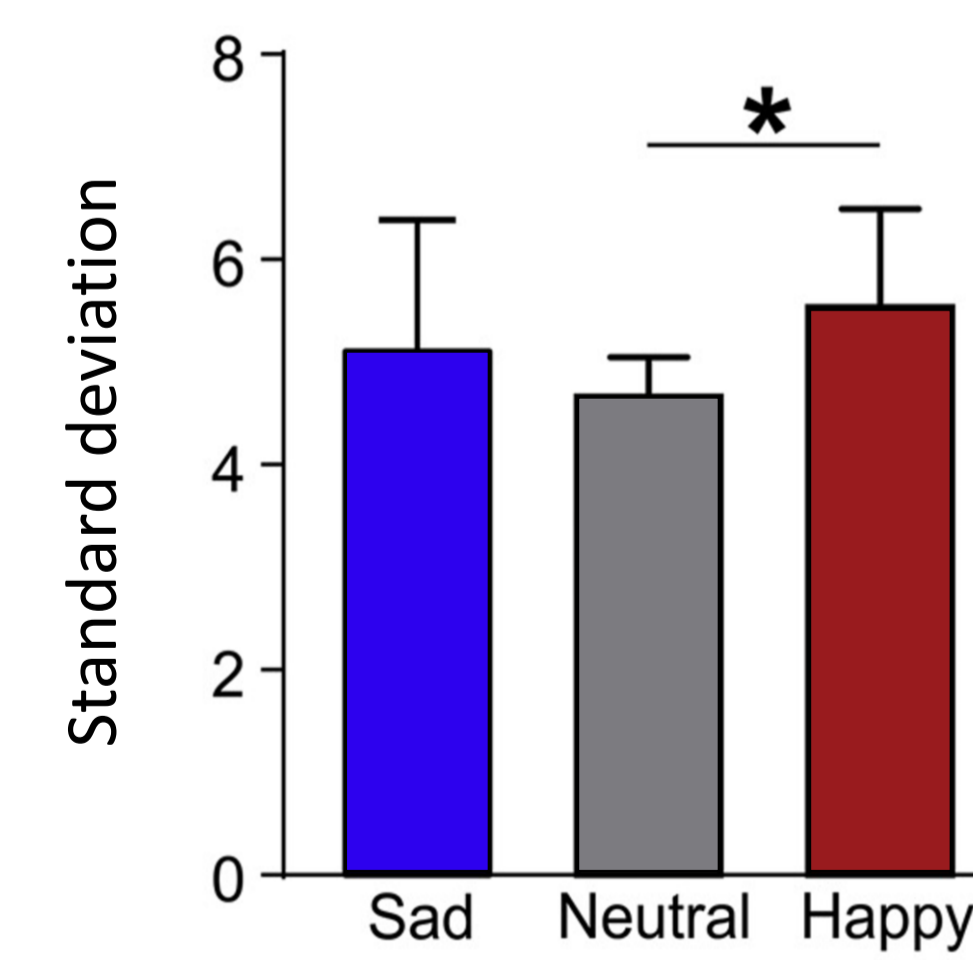
### Kinesthetic acuity



### Electrodermal activity



### Heart rate variability



\*  $p < 0,05$  \*\*  $p < 0,01$

## Discussion

Subjects listened to evocative classical music to induce sad, neutral, or happy emotions. Both the emotional rating and the physiological markers confirmed that they experienced the expected emotion.

In line with our microneurography study, only the sad condition was efficient in inducing a significant change in kinesthetic acuity, found to be larger, which confirms that emotion alters our proprioceptive feedback.

We suggest that emotion may prepare the body to react appropriately to the environmental context, for example, escape for negative emotion or approach for positive emotion (Coombes et al., 2007). Emotion may also aid the perception of movement and thus allow us to prime our movements.

## Bibliography

- Samain-Aupic, L., Ackerley, R., Aimonetti, J.-M., & Ribot-Ciscar, E. (2019). Emotions can alter kinesthetic acuity. *Neuroscience Letters*, 694, 99-103.  
Ackerley, R., Aimonetti, J.-M., & Ribot-Ciscar, E. (2017). Emotions alter muscle proprioceptive coding of movements in humans. *Scientific Reports*, 7(1), 8465.  
Coombes, S A, Cauraugh, JH, & Janelle, C M (2007). Emotional state and initiating cue alter central and peripheral motor processes. *Emotion*, 7(2), 275-284.