

Mental Representations of Pain: the Effect of the Sex of the Perceiver

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Context

Humans rely on facial expressions to assess emotions in others. Of all the negative-valued emotions, pain remains the least accurately recognized, especially for male observers¹. Studies have shown that this advantage for women may be related to a more efficient use of information relevant to emotion recognition². Moreover, pain is often confused with emotions like anger and disgust³. This study **verifies whether patterns of similarity between mental representations (MR) of pain and other negative emotions vary as a function of the observer's sex.**

Method

Phase 1: MR Extraction

Participants :

- Group 1: 89 participants (42 men)
- Group 2: 73 participants (37 men)

Task : Both groups participated in a variant of the Reverse correlation⁴ task:

- 2AFC (Gr1) or scale (Gr2)
- 500 trials per participant

Phase 2: MR Evaluation

Participants : 21 independent judges

Task : Rating of the perceived intensity of 7 emotions for the 162 mental representations of pain collected in the first phase:

Emotions :

- Pain
- 6 basic emotions

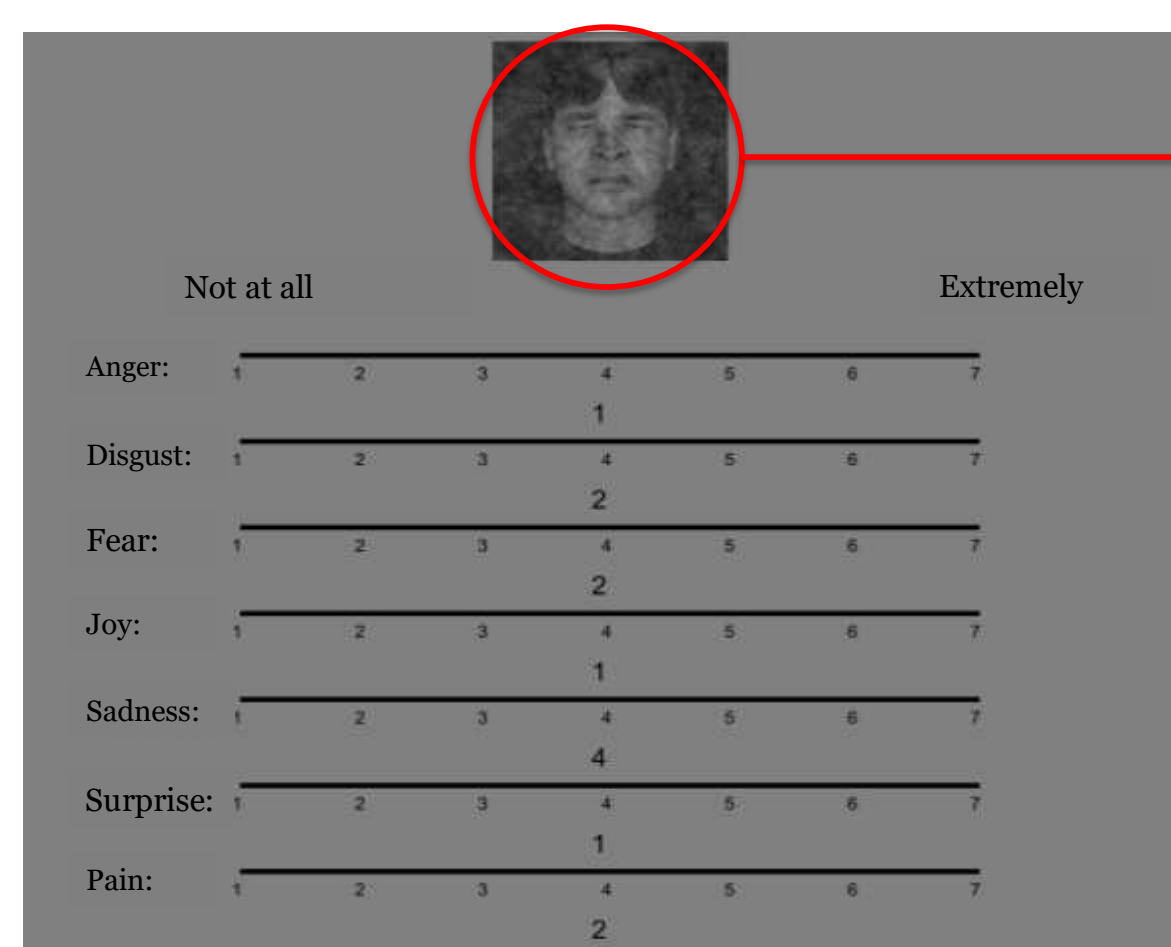


Figure 4. Example of one trial for the MR Evaluation task.

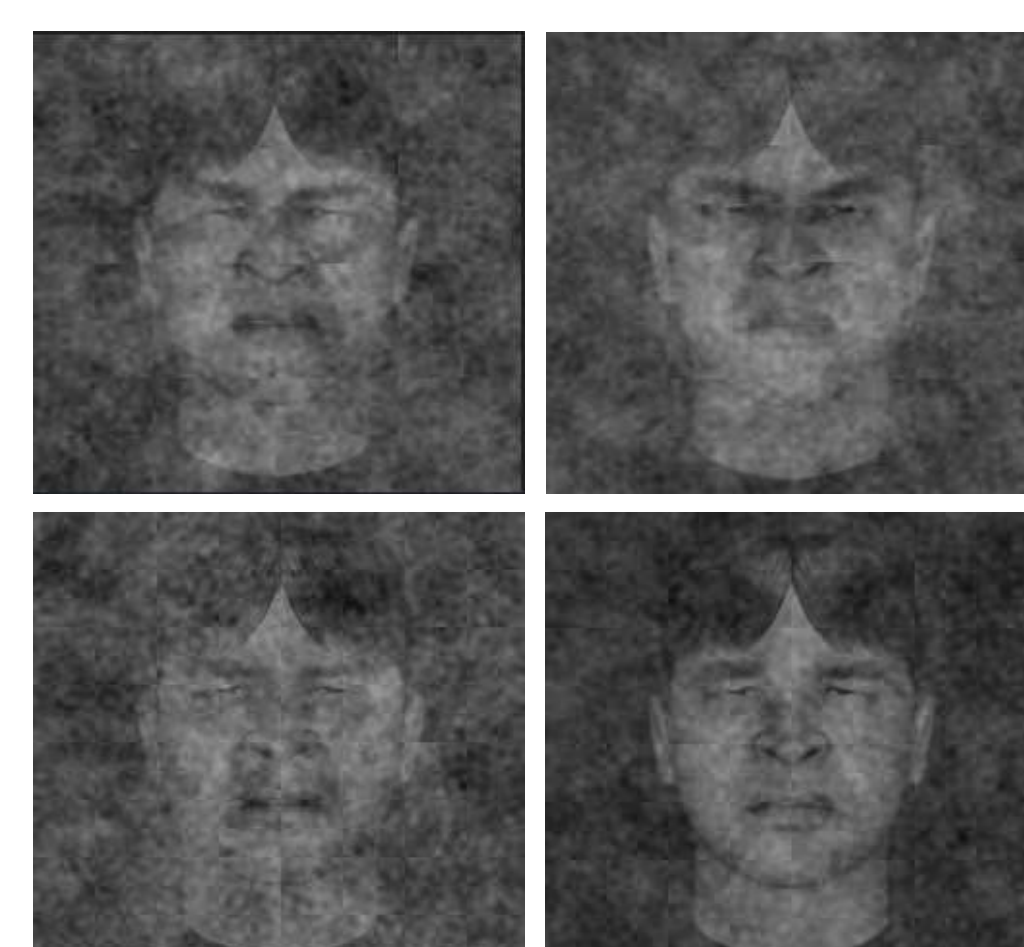


Figure 5. Examples of MR of pain from 4 different participants.

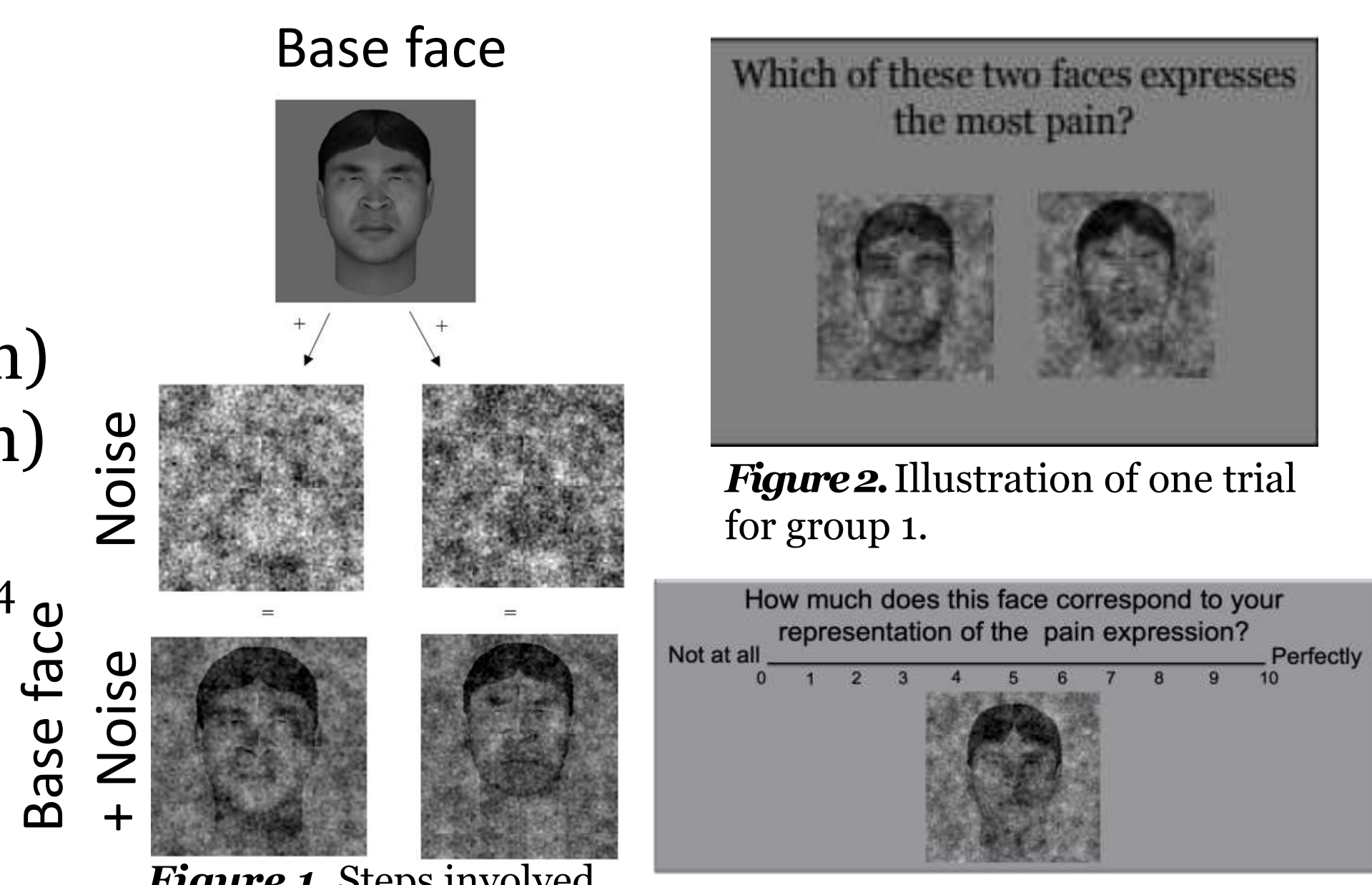


Figure 1. Steps involved in the creation of two stimuli for one trial.

Figure 3. Example of one trial for group 2.

Results

Group 1

A 2 (sex) x 7 (emotions) mixed ANOVA on the scores revealed a main effect of emotion [$F(1.81, 157.68)=196.07, p<0.001$] $\eta^2_{(partial)} = .69$, but no main effect of sex ($p = .92$) nor interaction ($p = .54$). (Figure 6)

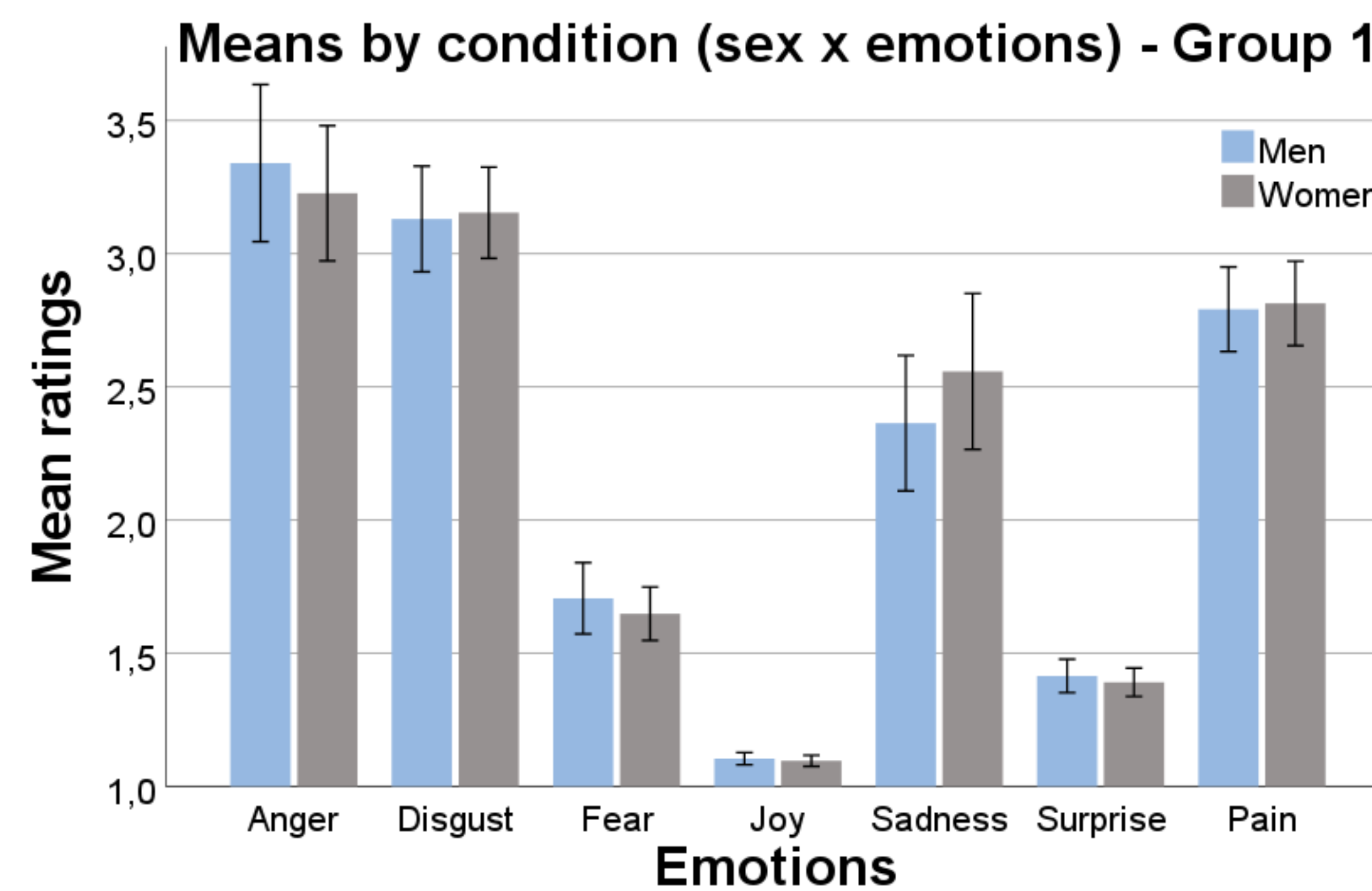


Figure 6. Bar graph representing the average intensity for each emotion, by sex, for group 1. Error bars represent the 95% confidence intervals.

Group 2

A 2 (sex) x 7 (emotions) mixed ANOVA revealed a main effect of emotion [$F(1.69, 119.98)=82.05, p<0.001$] $\eta^2_{(partial)} = .54$, but no main effect of sex ($p = .13$) nor interaction ($p = .70$). (Figure 7)

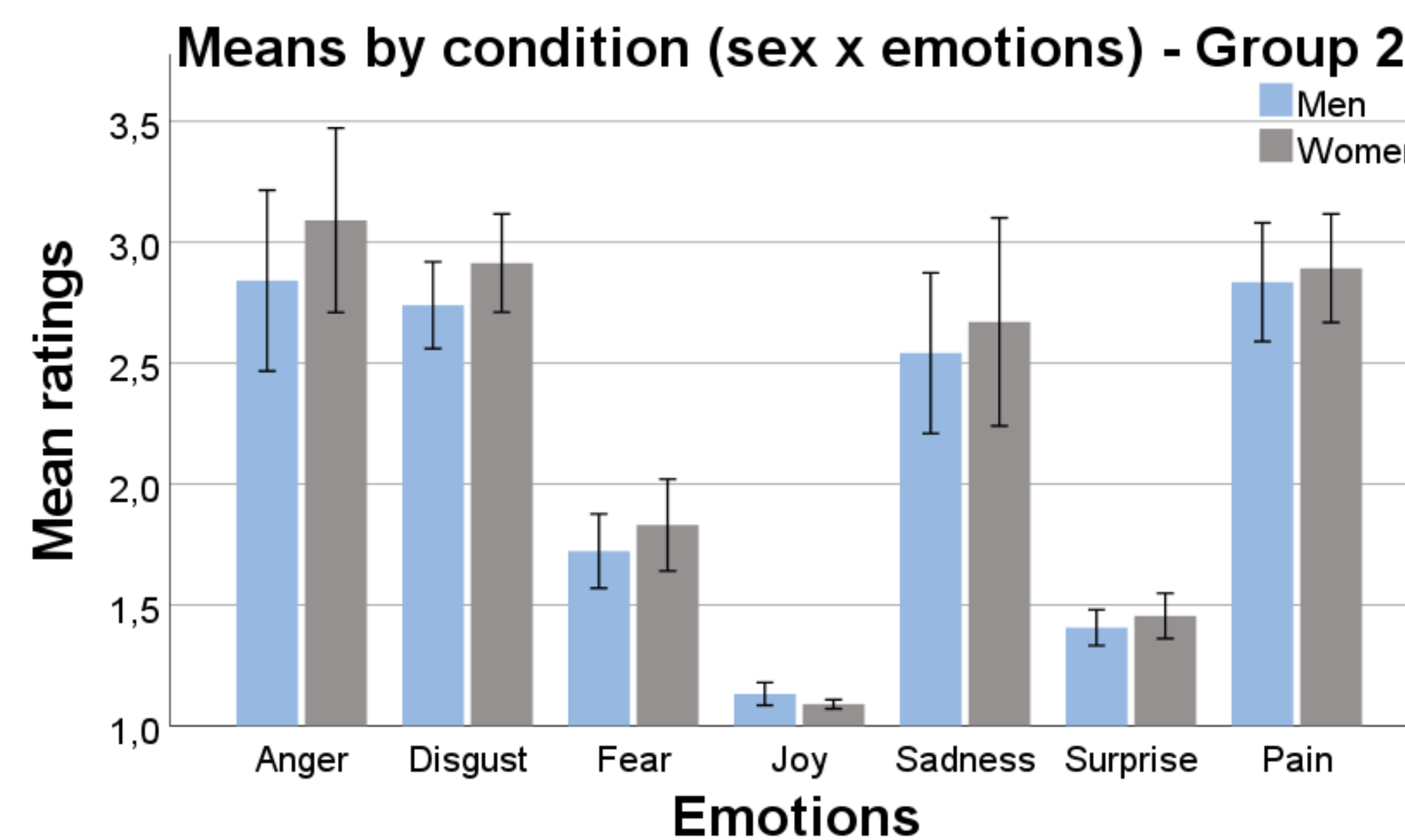


Figure 7. Bar graph representing the average intensity for each emotion, by sex, for group 2. Error bars represent the 95% confidence intervals.

Cluster Analysis

A hierarchical cluster analysis of the emotions perceived in each of the MR revealed 3 clusters (i.e. same for both groups), with pain not being the dominant emotion in any of them, but rather 1) anger, 2) sadness and 3) anger and disgust in equal parts. See Figure 8 for cluster analysis results

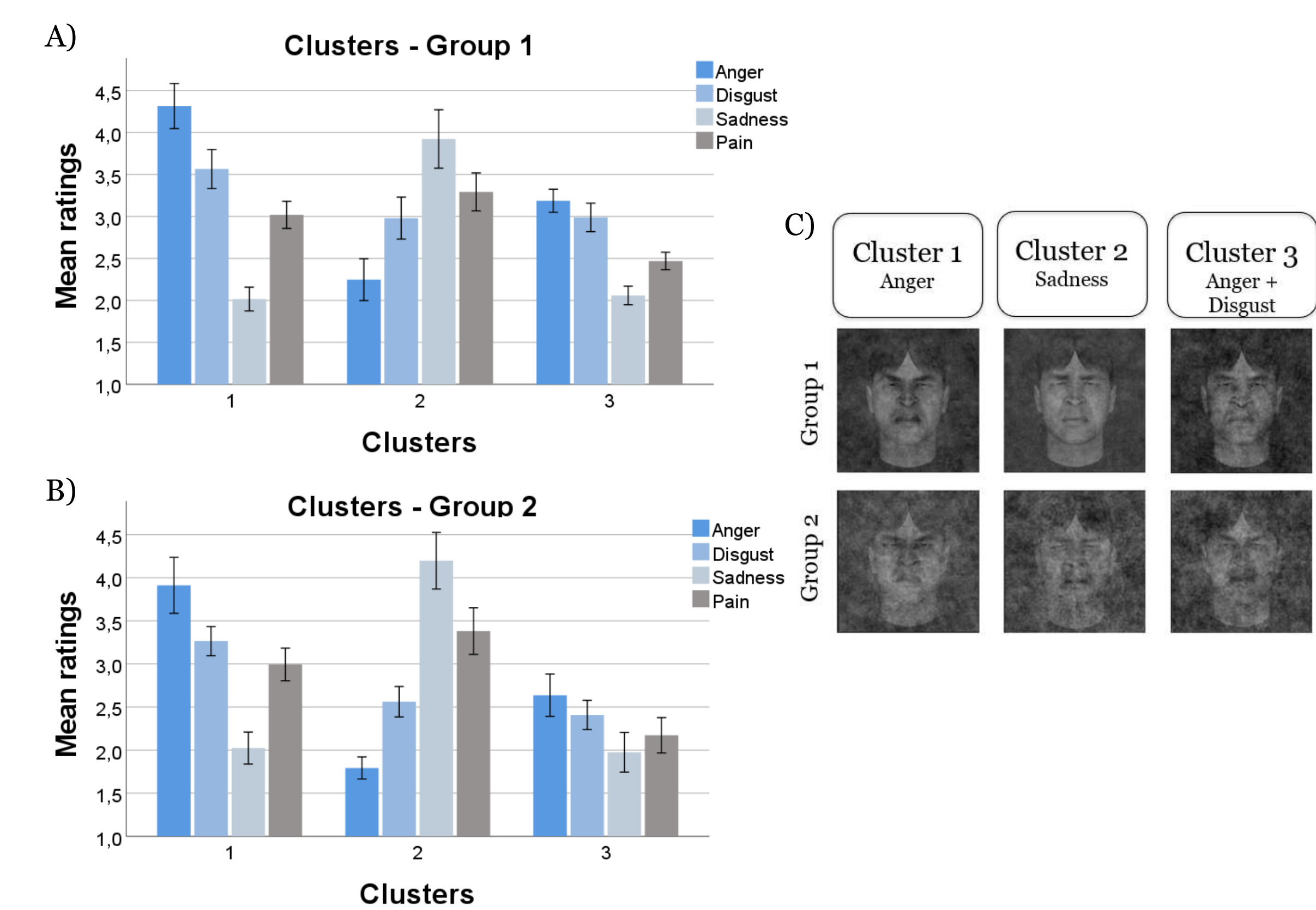


Figure 8. Cluster analysis results. A) Clusters for group 1. Error bars represent the 95% confidence intervals. B) Clusters for group 2. Error bars represent the 95% confidence intervals. C) Examples of MR of pain for each cluster and group.

Discussion

- The present results do not support the existence of sex differences in the mental representation of pain facial expressions.
- However, significant individual variations in the mental representation of pain facial expressions indicate that expectations about the appearance of this expression vary from one individual to the other.
- These variations may lead to alterations in the communication of pain. For instance, if an observer expects pain to look like sadness, but the person in pain displays an expression looking more like anger or disgust, or vice-versa.

References

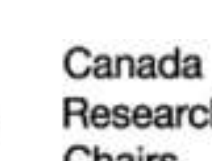
(1) Wingenbach, T. S., Ashwin, C., & Brosnan, M. (2018). Sex differences in facial emotion recognition across varying expression intensity levels from videos. *PLoS one*, 13(1). (2) Plouffe-Demers, M.-P., Saumure, C., Fiset, D., Cormier, S., & Blais, C. (2022). Facial Expression of Pain: Sex Differences in the Discrimination of Varying Intensities. *Emotion*. (3) Kappesser, J., & de C Williams, A. C. (2002). Pain and negative emotions in the face: judgements by health care professionals. *Pain*, 99(1-2), 197-206. (4) Mangini, M. C., & Biederman, I. (2004). Making the ineffable explicit: Estimating the information employed for face classifications. *Cognitive Science*, 28(2), 209-226.



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