The Impact of Face Ethnicity on the Discrimination of Facial Expressions of Pain

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Theoretical Background

Studies demonstrate that an observer's ability to recognize a facial expression is compromised when expressed by an individual belonging to a different ethnic group[1-5]. These studies suggest an overestimation of joy in white faces[1], an overestimation of anger in black faces[1-2], and an underestimation of pain in black faces[3-5]. However, the use of subjective tasks in these studies does not allow for verifying if a perceptual factor partially explains these effects.

Objectives

- To verify if the ethnicity of the face has an impact on the observer's ability to discriminate variations in intensity in facial expressions of joy, anger, or pain.
- To verify if this effect is partially explained by perceptual alteration.

Method

Three tasks : Two faces of the same ethnic profile (black or white) were presented sequentially (see Figure 1). The task involved indicating which face exhibited the most intense expression. Each task presented faces expressing one of three emotions (joy, anger, or pain; see Figure 2). Each participant (N = 150, 50 per emotion) completed 420 trials (210 for each ethnicity).

Conditions : Two intensity conditions, moderate condition (range of 14 to 49%) and high condition (range of 54 to 89%). The paired faces differed in intensity by 7 to 35% (see Figure 3).
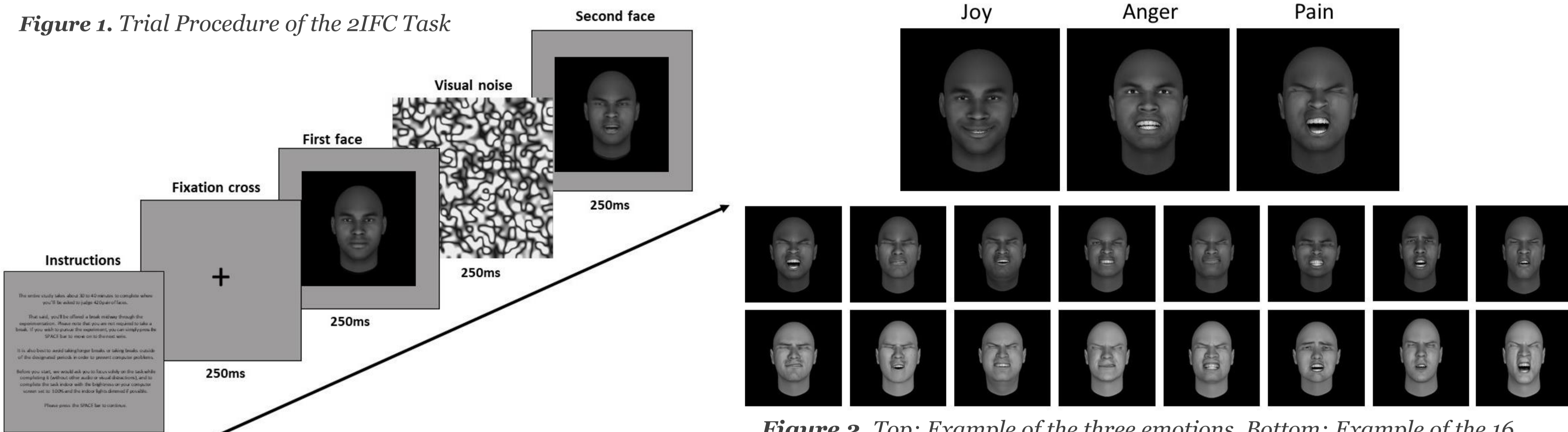

Figure 1. Trial Procedure of the 2IFC Task

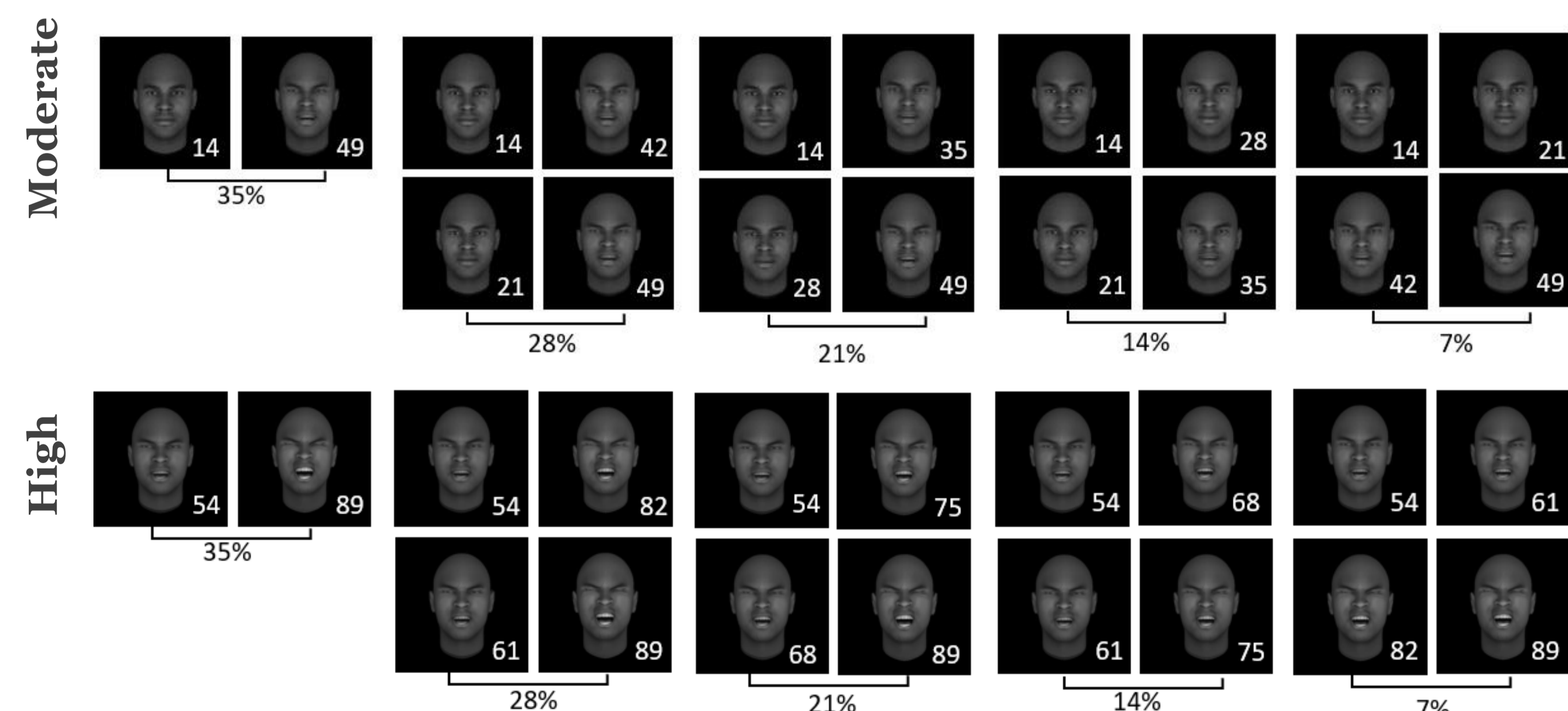*Figure 2.* Top: Example of the three emotions. Bottom: Example of the 16 avatars.

Figure 3. Examples of paired faces with different intensity gaps.

Analysis and Results

Repeated measures ANOVA 2 x 2 x 5 for each emotion; The triple interactions were significant for all three emotions, so repeated measures ANOVA 2 x 5 for each intensity level were conducted, followed by paired t-test when the two-way interactions were significant.
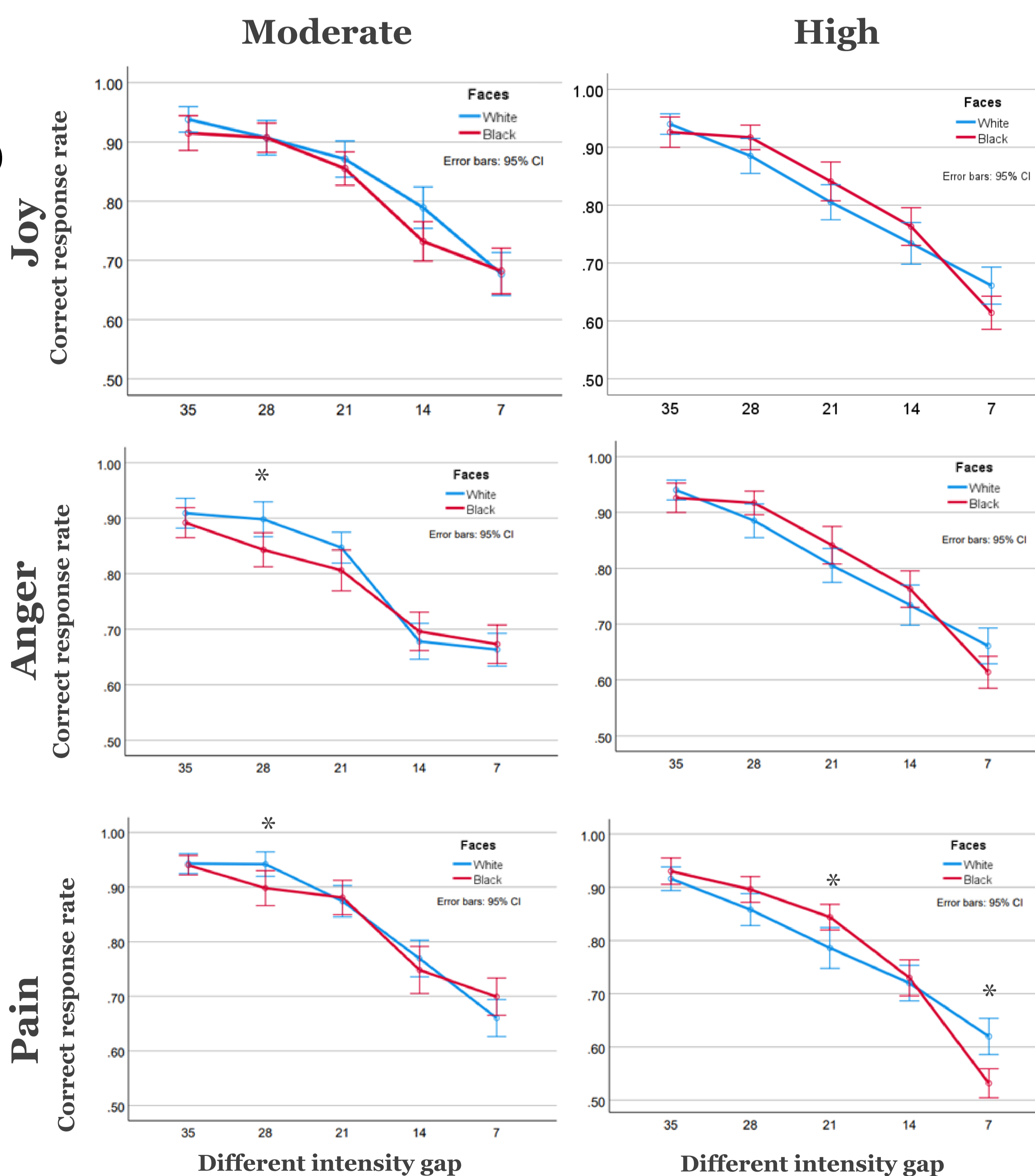
The interaction between ethnicity and difficulty levels was not significant for the moderate condition[$F(1, 49) = 2.368$, $p = .067$], but the main effects were significant for both the ethnicity [$F(1, 49) = 6.721$, $p = 0.13$, $\eta^2 = .121$] and the task difficulty [$F(2.96, 144.77) = 163.04$, $p < .001$, $\eta^2 = .769$] ; The interaction was significant for the high condition [$F(1, 49) = 2.931$, $p = .028$, $\eta^2 = .056$].

Significant interaction between ethnicity and difficulty levels for the moderate [$F(1, 49) = 4.115$, $p = .003$, $\eta^2 = .077$] and high condition [$F(1, 49) = 5.187$, $p < .001$, $\eta^2 = .096$].

Significant interaction between ethnicity and difficulty levels for the moderate [$F(1, 49) = 4.049$, $p = .009$, $\eta^2 = .076$] and high condition[$F(1, 49) = 10.723$, $p < .001$, $\eta^2 = .180$].

Figure 4. Accuracy rate for each condition and emotions, by intensity gap and ethnicity of stimuli. * indicate the significative paired t-test (p<.001).

Conclusion

The results suggest that the alteration in the ability to interpret the intensity of expressions of joy, anger, and pain with faces of black ethnic profile involves a perceptual component.

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