Is it Pain, Anger, Disgust or Sadness? Individual Differences in Expectations of Pain Facial Expressions.

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Context

Humans rely on facial expressions to assess other's affective states. However, pain facial expressions are poorly recognized and are often confused with other negative affective states, such as anger[1], disgust[1,2,3], fear[2], and sadness[3]. Previous research has shown that individuals' expectations about the appearance of pain facial expressions are not optimal and do not perfectly reflect the facial features typically observed in individuals expressing pain[4]. In the present study, **we verified if expectations about pain facial expressions are also suboptimal by overlapping with other affective states while exploring if there are individual differences in patterns of overlap.**

Method

Phase 1: Expectations Extraction (pre-collected data)

Participants :

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

Task : Both groups participated in a variant of the Reverse correlation[5] task:

- Scale (Dataset 1)
- 2AFC (Dataset 2)
- 500 trials per participant

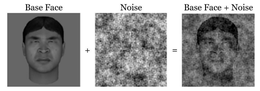

Figure 1. Steps involved in the creation of one stimulus using the Reverse Correlation process.

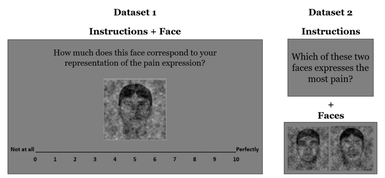

Figure 2. Procedure used in the two studies in which Datasets 1 and 2 were collected.

Phase 2: Proxies of Expectations Evaluation

Participants : 3 x 20 independent judges. Each judge rated a sub-group of 54 of the 162 proxies.

Task : Rating of the perceived intensity of 7 affective states for the 162 proxies of expectations about pain facial expressions pre-collected :

Affective states :

- Pain
- 6 basic emotions

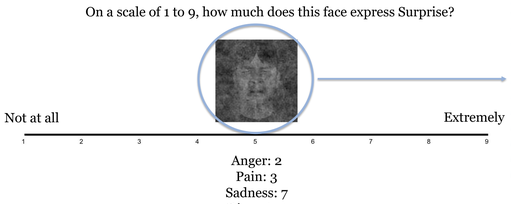

Figure 3. Example of one trial for the Proxies of Expectations Evaluation task.

Anger: 2
Pain: 3
Sadness: 7
Disgust: 4
Fear: 2
Joy: 1
Surprise: 1

Figure 4. Examples of proxies. Top two are from Dataset 1 and bottom two from Dataset 2.

Results

A mixed ANOVA 2 (Datasets) x 2 (Sexes) x 6 (Affective scales) revealed a main effect of the Datasets [$F(1, 158)=43.28$, $p<.001$; $\eta^2_p=.22$], a main effect of the Affective scales [$F(1.73, 272.63)=147.81$, $p<.001$; $\eta^2_p=.48$], but no effect of Sex ($p=.07$). The only significant interaction was between Affective scales and Datasets [$F(1.73, 272.63)=5.52$, $p<.01$; $\eta^2_p=.03$].

For **Dataset 1**, main effect of Affective scales [$F(1.67, 120.48)=62.53$, $p<.001$; $\eta^2=.47$] (Figure 5)

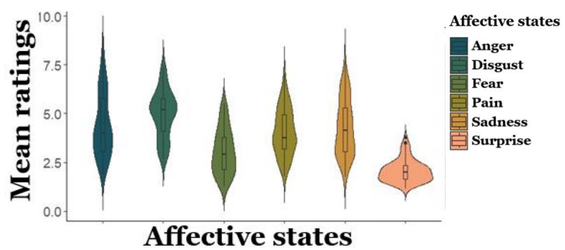

Figure 5. Violin plot showing distribution of the mean ratings for 6 affective states, for Dataset 1. Joy has been excluded from this analysis because 50% of ratings contained between 1.05 and 1.15

For **Dataset 2**, main effect of Affective scales [$F(1.86, 163.53)=94.96$, $p<.001$; $\eta^2=.52$] (Figure 6)

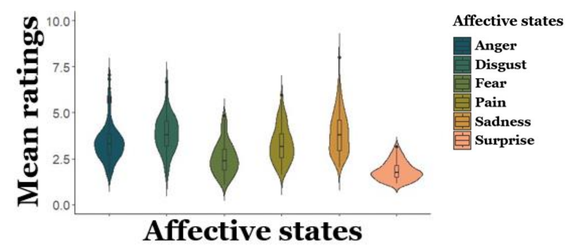

Figure 6. Violin plot showing distribution of the mean ratings for 6 affective states, for Dataset 2. Joy has been excluded from this analysis because 50% of ratings contained between 1.05 and 1.2

Cluster Analysis

A k-means cluster analysis of the affective states perceived in each of the proxies of expectations revealed 3 clusters (i.e. same for both Datasets) where the dominant affective state(s) perceived was/were : 1) anger and disgust, 2) sadness and 3) anger, disgust, sadness and pain altogether. See Figure 7 for cluster analysis results.

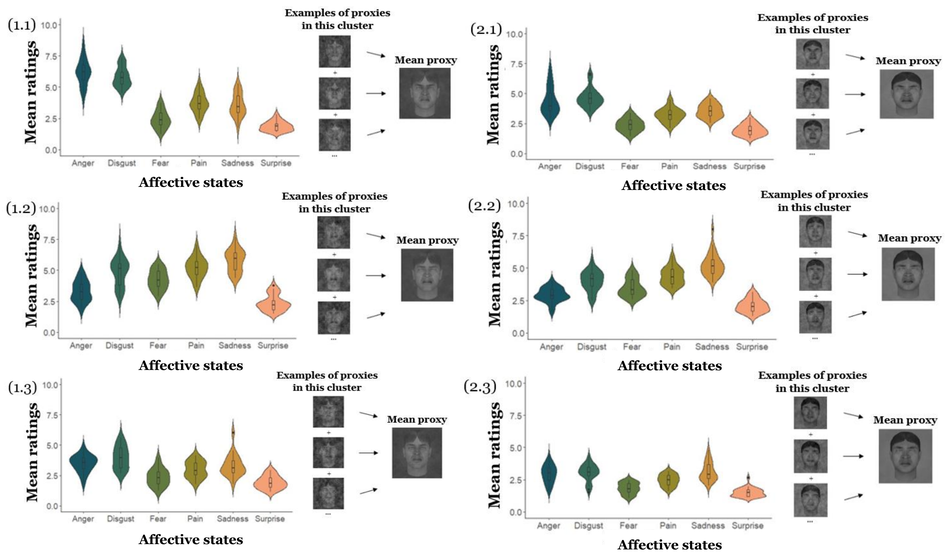

Figure 7. Cluster analysis results. First column (1.1, 1.2 and 1.3) shows clusters, examples of proxies and mean proxy from all participants from that cluster for Dataset 1. Second column shows the same as in the first column but for Dataset 2 (2.1, 2.2 and 2.3).

Discussion

- 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.
- Precisely, we found a cluster of individuals expecting pain facial expressions to be closer to disgust and anger, a second to be closer to sadness, and a third to equally overlap with anger, disgust and sadness.
- 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

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