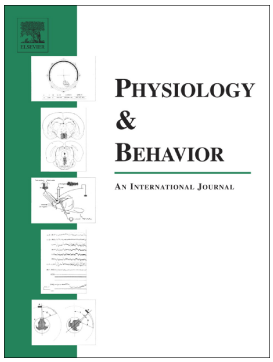

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Emotion recognition in young male offenders and non-offenders

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Abstract

The study of facial emotional expressions not only gives information about communicative and adaptive processes, but also provides valuable knowledge about some aspects of human behaviour, such as emotions and intentions.
Taking into account the proved evidence that deficits in processing emotional information shows difficulties in executive functions and social behavior, the present work aims to compare the perceptual and dimensional similarities between the emotions transmitted by the faces (facial emotions) and those typically associated with two particular emotional contexts (offenders and non-offenders). To evaluate the contextual influence on emotional face categorization, the emotional recognition in 69 male young (35 offenders (17.22 ± 1.5 years) and 34 non-offenders (16.90 ± 1.56 years) from Barranquilla (Colombia) was analyzed. Experimental results displayed significant differences among the two groups, mainly focused in the recognition of anger and disgust faces. In this sense, the analysis of abovementioned data may lead to the development of more specific and cost-effective therapeutic treatments for offender population.

Keywords: Offenders, non-offenders emotion recognition, facial emotional expressions.

1. Introduction

Due to the emotional and social phenomena of cognition play an essential role in brain dynamics, cognitive neuroscience researchers have spent so much effort in their study during last decades. Facial emotional expressions have an adaptive and communicative role since they provide information about other emotions and intentions. Moreover, they also influence the regulation of behavioural responses in individuals, as well as their own emotion modulation [1, 2, 3, 4]. Traditionally, deficits in emotion recognition have been linked to offending behaviour and psychiatric disorders in teenagers and adults [5, 6, 7, 8]. Studies on offending teenagers have shown deficits in facial emotional recognition, such as anger, fear, disgust and sadness [9], and all basic emotions probably due for abnormalities cortical structures [10]. These studies have been focused on the recognition of facial expression in isolated faces without attending the importance of the contextual influence on emotion recognition [5]. The facial expression recognition errors displayed by young offenders may be related to decline in context emotion integration [10], however other factors as physical and dimensional similarities between prototypical facial expression could also influence [11, 12, 13].

In this respect, the study of the effect of the context on emotional face categorization will become an element of great importance. It is mediated by the perceptual and dimensional similarities between the facial emotions and those typically associated to a particular emotional context (contextual emotions). Additionally, the population of young offenders is known to exhibit poor executive function [14], a significant decrease in verbal ability [15], and low attention and learning difficulties [16]. Furthermore, it has been suggested that deficits in inhibition mechanisms and associative learning are related to higher error rates in facial expression recognition tasks in this population [17, 10, 18]. Additionally, the ability to integrate implicit contextual cues while identifying facial expressions in congruent emotional contexts, as well as having interference difficulties when

presented in incongruent emotional context, decreases in young offenders [10]. In the same line it has been reported failures in the identification of facial expressions denoting disgust and anger in young offenders [19, 7].

Herein we report the comparative study of facial emotional expression recognition when embedded in a context, in two groups of male young. In this sense, we used physical and dimensional similarity between facial and contextual emotions. To asses it, the methodology proposed by Aviezer & cols [4] was used in this study. These methods are focused in faces express non-pleasant emotions in a variety of conditions, such as congruent, incongruent identity, low and high similarity. The hypothesis of this study was the exhibited differences in emotions processing between young offenders and non-offenders. This study allows to develop an ideal model to unveil cognitive and cerebral functioning in subjects who have restrained acts violence's in adolescence. Furthermore, it will provide alternative methods of prevention and psychological intervention in subjects that will be reintegrated into their social and family life.

2. Methods

2.1 Participants

69 volunteer male adolescents, 35 offenders (17.22 ± 1.35 years) and 34 non-offenders (16.90 ± 1.56 years) took part in this study. The offender population was selected from “Centro de Reeducación el Oasis” (Barranquilla, Colombia). To get consistent results, those teenagers who suffered any psychiatric and neurological disorder or were under psychopharmacological treatment were excluded from the study. The non-offenders (control group) was composed by teenagers without offending background selected from an educative institution of the same city, meeting the following inclusion criteria: a) absence of criminal background, b) being between 14 and 19 years old, c) basic secondary educational level (8^{th} to 11^{th} Colombian grade), d) absence of psychiatric or neurological background and e) absence of alcohol or drug abuse history. Groups were paired by age and education level. Prior starting the research, the experimental procedures were explained to all the participants, who gave their voluntary informed consent or in case of participant were under 18 years old a parental or guardian consent was given in accordance with the Declaration of Helsinki. The scientific methodology was approved by the Universidad Autónoma del Caribe Ethics Committee.

2.2 Procedure

To reach the main objective of this study, the facial emotional expression recognition when embedded in a context in a group of young offenders was explored. Because this, the physical and dimensional similarity between facial and contextual emotion was employed according Aviezer & cols [13].

2.3. Measurements

In order to evaluate the influence of context on the emotional categorization of faces, a task developed by Aviezer & Cols was used in this study [11]. This method has been applied in different experimental situations with both sane and neuropsychiatric populations [11, 12, 13]. The experimental task was composed by two experimental blocks: the first one (only body) and the second block (body face crossed). On the other hand, the bodies and the scene elements served as context and were the same as the images presented in the first block. The body-context composition created congruent and incongruent conditions, with an extra variable consisting in three levels of similarity between the target face and the facial emotion that is typically associated with the context.

Two levels were distinguished in the incongruent condition: Ⅰ) high similarity, in which disgust faces were fitted to a body reflecting anger, anger faces were fitted to a disgust body, fear faces to sadness bodies and sad faces to fear body. Ⅱ) low similarity, where disgust faces were fitted to fear bodies, fear faces to disgust bodies, anger face with sad body and sad face with anger body. The congruent condition corresponded to Ⅲ) identity in which each facial expression appeared in a congruent emotional context (*i.e*., disgust daces *vs* disgust body and so on) [11, 13].

2.4. Statistical analyses

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.0 (SPSS Inc., Chicago, Ⅲ., USA). Performance in the 2 blocks of the emotion recognition task was separately analysed by a one factor ANOVA. The influence of context mediated by the similarity was reflected by a measure of “recognition precision” which was conceptualized as the percentage of correct classifications (classifying on the basis of the face rather than the emotional context) and was analysed using a repeated measures ANOVA. The level of significance for all comparisons was $p < .05$.

3. Results

Results evidenced a similar accuracy in emotion recognition in offenders and non-offenders ($F_{(1)}$=.0009, p=.976, n^2=00), related to context mediated emotions (body only block); however there are significant differences in context (body face crossed block), ($F_{(1)}$=11.17, p=.001, n^2=15), even when controlling by age ($F_{(1)}$=13.61, p=.0004, n^2= .18), and education ($F_{(1)}$=7.18, p=.009, n^2=.10). Furthermore, the analysis of four types of face emotions (anger, disgust, sadness and fear) displayed a significant effect for type of emotion, ($F_{(3)}$=27.02, p=.000, n^2=30) and emotion-group interaction ($F_{(3)}$=3.67, p=.013, n^2=.056); mainly in the recognition of facial expressions to disgust (p=.003).

Related to similarity mediated context effects, experimental results showed a high precision in the recognition of facial expressions when faces were embedded in the identity condition. In contrast it was observed less precision in the low similarity condition and high similarity condition with the latter being the less accurate in both groups ($F_{(2)}$=89.93, p=.000, n^2=60); but there was significant group effects ($F_{(1)}$= 11.17, p = .001, n^2 = .15) after covariation of age ($F_{(0.83)}$= 3.97, p = .01, n^2 = .16) but ceased to be significant after controlling education ($F_{(0.89)}$= 2.22, p = .09, n^2 = .10). In contrast, results showed significant differences in recognizing emotions in all similarity conditions (identity: $F_{(1)}$=4.18, p=.044, n^2=.06; low similarity: $F_{(1)}$= 8.56, p=.004, n^2=.12; high similarity: $F_{(1)}$= 5.32, p=.024, n^2=.07).

The analysis of similarity mediated context effects in specific emotion recognition in the two groups revealed significant differences in both groups for "*disgust emotions"* cases $F_{(1)}$=16.42, p=.001. Additionally, difference in recognition accuracy of this emotion in both low (p = 0.020) and high (p = 0.041) similarity conditions was observed. To deep into the influence of context on disgust face recognition, an analysis on the rate of misclassification of disgust faces based on the context was performed. The results indicate that both groups could to misrecognize disgust as anger when the context implied anger (high similarity) and fear in fear contexts (low similarity). This pattern evidence significant differences between both groups ($F_{(1)}$=10.74, p=.001, n^2=14). For each level of similarity, results showed significant differences between groups in the high similarity condition $F_{(1)}$= 4.84, p = .031, n^2 = .07 but no effects were seen in the low similarity condition $F_{(1)}$= 3.66, p = .060, n^2 = .05.

In the analysis of *sadness*, experimental data showed that both groups were moderately affected by the similarity conditions in the recognition of the emotion, as shown by significant effect of context ($F_{(2)}$=62.01, p< .01=.001, n^2=50). On the contrary, the group study deferred significantly from controls in the categorization of this emotion $F_{(1)} = 5.88$, $p = .01$, $n^2 = .08$, and there was not any group–context interaction $F_{(1)} = 1.27$, $p = .28$, $n^2 = .02$, as well as in *"Fear"* ($F_{(2)}$=18.67, p< .01, n^2=23). There were significant effects of both group related to "*Anger*" ($F_{(1)}$=4.77, p=.03, n^2=07) and context ($F_{(2)}$=18.70, p< .01, n^2=23).

4. Discussion

Experimental results revealed that young offenders had difficulty to recognize emotions in conditions where both characteristics, congruency and non-congruency, are present. Despite offenders and non-offenders are sensible to the emotions portrayed by faces in the different contextual conditions, significant differences mainly in processing disgust faces where shown when these were presented in an anger or fear context. Equally, the offender's difficulty in recognition of anger and disgust faces grew in a significant manner when these were presented in anger context, but no so much when presented in a fear context [18, 20].

In similar studies, [21, 19, 22, 23, 24], authors used a task that presented context-isolated faces of disgust and anger. In these studies, the tendency to confound disgust as anger was significantly higher in the offender group. Such tendency, according to the authors, could be explained by the physical similarities, emotional arousal and valence shared by both expressions. According to the results, young offenders were mainly affected by the anger context. This finding supports important difficulties in the perception of this emotion, as well as the capacity to use it in the context-face integration [25]. In contrast, results showed different effects when anger faces were embedded in disgust context, which suggests that further experimental studies are needed to analyse this evidence. However, the emotional processing implies a fixation pattern that takes place during facial scanning. This scanning changes in a systematic manner depending on the context in which the facial expressions are embedded. In this way, the facial regions attended to in a given moment can affect the emotion perceived, and the magnitude of this effect varies depending on the level of similarity between the emotion in the face and that expected from the context [12,13].

In previous studies, Aviezer et al. [13], presented enraged and sad faces embedded in disgust contexts and compared recognition patterns in Huntington's disease subjects and controls. The authors hypothesized that if diseased subjects had difficulties in activated representations for disgust faces, then similarity effects would not be evidenced (due to such activation is necessary for the context-face integration process). Alternatively, if these deficiencies did not arise, they should exhibit a similar pattern of contextual influence than controls. In the same way to our study, both groups exhibited comparable recognition patters and contextual influence. This suggests that, neither the Huntington diseased nor the young offenders, showed deficiencies in the ability to activate or represent disgust faces when embedded in disgust context. This also implies that young offenders show an adequate capacity to integrate contexts portraying disgust with faces showing anger and fear. A possible explanation to this slant could be based in deficits on the inhibitory control mechanisms, such as interference control. For instance, our results show that young offenders showed decline in executive functions mediated by prefrontal cortex, especially in inhibitory control, working memory, cognitive flexibility and sensibility to interference. However, more exhaustive analysis is required (*i.e.* multiple regressions) to test if these could be of predictive nature to de decline in facial emotional expression processing [11].

5. Conclusion

In conclusion, our findings reveal specific deficiencies in the recognition of facial expressions due to disgust. It could be a result of failures in the integration of this particular emotion with the context. We propose that these failures might be related to an attentional slant but this is a matter that could be explored in future research.

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Bibliography

[1] Blair, R.J. Facial expressions, their communicatory functions and neuro-cognitive substrates. Philosophical Transactions of the Royal Society. 2003; 358(1431): 561-572.

[2] Cristinzio, C., Sandler, D. & Vuilleumier, P. Recognition of Emotional expressions and amígdala pathology. Epiletoplogie. 2007; 24: 130-138.

[3] Marsh, A.A, Ambady, N., & Kozak, M. Acurrate identification of fear facial expressions predicts prosocial Behavior. Emotion. 2007; 7(2), 239-251.

[4] Clemente-Suarez, V., Ruisoto, P., & Robles, J. Psychophysiological response to acute-high-stress combat situations in professional soldiers. Stress and health. 2018; 34(2): 247-252.

[5] Gery, I., Miljkovitch, R., Berthoz, S., & Soussignan, R. Empathy and recognition of facial expressions of emotion in sex ofender, non-sex offenders and normal control. Psychiatry Research. 2009; 165:252-262.

[6] Suchy, Y., Rau, H., Whittaker, W. J., Eastvold, A. & Strassberg, D.J. Facial affect recognition as a predictor of performance on a Reading comprehension test among criminal sex offenders. Applied Psychology in Criminal Justice. 2009; 5:73-89.

[7] Fairchild, G., Van Goozen, S.H., Calder, A.J., Stollery, S.J. & Goodyer, I.M. Deficits in facial expression recognition in male adolescentes with early-onset or adolescence-onset conduct disorder. Journal of Child Psychology and Psychiatry. 2009; 50: 627-636

[8] Vasconcellos, S.J., Salvador-Silva, R., Gauder, V. & Gauier, G.J. Psychopathic traits in adolescents and recognition of emotion in facial expressions. Psychologia Reflexao e Crítica. 2014; 27:768-774.

[9] Koolhof, R., Loeber, R., Wei, E.H., Pardini, D., & D'Escury, A.C. Inhibition deficits of serious delinquent boys of low intelligence. Crim. Behav. Ment. Health. 2007; 17:274–292.

[10] Gonzalez-Gadea, M.L., Herrera, E., Parra, M., Gómez, P., Báez, S., Manes, F. & Ibañez, A. Emotion recognition and cognitive empathy deficits in adolescent offenders revealed by context-sensitive tasks. Frontiers in Human Neuroscience. 2014; 8(850). doi: 10.3389/fnhum.2014.00850

[11] Aviezer, H., Hassin, R., Bentin, S., & Trope, Y. Putting facial expressions back in context. First impressions. New York: Guilford; 2008

[12] Aviezer, H., Hassin, R.R., Ryan, J., Grady, C., Susskind, J., Anderson. A, & Bentin. S. Angry, disgusted, or afraid? Studies on the malleability of emotion perception. Psychological Science. 2008; 19: 724-732.

[13] Aviezer, H., Bentin, S., Hassin, R.R., Meschino, W.S., Kennedy, J., Grewal, S, & Moscovitch, M. Not on the face alone: Perception of contextualized face expressions in Huntington's disease. Brain. 2009; 132:1633–1644.

[14] Koolhof, R., Loeber, R., Wei, E.H., Pardini, D., & D'Escury, A.C. Inhibition deficits of serious delinquent boys of low intelligence. Criminal Behavior of Mental Health. 2007; 17:274–292.

[15] Trujillo, N., Pineda, D.A. y Puerta, C. Alteraciones cognitivas en adolescentes infractores con trastorno disocial de diversos niveles de gravedad. Psicología conductual. 2007; 15:297-319.

[16] Maniadaki, K. & Kakouros, E. Attention problems and learning disabilities in young offenders in detention in Greece. Psychology. 2011; 2:53-59.

[17] Hoaken, P.N.S., Allaby, D.B., & Earle, J. Executive cognitive functioning and the recognition of facial expressions of emotion in incarcerated violent offenders, non-violent offenders, and controls. Agressive Behavior. 2007; 33:412-421

[18] Omar-Martínez, E., Pino-Melgarejo, M. M, Idarraga-Cabrera, C. P, & Rodríguez-Aldana, Y. Performance-Associated Factors of Elderly Patients with a Low Education Level, with Acquired Language Alterations in Tests to Explore Executive Functions. World Journal of neuroscience. 2017; 7(3):293-306.

[19] Sato, W., Uono, S., Matsurra, N. & Toichi, M. Misrecognition of facial expressions in delinquents. Child and Adolescent Psychiatry and Mental Health. 2009; doi: 10.1186/1753-2000-3-27

[20] Trepáčová, M., Řezáča, P., Kurečková, V., Zámečník, P., Řezáč, J., and Kopečkováb, L. Differences in facia affect recognition between non-offending and offending drivers. Transportation research part F: Traffic Psychology and behavior. 2019; 60:582-589.

[21] McCown, W., Johnson, J., Austin, S. Inability of delinquents to recognize facial affect. J Soc Behav Pers. 1986; 1:489-496.

[22] Bowen, K.L, Morgan, J.E., Moore, S.C & Van Goozen, S.H. Young Offenders' Emotion Recognition Dysfunction Across Emotion Intensities: Explaining Variation Using Psychopathic Traits, Conduct Disorder and Offense Severity. Journal of psychopathology and behavioural assessment. 2013; 36(1):60-73.

[23] Fox, B., Perez, N., Cass, N., Baglivio., and Epps, N. Trauma changes everything: Examining the relationship between adverse childhood experiences and serious, violent and chronic juvenile offenders. Child abuse & Neglect. 2015; 46:163-173.

[24] Gillespie, S., Rotshtein, P., Satherley, R., Beech, A. and Mitchell, I. Emotional expression recognition and attribution bias among sexual and violent offenders: a signal detection analysis. Frontiers in psychology. 2015; 6(595):1-12.

[25] Bennet, D.C, and Kerig, P, K. (2014). Investigating the Construct of Trauma-Related Acquired Callousness Among Delinquent Youth: Differences in Emotion Processing. Journal of traumatic Stress. 2014; 27(4):415-422.

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