

Emotional Content Analysis Among People With Psychopathy During Emotional Induction by the International Affective Picture System

Thierry H. Pham,^{1,2,3} Justine Gwicz,^{1,4} Anne-Sophie Scohier,^{5,6} Dorothee Rousseau,⁷ Nele Douven,⁸ Audrey Lavallée,^{1,9} Xavier Saloppé^{2,9,10}

¹ Université de Mons (UMONS), Mons, Belgium; ² Centre de Recherche en Défense Sociale, Tournai, Belgium; ³ Institut Philippe-Pinel, Montréal, Canada; ⁴ Institution Publique de Protection de la Jeunesse, Jumet, Belgium; ⁵ Prison de Marche-en-Famenne, Marche-en-Famenne, Belgium; ⁶ Caracol—Centre pluridisciplinaire, Arlon, Belgium; ⁷ Unité de Psychopathologie Légale, Tournai, Belgium; ⁸ Centre Régional de soins Psychiatrique, Les Marronniers, Tournai, Belgium; ⁹ Univ. Lille, CNRS, UMR 9193 - SCALab - Sciences Cognitives et Sciences Affectives, F-59000 Lille, France; ¹⁰ Service de psychiatrie, Hôpital de Saint-Amand-les-Eaux, France

Background: The emotional processes within people with psychopathy have been thoroughly investigated. Although content analysis is an interesting area for evaluating emotional characteristics, few data exist concerning the speech content of people with psychopathy in response to affective and neutral images.

Method: Our study population included male forensic inpatients ($n = 47$) from *Centre Régional de soins Psychiatrique, Les Marronniers, Tournai, Belgium*. According to their total score, as measured by the Psychopathy Checklist—Revised (PCL-R), the inpatients were divided into three groups: Psychopath ($n = 24$, PCL-R score of ≥ 25), Intermediate ($n = 12$, PCL-R score from 15.0 to 24.9), and Nonpsychopath ($n = 11$, score of ≤ 14.9). Using Tropes analyses and EMOTAIX scenario tools, we examined each narrative's emotional characteristics. We tested the hypothesis that people with psychopathy report fewer emotional words on all International Affective Picture System images, particularly on negative-valence images.

Results: Generally, our results do not support this hypothesis, that people with psychopathy report fewer emotional words on all images, but rather suggested a specific discordance in the verbal emotional treatment (exclusively PCL-R Interpersonal factor) but not in terms of the subjective evaluation. Moreover, this interpersonal factor was positively correlated with the self-referring pronouns (i.e., I and me) setting, whereas the PCL-R Social Deviance factor was positively correlated with action verbs.

Conclusion: Speech outputs of people with psychopathy present specificities in terms of emotional content and verbal setting. The results are congruent with the notion that psychopathy combines both functionality and subtle impairment.

Key words: Psychopathy, emotions, International Affective Picture System, IAPS, content analysis

Introduction

Psychopathy is a complex clinical construct defined by a mix of interpersonal, affective, and behavioural characteristics, including egocentricity, manipulativeness, callousness, irresponsibility, relational instability, impulsiveness, lack of empathy, anxiety, remorse or guilt, and poor self-control expressed in particular through anti-social behaviour that is not necessarily of a criminal nature [1,2]. Verbal behaviours, then, constitute a choice target for identifying psychopathic characteristics above and beyond any judicial and medicolegal information [3]. Speech analysis constitutes an excellent means of assessing normal and pathological psychological functioning. Indeed, language is a marker of an individual's emotional state, social identity, cognitive style [4,5], defensive style [6], personality traits [7–9], more generally, physical and psychological state [10]. The markers have been demonstrated among a variety of problems: psychiatric disorders [11], psychotic disorders [6,12], autism spectrum disorders [13], and anxiety and depression disorders [7,14,15]. However, there has been to date very little research on personality disorders using speech analysis.

Psychopathy and language

Among inmates with psychopathy assessed with the Psychopathy Checklist—Revised (PCL-R) [1], written and spoken language was found to abide by elementary grammatical rules regarding phonology, syntax, morphology, and semantics [16,17]. In other words, people with psychopathy did not use a specific language but rather adapted it to their circumstances depending on whether or not they were in a prison setting [17]. In a study involving inmates with psychopathy, as determined by the PCL-R, and without psychopathy, Brinkley et al. [18] asked participants to relate two memories, one that evoked fear and the other, anger. They demonstrated, through cohesion analysis, that people with psychopathy used fewer semantic ties to render their narratives cohesive and coherent; however, when they did use such ties, their speech appeared adapted to the circumstances.

These researchers also underscored the importance of taking anxiety levels into account, given that people with high levels had greater difficulty in coming up with coherent stories, compared with people with low levels. They surmised that these findings might be explained by the effect of emotional content. Adding a neutral condition would have allowed for testing this hypothesis. Years later, in a study using a semantic priming and interference task, Brinkley et al. [16] again stressed the importance of using both emotional and neutral stimuli.

Regarding verbal content, Endres [3] underscored the egocentric nature of the narratives produced by inmates with psychopathy, as well as their concerns regarding power and resisting the power of others, their use of obscenity, and the prevalence of dysphoric mood states. Although these elements are characteristic of psychopathy, they are not specific to this disorder. More recently, Hancock et al. [19] used content analysis to examine the narratives of inmates who had committed homicide, with psychopathy defined on the basis of a PCL-R total score of equal to or greater than 25. Their results showed that these people described powerful emotional events (crimes) idiosyncratically. Unlike the narratives of people without psychopathy who have committed homicide, the narratives of the inmates contained more causal relationships, more references to primitive physiological needs (focus on self-preservation and bodily needs) corresponding to the lowest tier in Maslow's [20] pyramid of needs. Their speech presented little content regarding social needs (family, religion and [or] spirituality), more tangential hesitation, and a greater emotional detachment. In fact, participants with a high interpersonal factor score used fewer intense emotional words, particularly positive words, and spoke in the past tense more often. More recently, Le et al. [21] generally confirmed these results in a study based on the content analysis of PCL-R interviews. These people with psychopathy showed more disfluency (i.e., hesitation), made greater use of personal pronouns, particularly those in the first-person

singular, spoke in shorter sentences, were egocentric, and did not exhibit much emotion.

Finally, people with psychopathy reported more fringe details when describing their homicide (e.g., what they ate that day), and demonstrated greater disfluency, compared to people without psychopathy [19]. This converged with earlier results reported by Christianson et al. [22], who underscored that, unlike inmates without psychopathy, inmates with psychopathy did not provide a greater number of central details regarding negative stimuli. However, the inmates did not differ regarding the number of central and peripheral details reported regarding neutral stimuli.

In the end, this difficulty in processing information related to emotional processes seems to depend, in fact, as much on the people with psychopathy's perception of emotional stimuli as on the task at hand. In this regard, Hancock et al. [19] recognized it was difficult to know whether homicidal inmates with psychopathy presented an emotional impairment, given the difficulty of determining baseline levels for emotional content, or whether narrating a homicidal act was an unusual task. For this reason, these researchers recommended that future studies examine the speech characteristics of people with psychopathy, both for emotional and for unemotional events. In their opinion, participants' responses to emotional stimuli had to be considered both objectively and subjectively [23,24].

Purpose of study

Against this background, we undertook a study to analyze the speech of people with psychopathy in response to images intended to elicit positive and negative emotions, and also to images with neutral valence corresponding to an unemotional situation [18,19]. Following Hancock et al. [19], we defined the psychopathic group based on a PCL-R total score of equal to or greater than 25. Our primary hypothesis was that people with psychopathy would use fewer emotional words across all images, and more specifically in response to images

with a negative valence. This hypothesis was tested using the EMOTAIX scenario [25], which also allowed verifying whether people with psychopathy demonstrated more impassivity and less surprise in response to emotional stimuli, compared with people without psychopathy. As did Brook et al. [23], we expected to find no difference in scores between people with and without psychopathy regarding their subjective evaluation of International Affective Picture System (IAPS) images [26]. Moreover, based on the study by Le et al. [21], we hypothesized that, given egocentricity and narcissism [3,27], people with psychopathy would use significantly more personal pronouns (first person), compared with people without psychopathy.

Method

Participants and setting

The sample consisted of forensic male inpatients ($n = 47$) divided into three groups according to PCL-R total score: Psychopath (≥ 25 ; $n = 24$), Intermediate (15.0–24.9; $n = 12$), and Nonpsychopath (≤ 14.9 ; $n = 11$). Descriptive analysis of PCL-R total scores by age, full-scale IQ score [28], social desirability [29], and length of hospital stay by forensic groups are given in Table 1. The three groups do not differ on all variables except for social desirability. Indeed, the mean total score of the nonpsychopath group was significantly higher than that of the psychopath group, $U = 42.50$, $p = .001$. However, social desirability total score was not associated with the dependent variables (EMOTAIX and Tropes scores). The forensic group broke down by type of offences as follows: sexual, $n = 27$ (60.00%), nonsexual violent, $n = 20$ (44.40%), and nonsexual, nonviolent, $n = 18$ (40.00%). No inter-group difference emerged between the three groups.

Main instruments

Psychopathy Checklist

The PCL-R comprises two main factors and four facets. Factor 1 is referred to as the interpersonal factor and covers affective, interpersonal, and narcissistic elements. It breaks down into Facet 1, Interpersonal, and Facet 2,

Table 1: Descriptive analysis of psychopathy scores, age, full-scale IQ score, social desirability total score, and length of hospital stay by level of psychopathy

Variable	Level of Psychopathy					
	Nonpsychopath <i>n</i> = 11		Intermediate <i>n</i> = 12		Psychopath <i>n</i> = 24	
	Mean	SD	Mean	SD	Mean	SD
Total score	9.78	3.21	19.58	3.50	28.57	3.36
Factor 1	4.86	2.91	8.67	2.90	11.31	2.17
Factor 2	4.00	3.11	9.21	2.41	14.33	2.91
Interpersonal	1.41	1.36	3.41	1.63	5.31	1.88
Affective	3.45	2.24	5.68	1.27	6.02	1.49
Lifestyle	2.20	1.69	4.95	1.98	7.25	1.74
Antisocial	1.67	1.79	3.75	2.60	7.58	2.04
Age	50.57	8.96	47.64	9.75	43.82	10.69
Full-scale IQ score	75.82	21.13	76.17	17.95	78.81	14.53
Social desirability total score	23.18	3.95	19.83	5.34	18.33	3.91
Length of hospital stay, years	13.37	9.11	9.52	4.95	10.71	9.27

SD = standard deviation

Affective. Factor 2 is known as the Social Deviance factor and focuses on the propensity for chronic antisocial behaviour. It breaks down into Facet 3, Lifestyle, and Facet 4, Antisocial. The PCL-R is composed of 20 items rated on a three-point scale where “0” indicates that the item does not apply, “1” that it applies only in part, and “2” that it applies in full. It thus has a total score range of 0 to 40. The instrument was administered as prescribed by its creator, Robert D. Hare. Information for the purposes of the evaluation was culled from two sources, namely, criminal, social, psychological, and psychiatric records, and semi-structured interviews. In Belgium, the PCL-R was subjected to psychometric evaluation in a prison setting [30], was used with a forensic psychiatric population [31], and was the focus of a predictive validation study [32,33]. We used the French translation of the instrument [34] in this study, and set the cut-off score at 25, as suggested for European countries [35,36]. Pham [30] evaluated the psychometric properties of the PCL-R with 103 Belgian inmates. The fidelity coefficients obtained were excellent: .91, .93, and .96. Internal consistency (Cronbach alpha) also proved to be good: .86

for total score, .86 for Factor 1 score, and .85 for Factor 2 score.

Procedure

The participants in this exploratory study were all recruited, on a voluntary basis, and consented to take part in the research in accordance with the ethical principles of the Helsinki declaration and the right to the protection of privacy as stipulated under the Belgian law of July 30, 2018, concerning the processing of personal data. Moreover, this study was approved by the research ethics board of the Centre Régional de soins Psychiatrique [Regional Psychiatric Centre (RPC)], also known as Les Marronniers. All participants signed an informed consent form specifying the purpose of the study and guaranteeing anonymity and confidentiality. The participants were evaluated individually at least one month after admission to the facility. Evaluations were carried out by psychologists in Admission Services, duly trained in PCL-R, where the focus is on evaluating patients in a general way, with no specific therapeutic aim. The emotional task and the self-reported questionnaires

were carried out by the team at the Centre de Recherche en Défense Sociale.

Participants were given the following instructions:

The aim of our research is to examine how people react emotionally to images. You will be shown images and we would like you to tell us spontaneously how they make you feel. Then, we will ask you to evaluate what you felt in the face of each image by completing a questionnaire, the Self-Assessment Manikin (SAM). You will be required to gauge the emotional valence, (i.e., pleasure/displeasure) and arousal (i.e., intensity), two key dimensions of any affective experience.

Participants were recorded using a Philips PC Headset SHM2000. They were debriefed following the study.

Stimuli

International Affective Picture System and Self-Assessment Manikin

The pictures used ($n = 18$) were taken from the IAPS database [26]. The IAPS comprises a set of positive, negative, and neutral pictures depicting scenes intended to evoke a range of emotions, characterized by varying degrees of valence, arousal, and control. Among the 18 images selected, six had a positive valence (low intensity: 2,370 and 5,760; moderate intensity: 5,830 and 2,311; high intensity: 4,250 and 8,185), six had a neutral valence (low intensity: 5,740 and 7,020; moderate intensity: 1,390 and 1,101; high intensity: 5,940 and 1,321), and six had a negative valence (low intensity: 9,220 and 9,331; moderate intensity: 3,230 and 3,220; high intensity: 3,400 and 9,250). To avoid bias related to presentation effects, the images were presented at random to control the effect of the emotional feeling of one image on the next. Each image was presented for one minute.

After the presentation of each image, participants were asked to express their feelings. After completing all 18, they were asked to

complete a self-administered questionnaire, the SAM, to evaluate the images in terms of valence (i.e., pleasure/displeasure) and arousal (i.e., intensity), two key dimensions of affective experience. These were rated on two 9-point Likert scales, ranging from 1 (lowest level of pleasure/arousal) to 9 (highest level).

Content analysis

To examine the emotional characteristics of the narratives, we used the EMOTAIX Scenario (version V1_2) [37], driven by the Tropes (version 8) linguistic analysis software. EMOTAIX allows for analyzing the emotional lexicon, organized as a dictionary, with 2,014 references (semantic categories) and 4,921 words. It allows for identifying, categorizing, and automatically counting of the emotional lexicon contained in an oral and written production of any length. This lexicon (literal and figurative) refers to the following psychological states: emotions, feelings, mood, emotional personality, and temperament [25]. In addition to analyzing emotional content, we examined Style and Setting with the Tropes software. Tropes distinguishes four text styles: Argumentative, Narrative, Enunciative, and Descriptive. Tropes also distinguishes four verbal settings: Dynamic/Action, In the Real, Involving the Narrator, and Involving "I."

Data analysis

The analyses were run on the Statistical Product and Service Solutions (SPSS), version 25.0 (IBM Corp., Armonk, NY, USA) program. After failing to normalize the data, comparisons were conducted with nonparametric tests on account of the abnormal distribution of the data, as verified by the Shapiro–Wilk test.

Accordingly, inter-group comparisons were carried out using the Kruskal–Wallis test (when comparing three groups) and the Mann–Whitney U test (when comparing two groups) on age, social desirability total score, full-scale IQ score, and length of stay. The chi-square (χ^2) test and the Fisher exact test statistic were used to compare groups on offences.

We first compared groups (nonpsychopath and psychopath) with the Mann–Whitney U test on

1. the EMOTAIX scores (total number of words expressed, Positive and Negative Emotion, Impassibility, and Surprise categories),
2. the Tropes scores (Style and Setting) and
3. the SAM scores (Valence and Intensity).

These analyses were conducted according to valence (Positive, Neutral, and Negative) and intensity (Low, Moderate, and High) of the IAPS images. The Dunn–Bonferroni procedure was used to hold the maximum familywise (FW) type I error rate for each set of dependent variable comparisons at Cronbach $\alpha_{FW} = .10$ [38]. Because there were nine (IAPS: 3 Valence \times 3 Intensity) comparisons in each set, the type I (T) error rate per individual test was set at Cronbach $\alpha_T = .10/9 = .01$. Otherwise, the .05 threshold will be used to calculate comparisons of total scores.

Effect sizes ($r = z/\sqrt{n}$) are reported for only two-by-two comparisons [39]. Cohen r criterion was used [40]: .10 = small, .30 = medium, .50 = large. These analyses were run on 35 participants, that is, all but the intermediate subgroup.

Then, we performed correlational analyses between the EMOTAIX scores (total number of words expressed, total number of emotional words to total number of words, Positive and Negative Emotion, and Impassibility and Surprise categories), the Tropes scores (Style and Setting), the SAM scores (Valence and Intensity), and the PCL-R total score and factor scores. We computed partial correlations on the factors by further controlling the respective effects of the PCL-R factors. For correlations, the .05 significance threshold was chosen. Effect size was calculated using Cohen's r criterion [40] as follows: .10 = small, .30 = medium, and .50 = large.

In a continuum perspective, these analyses were run on 47 participants, including the intermediate subgroup.

Results

Groups compared on EMOTAIX and SAM scores

People with psychopathy did not express fewer negative emotions and more impassibility than people without psychopathy. Indeed, the two groups did not differ on total number of words expressed during tasks and on the EMOTAIX scores for all images (negative, neutral, and positive) (Table 2). People with psychopathy express more emotional words, to total number of words, for all images, than people without psychopathy. Specifically, the psychopath group reported significantly more positive emotions to total number of words for all images, and for positive valence images, especially for high-intensity images ($U = 56.50$, $p = .006$, $r = .45$).

Regarding the SAM valence scores, the psychopath group evaluated the positive valence images more positively than the nonpsychopath group, regardless of the intensity of the images (Moderate, $U = 48.50$, $p = .002$, $r = .52$; High, $U = 47.00$, $p = .002$, $r = .55$). Moreover, the psychopath group evaluated the negative-valence images more negatively than the nonpsychopath group, especially low-intensity images ($U = 29.50$, $p < .001$, $r = .62$). Regarding the SAM Intensity scores, the psychopath group evaluated emotional images more intensely than the nonpsychopath group, especially negative-valence images. The same trend is observed for the moderate-intensity images ($U = 58.50$, $p = .008$, $r = .45$).

Regarding correlation analyses (Table 3), we observed a positive correlation, with a moderate size effect, between the PCL-R Interpersonal factor and total number of words expressed, especially about negative emotions for positive valence images and positive emotions for negative-valence images. We found the opposite pattern for the PCL-R Social Deviance factor. This proved negatively correlated, with a moderate size effect, with total number of words expressed. Similarly,

Table 2: Statistics for Nonpsychopath and Psychopath groups compared on EMOTAIX scores (total number of emotional words) and Self-Assessment Manikin (SAM) scores (Valence and Intensity) for all images, and positive, negative, and neutral images

Variable	Nonpsychopath <i>n</i> = 11		Psychopath <i>n</i> = 24		Statistics		
	Mean	SD	Mean	SD	<i>U</i> ^a	<i>p</i>	<i>r</i>
All images							
Number of words	334.18	334.95	403.88	482.3	—	—	—
Number of emotional word	0.05	0.04	0.12	0.18	74.50	.040	.35
Number of positive emotion words	0.02	0.02	0.06	0.07	71.00	.030	.37
Number of negative emotion words	0.03	0.02	0.06	0.12	—	—	—
Number of surprise words	0.00	0.00	0.00	0.00	—	—	—
Number of impassibility words	0.00	0.00	0.00	0.00	—	—	—
SAM, Valence	81.00	17.35	89.87	11.64	—	—	—
SAM, Intensity	61.10	23.78	93.00	35.04	59.00	.008	.44
Positive images							
Number of positive emotion words	0.04	0.04	0.12	0.17	65.00	.016	.40
Number of negative emotion words	0.00	0.00	0.01	0.03	—	—	—
SAM, Valence	10.82	6.43	33.42	20.26	57.50	.007	.45
SAM, Intensity	21.27	9.72	32.58	16.27	—	—	—
Negative images							
Number of positive emotion words	0.01	0.01	0.01	0.02	—	—	—
Number of negative emotion words	0.01	0.01	0.01	0.02	—	—	—
SAM, Valence	46.18	6.97	27.12	16.62	44.00	.001	.53
SAM, Intensity	14.27	12.24	31.46	15.47	54.00	.005	.47
Neutral images							
Number of positive emotion words	0.02	0.03	0.05	0.06	—	—	—
Number of negative emotion words	0.02	0.04	0.07	0.17	—	—	—
SAM, Valence	24.00	9.13	29.33	8.25	—	—	—
SAM, Intensity	25.55	7.59	28.96	11.22	—	—	—

^a Mann–Whitney *U* test

it correlated negatively, with a moderate size effect, with positive emotions for negative-valence images, and with negative emotions for positive valence images. Finally, this factor correlated negatively, with a small size effect, with Surprise emotions for neutral valence images.

We observed a positive correlation, with a moderate size effect, between the PCL-R total score and the SAM Intensity score for positive valence images and negative-valence images. We also observed a positive correlation, with a moderate size effect, between the SAM valence score for positive

Table 3: Correlation analyses between Psychopathy scores, Self-Assessment Manikin (SAM) scores (Valence and Intensity), EMOTAIX and Tropes scores

Variable	Total score, r_s	Factor 1, r_p	Factor 2, r_p
All images			
Number of words	.006	.340 ^a	-.356 ^a
Positive emotions	.219	.239	-.140
Negative emotions	.134	.230	-.222
SAM, Valence	.273	.265	-.007
SAM, Intensity	.415 ^b	.215	.143
Dynamic/Action setting	.166	-.122	.364 ^a
Involving, "I" setting	.252	.427 ^b	-.258
Positive images			
Positive emotions	.246	.158	-.061
Negative emotions	-.085	.317 ^a	-.331 ^a
SAM, Valence	.473 ^b	.317 ^a	.231
SAM, Intensity	.348 ^a	.226	.087
Dynamic/Action setting	-.043	-.325 ^a	.362
Involving, "I" setting	.244	.420 ^b	-.159
Negative images			
Positive emotions	.072	.368 ^a	-.320 ^a
Negative emotions	.123	.152	-.126
SAM, Valence	-.509 ^b	-.295	-.261
SAM, Intensity	.423 ^b	.255	.183
Dynamic/Action setting	.202	-.032	.344 ^a
Involving, "I" setting	.173	.385 ^a	-.279
Neutral images			
Positive emotions	.178	.216	-.133
Negative emotions	.127	.228	-.239
SAM, Valence	.252	.274	-.033
SAM, Intensity	.100	-.006	.067
Dynamic/Action setting	.167	.076	.114
Involving, "I" setting	.193	.413 ^b	-.301

^a $p < .05$; ^b $p < .01$

r_s = Spearman correlation; r_p = partial correlation

valence images and the PCL-R total score and the PCL-R Interpersonal factor. Conversely, we found a negative correlation, with a large effect size, between the PCL-R total score and the SAM valence score for negative-valence images.

Groups compared on Tropes Style and Setting score and correlation analysis between PCL-R and Tropes Setting score

The groups did not differ on the Style and Setting score. Conversely, we observed a positive correlation, with a moderate effect size, between the PCL-R Interpersonal factor score and the Involving "I" Setting score for all images, positive valence images, negative-valence images, and neutral valence images. Moreover, a positive correlation, with a moderate effect size, emerged between PCL-R Social Deviance factor score and Dynamic, Action Setting score for all images, positive-valence images and negative-valence images.

Discussion

Psychopathy is a clinical construct defined by a mix of interpersonal, affective, and behavioural characteristics [1,2]. Language constitutes an excellent means of studying these features [3,19,21]. Through content analysis, previous research had shown people with psychopathy to be inexpressive and emotionally detached. However, the heterogeneity of experimental designs made it difficult to generalize results, owing to the absence of a neutral, unemotional condition [18,19] or of an objective and a subjective measure of emotional stimuli [23,24]. To remedy these shortcomings, we analyzed the speech of people with psychopathy in response to images intended to elicit positive and negative emotions and to images with neutral valence corresponding to an unemotional situation [18,19].

Overall, our results do not support the hypothesis that people with psychopathy use fewer emotional words in response to

negative-valence images, are more impassive, and express less surprise. Subjectively, the psychopath group evaluated the negative-valence images more negatively (SAM valence) and more intensely (SAM Intensity) than the nonpsychopath group. Regarding word production, these people expressed significantly more positive emotional words relative to the total number of words used, in response to all images and positive valence images. This is congruent with findings of previous studies that demonstrated the absence of an emotional impairment in connection with positive valence emotional stimuli [41,42].

Conversely, we find difficulties specific to psychopathic interpersonal functioning related to the expression of incongruent emotions in response to negative or positive stimuli. Indeed, the PCL-R Interpersonal factor correlated positively with negative emotions for positive valence images and with positive emotions for negative-valence images. This discordance was not found by Hancock et al. [19], who had pointed out the use of emotionally less positive and intense language. However, we are loath to compare our results with those of their study, where participants were asked to narrate a homicide and express how they felt about it. We have no information on how psychopathic people perceived their crime emotionally. Hancock et al. [19] underscored the necessity of comparing the narratives of people with and without psychopathy based on standardized material, such as video clips of variable intensity, as we did in this study.

However, this result is not found on a subjective evaluation. Indeed, we also observed a positive correlation between the SAM valence score for positive valence images and the PCL-R Interpersonal factor. Therefore, it seems that there is a difference in the treatment of emotional information between subjective assessment and emotional response. Brook et al. [23] previously pointed out this dissociation between the physiological dysfunctions of emotional responses and the apparently “normal” subjective judgment of people with psychopathy.

According to these authors, these people present a specific dysfunction in the treatment of negative emotional information about verbal emotional output but not about the subjective evaluation of the valence of negative emotional stimuli.

The inverse correlational pattern for the PCL-R Social Deviance factor is congruent with the findings of Hick and Patrick [43], who demonstrated an opposition between the expression of emotional distress and the PCL-R factors. Indeed, the interpersonal factor correlated negatively with the expression of emotional distress, whereas the Social Deviance factor correlated positively. On the whole, our results confirm the importance of considering the crossover suppressor effects of the PCL-R factors on the emotional variables [43].

Next, we analyzed how people with psychopathy expressed themselves in terms of verbal setting and style. We hypothesized that, owing to their characteristic egocentricity and narcissism [3,19], people with psychopathy would use significantly more personal pronouns (first person), compared with people without psychopathy [21]. This result was not significant; however, the PCL-R Interpersonal factor was positively correlated with the self-referring pronouns, regardless of emotional valence. The use of self-referring pronouns can be considered as a measure of egocentric narcissism [44]. However, although first-person singular pronouns may reflect egocentricity, they are not the direct expression of deceptiveness, but rather of honesty [45]. This self-centredness is found among depressed people, and is associated with negative thoughts of which the subject has an accrued awareness [46,47]. Whereas depressed people express little or no self-centredness when they are actors in positive situations [46], people with psychopathy, owing to their narcissism, tend to maintain a positive view of themselves even if it means being aggressive with others [48]. Consequently, how we interpret the use of personal pronouns requires that we consider the global linguistic context relative to personality traits.

We found a positive correlation between the Social Deviance factor and the Dynamic, Action setting. The Social Deviance score correlated with action verbs, both for positive and negative images. This result is congruent with the behavioural characteristics of this factor (e.g., impulsiveness, thrill-seeking, poor self-control) and the implication of motor responses with action verbs [49].

Limitations and future directions

Our results provide evidence of a subtle abnormality in affective responding and language use specific to people with psychopathy, focused not on the quantity of emotions expressed but on the adequacy of the emotional response that would depend on the interpersonal factor score. Therefore, it would be interesting to compare manipulative and aggressive profiles, which are the two main variants of psychopathy [50].

Despite the joint use of an objective evaluation of verbal output and a subjective evaluation of the images used, we question the relevance of using emotional induction by way of IAPS images. In the future, we believe it would be preferable to use autobiographical memories directly identified as important for each participant; that is, ecological material with a high degree of personal involvement, to attenuate any motivational bias. We observed that action verbs were associated with the Social Deviance factor and, more generally, with behavioural responses. Consequently, it would be worthwhile to carry out more refined linguistic analyses by examining the semantic polarity (affirmative, negative) of speech given that behavioural responses depend on this [51]. The small size of our groups and the presence of nonnormal distributions prompted us to undertake nonparametric analyses. Consequently, we must consider our results as merely exploratory.

Conclusion

The speech output of people with psychopathy in forensic settings presents specific characteristics about emotional content and verbal

setting. In keeping with our earlier research based on self-reported data [51,52], and the decoding of facial expressions [53], these people would seem to be much more functional and much less impaired at the emotional level than anticipated. Psychopathy, it would seem, stems from a combination of functionality and subtle impairment [54].

Conflict of Interest: none

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Corresponding author

Xavier Saloppé, Centre de Recherche en Défense Sociale, CRDS, Tournai, Belgique; Rue Despars, 96, 7500 Tournai; 0032 (0) 69 64 65 73 — email: xavier.saloppe@crds.be