

Induced Affectivity and Impact on Creativity: Personal Growth and Perceived Adjustment when Narrating an Intense Emotional Experience

S. Da Costa, D. Páez, F. Sánchez

Abstract—We examine the causal role of positive affect on creativity, the association of creativity or innovation in the ideation phase with functional emotional regulation, successful adjustment to stress and dispositional emotional creativity, as well as the predictive role of creativity for positive emotions and social adjustment. The study examines the effects of modification of positive affect on creativity. Participants write three poems, narrate an infatuation episode, answer a scale of personal growth after this episode and perform a creativity task, answer a flow scale after creativity task and fill a dispositional emotional creativity scale. High and low positive effect was induced by asking subjects to write three poems about high and low positive connotation stimuli. In a neutral condition, tasks were performed without previous affect induction. Subjects on the condition of high positive affect report more positive and less negative emotions, more personal growth (effect size $r = .24$) and their last poem was rated as more original by judges (effect size $r = .33$). Mediation analysis showed that positive emotions explain the influence of the manipulation on personal growth - positive affect correlates $r = .33$ to personal growth. The emotional creativity scale correlated to creativity scores of the creative task ($r = .14$), to the creativity of the narration of the infatuation episode ($r = .21$). Emotional creativity was also associated, during performing the creativity task, with flow ($r = .27$) and with affect balance ($r = .26$). The mediation analysis showed that emotional creativity predicts flow through positive affect. Results suggest that innovation in the phase of ideation is associated with a positive affect balance and satisfactory performance, as well as dispositional emotional creativity is adaptive.

Keywords—Affectivity, creativity, induction, innovation, psychological factors.

I. INTRODUCTION

CREATIVITY is a relevant psychological process in the current context, which requires companies and individuals to make efforts in innovation. Unlike in the past, today emotions are conceived as an important factor in decision-making and creativity [1]. In this study, we wanted to review how emotions are linked to creativity. On the other hand, the capacities or competences of emotional regulation have shown to be important for creativity. Although these are

This article does not examine the results of the neutral group and presents focused analyses to meet the requirements of the journal.

S. da C. is with the University of the Basque Country, CO 20011 Spain (corresponding author, phone: +24658419967; (e-mail: silviacristina.dacosta@ehu.es).

D. P. is with the University of the Basque Country, CO 20011 Spain (e-mail: dario.paez@ehu.es)

F.S. is with Madrid Autonomous University (e-mail: flor.sanchez.flor@gmail.com).

generally evaluated as emotional intelligence (EI), in this study we will examine the role not of EI, but of emotional creativity (EC), which is associated more with divergent than convergent thinking - and which has been less studied [2].

A. Research Objectives

The first objective of research was to examine the effects of experimental modification of positive effect on creativity and the mediational role of positive emotions. The experimental study contrasts the effects of inducing effect on creativity and the mediational role of positive emotions, with respect to creative performance.

The second objective was to evaluate the role of EC in creative performance. The correlational study contrasts the association between EC and performance, affect and flow in creative tasks. These two studies aim to show that positive affect and EC are factors favoring creativity.

II. PREVIOUS STUDIES

A. Positive Affect and Creativity

Positive affect is associated with creativity according to two meta-analyses ($r = .19$) reviewed in a meta-analytic integration [3]. The experimental studies found that positive affect reinforces the originality and fluidity of the creative response ($r = 0.11$ and $r = 0.09$). Authors [1] suggest that high activation reinforces creativity. First, positive affect reinforces creativity through memory and thinking, generating a greater flow or number of ideas, because the high density of the associative network in the memory of positive materials promotes the accessibility of information. Positive affect influences creativity also through thinking, by facilitating greater flexibility in mental categories use, because people with a positive mental state are more inclusive when categorizing stimuli. Finally, positive affect would reinforce the generation of infrequent, original ideas [4]. Secondly, positive feelings, acting as a signal suggesting that a state of wellbeing prevails, evoke a playful, relaxed approach to tasks, whereas negative feelings would indicate danger, thereby provoking systematic thought in problem solving. A positive outlook would reinforce divergent thinking, broad attention and the repertoire of actions and ideas [5], [1]. Thirdly, positive affect and associated emotions influence creativity through the tendency to action associated with it. Positive emotions of high levels of activation, such as happiness and interest, which imply action tendencies of approaching to the environment, scrutinizing and modifying it, help creativity

through these motivations and associated behavioral styles. It is important to emphasize that effects and emotions of low arousal, such as calmness, do not reinforce creativity [6], but rather hinder it. The affective state must be of positive valence and high arousal in order to help creativity.

First hypothesis (H1): Subjects in the high positive affect condition should show high creative performance than subjects in the low positive affect condition.

B. EC

EC is the personal disposition to experience complex and adaptive emotions and is measured by Averill's Emotional Creativity Scale (ECI) scale composed of three dimensions: Emotional preparedness; Novelty of emotional experience; Authentic and useful emotional experience, disposition to feel uncommon and original emotions and adaptive use of emotions [2]. ECI positively correlated with self-reports of creative behavior [7], [8]. Studies support that ECI scores correlate strongly with creative behavior or performance evaluated by judges on affective or emotional loaded creativity tasks, than with cognitive creativity tasks [9], [10]. For instance, Averill found that ECI correlates strongly with Torrance style affective tasks than with cognitive creative task [2]. Evidence supports partially that EC is associated to creative behavior and performance, congruently with evidence suggesting that is associated to personal factors favorable to creativity like intense positive affect, efficacy, intrinsic motivation, and creative forms of regulation that implies creativity, like reappraisal and post stress growth [6]. The adaptive and creative regulatory capacity of people with high CE will help them to better manage creative tasks and will probably be associated with optimal experience or flow during them. Flow is an optimal experience of challenge that provokes concentration and positive effects of gratification [11], [12]. As we did not find any studies that have tested whether EC is a flow facilitator, this research seeks to examine this hypothesis [13].

It was hypothesized that emotional creativity will be associated with flow during the creative activity (H2) and with the positive affect felt during this activity (H3).

C. Assessment of Creativity: CAT

The Consensual Assessment Technique (CAT) is based on the fact that the best measurement of the creativity of a work of art, a theory or any other artefact, is a combined evaluation by experts in that field. This technique is designed to assess creative production. Independent judges (usually experts) are asked to act as graders of creativity supposing that the combined assessments are the best possible assessment in a domain. By using this method, the researchers do not impose their point of view concerning what is creative on the evaluators. This technique insists that product assessment must be done comparatively, i.e., it must be evaluated in relation to other products and not to ideal standards. According to [14] an advantage of this methodology is that, it is not linked to any particular theory of creativity and its validity does not increase or diminish with its successes or

failures. The working hypothesis proposed was that assessment with judges using the CAT method would be significantly associated, confirming the construct validity of these measurements as a reflection of the concept of creativity

III. METHODOLOGY

A. Participants

The number of people participating in this study ranged from N = 230 (global sample) to 120 people (sample answered Flow scale). All were students of psychology at a Spanish public university.

B. Procedure and Instruments

A task booklet was randomly given to participants to be completed in a single 30 to 75 minute session. The booklet contained scales to measure the emotions felt when writing three poems and when narrating an episode of intense love. It also sought to evaluate adjustment and growth after the narration. Subsequently, narrative or verbal and graphic creativity was evaluated using the Creative Imagination Test for Adults (PIC-A) scale [15]. Finally, people had to answer a scale of EC and a scale of individual flow, with respect to the experience during creativity tasks.

Haikus [10]

Participants were asked if they knew the haikus poems and what they knew about them - over 50% of the sample had never heard of them and approximately 40% had, although it was not a regular activity for them. They were then given the task booklet with examples and criteria to be met [10]. The first haiku was common and was given as a stimulus for all three conditions the word game. The third haiku was evaluated as a creativity product. Non-expert and expert haiku judges, university professors who regularly write and read these poems, independently evaluated this task. They were asked to read all the poems and then evaluate their originality. Each judge was given an answer sheet with the indications, the criterion and the pertinent codes and the haiku poems (which were transferred to a Word document to remove any element that could identify the participant). The instruction given to the judges for this task was: You are a member of a competition jury that is assessing the creation of Haikus. Assess the novelty/originality and the authenticity of the last haiku created, based on the following criterion 1= none to 10 = very much. The agreement between the expert judges was significant and satisfactory for global evaluation, *Spearman Brown* $r = .56, p < .01$. The evaluation of the non-expert judges for novelty show an Intra Class Coefficient ICC = .59, $p < .001$ and .61, $p < .001$ for authenticity.

DESm: Differential Scale of Emotions by Izard, Adapted by [16]

People had to answer about the emotions felt when writing the third poem. This scale proposes 20 items containing positive and negative adjectives to describe each emotion. It is answered with a Likert type scale where 0 = nothing to 4 = very much. The reliability of the scale for this study was very

satisfactory $\alpha = .90$ for positive emotions and $\alpha = .79$ for negative emotions.

Narration [10]

Participants were then asked to write for 10 minutes about a significant love relationship or intense crush they had experienced. The instruction sheet asked "please describe or narrate a significant love relationship or intense crush you have had and answer the following questions: 1. what was going on in your life at that time; 2. what emotions did you experience; 3. what made this experience unique or different from others? and 4. what did you learn from this experience, how did it change you? Judges independently evaluated these stories. This assessment was carried out by ten independent judges participated in this task. The instruction given was to assess the narration or story from 1 = none to 5 = very much, based on the following four criteria: 1. Novelty. 2. Effectiveness. 3. Authenticity. 4. Global assessment of EC. The intra-class correlation index was satisfactory for novelty $r = .51, p < .001$; for efficacy; $r = .43, p < .001$; for authenticity $r = .54, p < .001$, and for EC $r = .45, p < .001$. Global reliability was very satisfactory $\alpha = .84$.

Post-Traumatic Growth Inventory [17], Short Spanish Version

After completing the narrative, the changes perceived in the face of the emotional event narrated - because of emotional and cognitive processes arising from facing this event - should be evaluated using an 8-item scale. The answers were given on a Likert-type scale, ranging from 1 = nothing to 7 = a lot. Examples of items are personal growth; learning about personal capacities, skills and resistance; improving knowledge about oneself and others; appreciating what one has and learning the important priorities in life. The scale showed good reliability $\alpha = .86$.

DESm

The participants reported what they had felt during the story, using the scale described above. The reliability in this case was very satisfactory $\alpha = .91$ for positive emotions and from $\alpha = .89$ for negative emotions.

Assessment of Creative Imagination Games

In order to assess the tasks the PIC-A manual was used [15]. This is a Spanish version of Torrance's style creative tasks. A copy of the creative verbal and pictorial product was given to each judge, with a Word sheet where the code of each participant was recorded and the instruction with the assessment criterion. The Intra Class Coefficient (ICC) among the three judges in the narrative task was .99 in fluidity, .96 in flexibility and .97 in originality, meaning that they were worked with as a single indicator. As for the graphic creativity evaluated by game 2 of the PIC-A, there was an inter-judge agreement over 0.95 in terms of the evaluation of the creativity of the answers (judged according to the fluidity or number of ideas, the use of different categories and originality of the product).

EC: Spanish Version [7] of the EC Inventory [2]

The questionnaire consists of 17 items grouped in three dimensions. Emotional preparedness [i.e., when I have strong emotional reactions, I look for reasons for my feelings]; novelty or ability to experience new or unusual emotions [i.e., I have felt a combination of emotions that probably other people have never experienced]; and effectiveness/authenticity [i.e., the way I express and experience my emotions helps me in my reactions to other people]. A Likert scale was used (strongly disagree = 1 at 6 = strongly agree). Reliability proved to be very satisfactory for this study ($\alpha = .82$).

Individual Flow

The Spanish version of the Jackson & Marsh DFS flow scale was used [11]. At the end of the haiku task, some of the people participating in that study completed the 18-item scale of individual flow.

C. Data Analysis

Mean comparisons were made using ANOVA, the r-point biserial was used as a contrast test and effect size estimation (positive stimulus condition = 2, negative = 1). A multiple regression contrasted the mean role of affectivity in the impact of manipulation on creativity, establishing $p < .001$ as the statistical significance level, using the SPSS 22.0 statistical package for Windows. The Mediate procedure was used to estimate mediation [18]. Correlations, regressions and mediational analysis were carried out to analyze associations of EC with affect and creativity.

IV. EXPERIMENT

The experimental study contrasts the effects of inducing effect on creativity and the mediational role of positive emotions. To elicit high and low positive affect, participants were asked to write three short poems or Haikus in their simplified American version, based on positive and negative valence stimuli respectively. In the positive condition ($N = 115$) people wrote a poem about spring (2nd poem) and another one about summer. In the negative condition ($N = 115$) they wrote a poem about autumn (2nd poem) and another one about winter (in that order).

V. RESULTS

To contrast hypothesis one a comparison of means was made. The differences in means observed among those who wrote poems associated with high positive affectivity versus low positive affectivity confirmed the impact of manipulation on creativity or originality of the last poem, in addition to the impact on affectivity (Table I).

In the positive condition, subjects report more positive affect (during writing the poem as well as when writing about the significant love experience) as well as more personal growth, compared with subjects in the low positive affect condition. The last poem (but not narration of experience) was evaluated as more original in high positive condition by independent judges. Creativity performance that was measured with PIC-A was not influenced by the experimental

manipulation. Positive affectivity in narrating was associated with growth $r_{(223)} = .30, p < 001$. Manipulation was associated with positive affectivity $r = .13, p = .026$ and growth $r = .12, p = .028$. With these results a mediation was performed [16] using the Mediate procedure: DV = growth after the episode narrated, IV = manipulation and Mediational Variable = positive affectivity when narrating the episode. Standardized coefficients were used. We found a total mediating effect of manipulation through narrative affectivity on growth $\beta = .0871, SD = .047$ 95% CI [.040; .195]. That is, the manipulation shows a significant coefficient through positive narrative affectivity that does not include zero in the confidence interval. $R^2 = .11$ and the model explains 1.1% of the variance. In order to contrast H2 on the association between EC and creative performance, EC score was correlated with creativity outcomes in the global sample. The EC scale correlated to creativity scores of the creative task (poem), $r_{(223)} = .14$, to creativity of the narration of the infatuation episode, $r = .21$, both $p < .05$. In order to contrast the H3, the score in EC was correlated with the scale of affects in the sample that had answered the flow scale ($n = 120$). EC was also associated to individual flow scale, $r_{(123)} = .27, p < .05$ and correlates with high positive and low negative affectivity or affect balance, $r = .26, p < .05$, after performing a creativity task (i.e., writing the poem). Subsequently, a mediational analysis using Model 4 of Preacher Process procedure was carried out. Individual flow during the writing of the poem was the dependent variable; EC was the predictor variable and emotional experience was the mediator. Standardized coefficients were used. We found an indirect effect $\beta = .1070, SD = .063$ 95% CI [.005; .243] and a total mediation of EC in the flow through the scale of affects felt during the writing of the third poem. That is, EC shows a significant coefficient through the affects felt during the creative task that does not include zero in the confidence interval. $R^2 = .52$ and the model explain 27% of the variance.

TABLE I
AFFECT BALANCES (POSITIVE MINUS NEGATIVE AFFECT), POSITIVE AFFECT AND ORIGINALITY OF LAST HAIKU POEM, GROWTH AFTER EMOTIONAL EPISODE AND CREATIVITY TASKS BY POSITIVE VERSUS NEGATIVE CONDITIONS

Variable	Negative		Positive		F	P	η^2
	M	SD	M	SD			
DESM positive affect	1.68	.95	2.08	1.89	10.30	.002	.21
Poem Originality*	5.28	1.77	5.75	1.82	3.99	.04	.13
Growth-PTGI	5.57	1.58	5.92	1.07	7.51	.001	.21
Affect Balance narration	25.51	9.29	27.44	10.00	2.82	.062	.13
Verbal creativity task (PIC-A J2)	93.87	48.33	93.71	47.37	.544	.581	.05
Graphic creativity task (PIC-A J4)	25.96	11.02	25.03	11.43	2.12	.121	.11

* $p < .05$ ** $p < .01$ *** $p < 001$. *Evaluated by judge J2 and J4 = Task 2 and 4. PTGI = Post-Traumatic Growth Inventory. PIC-A = Test of creative imagination for adults

VI. RESEARCH RESULTS AND CONCLUSION

The operational definition of creativity is the degree to which observers agree that an answer is creative, generally

based on its novelty or originality and functionality or efficacy. In the CAT method, inter-judge reliability equals the construct validity of creativity. This approach was used in this study with relative success. The experimental study found that positive affectivity was a predictor of creativity. Modifications in the level of positive affectivity increased creativity in open creative tasks (creation of a poem) evaluated by judges, as well as induced a vision of greater positive changes after an intense emotional episode. Given that the allocation to the conditions was made at random, it can be thought that this greater perceived growth is the effect of a more intense positive reevaluation of what happened - positive reevaluation is a form of regulation is a correlate of creativity-. A mediational analysis showed that positive emotions totally explain the influence of the manipulation on personal growth. Globally, results confirm that manipulation of positive affect enhance creativity with effect sizes of $r = .33$ for creativity (last poem originality evaluated by judges) and $r = .28$ for personal growth. Level of positive affect also correlates $r = .33$ to personal growth explaining 9% of variance, an effect size higher than meta-analysis of Baas et al. [1].

Results confirmed that EC was associated with better creative performance, a positive effect balance and flow during the performance of the creative task. Results showed that EC predicted a greater optimal experience in the short term. Likewise, it was confirmed that it predicted a better balance of affect or more positive and less negative affectivity during the performance of the task. Results showed that EC predicts flow mediated by positive effect EC facilitates the experience of creative flow by maintaining positive effect during the effort of carrying out a creative task. That is, it generates more positive and less negative emotions during its completion.

VII. RECOMMENDATIONS

This study confirms that positive affectivity improves creative performance, even when induced by a small manipulation. It suggests that generating a positive emotional climate in organizations will not only improve well-being but can also help innovation. On the other hand, it suggests that feeling complex emotions helps to be more creative and feel better, more absorbed and rewarded during creative tasks. Training programs should not only integrate EI, but also content linked to EC - to improve creative performance.

A. Suggested Research

Future research should evaluate the role of affectivity in creative tasks more linked to organizational performance. EC training programs should also be evaluated to see if they could be improved through learning. There is limited evidence showing the possibility of increasing EC [19].

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Silvia da Costa. Born in Uruguay in 1972. Graduate in Educational Psychology, 2011, University of the Basque Country, Faculty of Philosophy and Sciences of Education, San Sebastian, Spain. Master on Organizational Psychology and Psychosocial Intervention, 2012, University of the Basque Country, Faculty of Psychology, San Sebastian, Spain. Master Research Individual, Group, Organization and Culture, University of the Basque Country, Faculty of Psychology, San Sebastian, Spain. Ph.D. in Psychology, 2018, University of the Basque Country, Faculty of Psychology-organizational and social psychology. Pre-doctoral and post-doctoral researcher at the Department of Social Psychology, University of the Basque