International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013)

Social emotions and cognition: shame, guilt and working memory

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Abstract

The relation between cognition and emotion has been increasingly explored in literature but few studies have explored the relation between social emotions and cognitive performances.

To this end, 60 undergraduate female students were assigned to a dual-task condition in order to test their working memory abilities. They were then randomly assigned to three different writing disclosure tasks: shame condition, guilt condition and neutral condition. They were finally assigned to a new dual-task condition in order to assess differences on cognitive performances between the emotional and the neutral conditions. Statistically significant differences of dual-task performances related to the shame, guilt and neutral writing conditions were found. Shame and guilt conditions were related to lower cognitive performances than neutral condition subjects. In particular, state shame was a significant predictor of impairment in working memory performances. Furthermore shame-prone individuals were found to perform lower in working memory tests than guilt-prone participants suggesting a greater interference of shame (as emotional experience and as personal predisposition on working memory than guilt- related condition.

Keywords: Social emotions; Shame; Guilt; Working Memory;

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1. Main text

1. Introduction

Shame and guilt are distinctive self-conscious emotions that are inextricably linked to the self in relationship with others (Tangney & Dearing, 2002). These emotions can be experienced intensely enough since earliest interpersonal experiences and they are characterized by feelings of distress arising in response to personal transgressions (Wolf, Cohen, Panter, Insko, 2009). Although they share some important similarities, crucial differences in the phenomenology of shame and guilt have been reported in terms of adjustment, pathology, and interpersonal relatedness (Woien, Ernst, Patock-Peckham, & Nagoshi, 2003). For instance, it's possible to differentiate shame and guilt both in terms of emotional experiences and in terms of shame and guilt-proneness (Anolli & Pascucci, 2005; Wallbott & Scherer, 1995; Tangney, Wagner, Gramzow, 1992).

As emotional experiences, researchers have observed that guilt is an action-focused emotion owing that it involves self-criticism for a specific action (Tangney, Stuewig & Mashek, 2007; de Hooge, Breugelmans, & Zeelenberg, 2008). Feelings of guilt remain focused on a specific behavior and, as a consequence, on the harm that it may cause to others. In guilt emotional experience, the self is not the central object of negative evaluation, but the focus is rather on what has been done or undone (Lewis, 1971). So, guilt seems not to affect one's core identity so that the self remains basically intact. When experiencing guilt, a person may think, ''I did a bad action'' (Anolli et al., 2005). Guilt, as emotional experience, involves a sense of tension, remorse and regret. It motivates performing reparative actions, including apology, confession and pro-social actions. Therefore, guilt is an adaptive and constructive moral affect, since it promotes behaviors that benefit interpersonal relationships (Tangney, Wagner, & Gramzov, 1989).

In contrast, shame as emotional experience is directly related about the self which is the immediate focus of the evaluation. Shame emotion is accompanied by a sense of worthlessness and powerlessness or of "being small" and it has been often considered as more painful and "destructive" than guilt. In fact, feelings of shame are more likely to motivate desire to hide or escape the shame-inducing situation, to sink into the floor and disappear (Tangney et al., 2002).

A second and integrative view of shame and guilt related process is in term of proneness. The term is used here to describe a lasting affective predisposition. A guilt-prone person usually makes internal, specific and unstable attributions when transgression occur (Tagney et al., 2002). Guilt-prone individuals appear better able to empathize with others and to accept responsibility for negative interpersonal events. They are relatively less prone to anger than their shame-prone peer and they feel unable to repair, apologize or amend for they have done wrong (Bybee & Quiles, 1998). On the contrary, shame-prone people seem to be more inclined to make internal, global and stable attributions and to have a negative self-conception with a decreasing of depression regardless of the circumstances. Shame-prone individuals tend more likely to blame others (as well as themselves) for negative events. Furthermore, they are more prone to rumination and to unexpressed anger and less able to empathize with others in general (Tangney et al., 2002).

Although a lot of researchers have explored the relation between emotions and other psychological correlates, such as working memory (Baddeley, Banse, Huang & Page, 2012; Brose, Schmiedek, Lovden, Lindenberger, 2011; Schmeichel & Demaree, 2010; Van Dillen & Koole, 2007), to our knowledge, studies that have analyzed the relation between social emotions and working memory are still scarce. Schmeichel and colleagues (2008) underline a link between high working memory capacity and ability in self-regulation of negative emotions. On the other hand, Van Dillen and Koole (2007), underlined that loading working memory can promote distraction from negative moods as well. Some studies (Brose et al., 2012; Joormann, & Gotlib, 2008) indicated a prevalence of deficits in cognitive control due to increased elaboration of negative material and of ruminal thoughts. In particular, reduction in working memory performances is coupled with high levels of negative emotions (Brose et al., 2012). Furthermore, other studies have shown evidence that other intra-individual variables such as trait anxiety can reduce cognitive test performances (Eysenck, Derakshan, Santos & Calvo 2007; Owens, Stevenson

Norgate & Hadwin, 2008). Therefore, actual research is needed in order to explore the relation between memory, social emotions and personal traits.

1.1 The present study

In this paper, we want to quantitatively examine whether and to what extent shame and guilt interfere with working memory performances. In particular, its aims are (1) to determine the relative contributions of shame and of guilt, as emotional experience, to increases in deterioration of working memory performances and (2) to determine whether guilt- and shame-proneness and trait anxiety interfere with working memory performances evaluated through a dual-task condition. It can be hypothesize that, even if shame and guilt remain both disruptive emotions, individuals experiencing shame will have large negative effect on working memory performances as a consequence of worthlessness and powerlessness feeling that are in turn linked with an unworthy self.

2. Methods

2.1 Sample

62 undergraduate female students enrolled in different faculties (Economics, Law, Science Education, Psychology) of University of Milano – Bicocca volunteered to participate in this study. The mean age of participants was 21.22 years (SD = 2.5). Of the 62 students that completed the baseline 60 (97%) participants completed the whole experiment. The research had been conducted following the APA's ethical principles and code of conduct (American Psychological Association, 2010).

2.2 Procedure

Procedure is composed of two steps: in the first one participants received one envelop in which they found informed consent, a form to gather demographic information and two questionnaires: the *State-Trait Anxiety Inventory* (STAI) (Spielberg, 2005) and the *Test of Self-Conscious Affects* (TOSCA) (Tangney et al., 1989). STAI allows the assessment of trait anxiety and it was used in order to evaluate anxiety trait contribution to working memory interferences. TOSCA allows the assessment of guilt and shame dispositions in such a way to assess individual differences in the degree to which people are prone to experience shame and guilt across a range of situations involving failures or transgression (Woien et al., 2003). The Italian version of TOSCA was used because it has already been referred to back-translation procedure (Anolli et al., 2005).

In the second step participants were received in a soundproof room lab of University of Milan – Bicocca and they were assigned to a paper and pencil dual-task test (DT1) (Della Sala, Foley, Beschin, Allerhand & Logie, 2010). Before commencing the digit recall task, digit span of each individual was assessed in order to remove individual working memory capacity differences from final results. Dual-task procedure consisted of performing digit recall and tacking task separately and then simultaneously, following the procedure reported by Della Sala and colleagues.

Then, participants were randomly assigned to three different writing disclosure tasks: shame condition (S), guilt condition (G) and neutral condition (N) in order to elicit different emotional experiences. In the condition S, participants were asked to write about a personal negative experience in which they felt so bad about their selves that they wanted to deny, escape and hide from. In the condition G, participants were asked to write about a personal negative experience in which they felt so inadequate about one specific behavior they wanted to confess or try repair to their action. In the last condition (N), participants were asked to write about neutral topic such as the furniture of the room they were in. Before the start of the writing task, the experimenter went out of the room in order not to interfere with the emotional experience. All three different conditions lasted 10 minutes and participants were asked to quit their own writing when the experimenter re-entered into the room. At that point,

participants were assigned to a new dual-task test (DT2) in order to evaluate potential differences in working memory performances. Finally participants were asked to fill in the Shame and Guilt State Scale (SGSS, Marschall, Sanftner, Tangney, 1994) in order to gather information on levels of shame or guilt elicited after performing the writing task.

2.3 Data analysis

Since we were interested in exploring the impact of the emotional experience of *guilt* and *shame* on working memory performances also controlled for trait axiety, a three-block hierarchical multiple regression with enter method was applied (see Pedhazur, 1997 for further information). The regression model was set with the Δ dual-task (DT2-DT1) as dependent variable and *state shame/guilt*, *guilt-* and *shame-proneness* and *trait anxiety* as independent determinants. For the condition G, the variable *state guilt* was added at step 1. At step 2, the effect of both *guilt-* and *shame-proneness* was then evaluated. Finally, the last determinants (*trait anxiety*) was added at step 3.For the condition S, the strategy was the same apart from *state shame* included in step 1. For the N condition, a last regression was run with both *guilt-proneness* and *shame-proneness* included at step 1 and the anxiety trait at step 2. Regression assumptions (e.g., homoscedasticity, multivariate normality) were checked and found to be fulfilled for all variables. Finally, a p <.001 Mahalanobi's distance criterion was used to identify and skip multivariate outliers. All regression models were evaluated through statistically significant variation of R^2 and Cohen's (1988) effect size f^2.

3. Findings

Significant differences between participants were found between the three writing conditions comparing dual-task-retest with dual-task scores: the writing of social emotional past experiences determine lower dual-task retest scores. High Δ dual-task scores indicates lower dual-task retest scores compared to those obtained before the writing task. If compared through ANOVA, *Δ dual task* scores in S (*m* = 59.30, *sd* = 12.07) and G (*m* = 49.11, *sd* = 5.03) writing conditions are significantly lower ($F_{2,43}$ = 10.72, p < .001) than in the condition N (*m* = 27.52, *sd* = 13.67) (Table1). Tukey's post-hoc comparison confirmed that all group scores are statistically different.

Table 1. Mean (m) and standard deviations (sd) of DT1, DT2 and Δ dual task in the three writing conditions

	G		S		N	
	m	*sd*	*m*	*sd*	*m*	*sd*
DT1	95.12	18.81	104.72	23.31	103.67	16.59
DT2	86.66	15.85	95.68	16.12	114.69	18.75
Δ Dual-task	49.11	5.03	59.30	12.07	27.53	13.67

In table 2 are reported values of first-order correlations between Δ Dual-task and other determinants once controlled for age. In particular, baseline measure of *shame-proneness* shows moderate-strong correlations with *trait anxiety* (r = .54) and with worse working memory performances measured by the Δ dual- task (r = .38).

Table 2. First-order correlations between variables

	1	2	3	4
Shame-proneness (1)				
Guilt-proneness (2)	.38*			
Trait Anxiety (3)	.54**	.12		
Δ Dual-task (4)	.38*	-.20	.163	

* p < .05;   ** p < .001

The result confirms evidences from other studies (e.g. Tangney, Stuewig & Mashek, 2007) suggesting that shame-prone people are likely to experience higher levels of anxiety. In a similar fashion, the statistically significant correlation (r = .38) between *shame-proneness* and Δ dual-task suggested a plausible association between shame-prone people and worse working memory performances after experiencing emotional discomfort. On the contrary, *guilt-proneness* doesn't show statistically significant correlations between *trait anxiety* and *Δ dual task*. Regression analysis will provide a more in-depth portrait into the relation among variables under study.

The first regression (G condition) was performed using the *Δ dual-task* as dependent variable and *state guilt* as independent variable at step 1, and *guilt-* and *shame-proneness* at step 2 and *trait anxiety* entered at step 3 (Table 3).

Table 3. Multiple regression analyses on state guilt (SGSS)

Dependent variable	Independent Variables	B	*t*	*p*
1.Step				
Δ dual-task	Constant	45.54	7.73	<.001
	State Guilt	.43	1.05	.299
2. Step				
Δ dual-task	Constant	111.71	3.31	<.005
	State Guilt	.192	.524	.603
	Guilt-proneness	-1.70	-2.81	<.01
	Shame-proneness	.92	3.3	<.005
3. Step				
Δ dual-task	Constant	120.21	3.39	<.005
	Guilt	.25	.67	.510
	Guilt-proneness	-1.75	-2.86	<.01
	Shame-proneness	1.06	3.22	<.005
	Trait Anxiety	-.23	-.82	.418

At step 1, *State guilt* wasn't a statistically significant determinants of differences in the *Δ dual-task* ($F_{1,37}$ = 1.11, p = ns). When *guilt-* and *shame-proneness* were entered at step 2, the model is statistically significant ($F_{3,35}$ = 4.98, p = .006; R^2 = .299) and it accounted for a 30 % of the variance (Cohen's f^2 = 0.42) of *Δ dual-task* . More specifically, *shame-proneness* (B = .92, *t* = 3.22, *p* = .002) and *guilt-proneness* (B = -1.7, *t* = -2.81, *p* < .01) were statistically significant determinants, however only *shame-proneness* seemed to negatively affect the working memory performance. From this point of view, the more the *shame-proneness* is present, the more serious the interference with working memory become. The addition of *trait anxiety* at step 3 made no further significant contribution to the prediction of *Δ dual-task* (Δ$F_{4,35}$ = -1.11, p = ns, ΔR^2 = .01*)* thus suggesting the exclusion of the variable from the regression equation.

The regression for the S condition was performed between *Δ dual-task* as the dependent variable and *state shame* as independent variable entered at step 1, and *guilt-* and *shame-proneness* entered at step 2, and *trait anxiety* entered at step 3 (Table 4). In line with what it was expected, *state shame* level was a statistically significant predictor of dual-task retest impairment as it is ($F_{1,37}$ = 19.01, *p* < .001, R^2 = .339). The addition of *shame-* and *guilt-* predisposition variables inserted at step 2 made a statistically significant contribution to the prediction of differences in dual-task test scores ($F_{3,35}$ = 10.32, *p* < .001, R^2 = .469). The addition of *trait anxiety* inserted at step 3 made no significant contribution to the prediction of *Δ dual-task* (Δ$F_{4,34}$ = -1.01, p = ns, ΔR^2 =

.05*). In summary, result of regression suggest to adopt the model represented at step 2 in which *shame-proneness* was a significant predictor determining lower scores in DT2 (B = .64, t = 2.49, p = .018) whereas *guilt-proneness* predicted better working memory performances (B = -1.33, t = -2.47, p = .018). However *state shame* confirmed its importance remaining the stronger determinant of *Δ dual-task* (B = 1.28, p = 002). It was worthwhile to remark that the R^2 values accounted for 52% of the variance, a quite high value in the social science (the Cohen's effect size f^2 for multiple regressions was .98).

Table 4. Multiple regression analyses on state shame (SGSS)

Dependent variable	Independent Variables	B	T	p
1.Step				
Δ dual-task	Constant	29.20	5.38	<.001
	State shame	1.67	4.36	<.001
2. Step				
Δ dual-task	Constant	86.94	2.89	<.01
	State shame	1.29	3.40	<.005
	Guilt-proneness	-1.33	-2.48	<.05
	Shame-proneness	.64	2.49	<.05
3. Step				
Δ dual-task	Constant	101.26	3.38	<.005
	State shame	1.49	3.91	<.001
	Guilt-proneness	-1.38	-2.65	<.05
	Shame-proneness	.885	3.17	<.005
	Trait Anxiety	-.46	-.28	.067

The last regression in N condition was performed between *Δ dual-task* as the dependent variable, *guilt-* and *shame-proneness* entered at step 1, and *trait anxiety* entered at step 2. G*uilt-* and *shame-proneness* made significant contribution to the prediction of *dual-task* accounting for a 29 % of the explained variance (Cohen's f^2 = 0.41). The addition of *trait anxiety* inserted at step 2 made no significant contribution to the prediction of *Δ dual-task (*ΔF $_{1,35}$ = -2.39, p = ns, ΔR² = .01). In the final model *shame-proneness* was a significant predictor determining lower scores in dual task retest (B = 1.08, t = 3.3, p < .005) whereas *guilt-proneness* showed significant results but in an opposite direction (B = -1.78, t = -2.94, p = .006). Results are similar to what has been found in all conditions thus suggesting a general effect of *guilt-proneness* and *shame-proneness* on explaining part of the differences in working memory performances. However, the evaluation of the models support the idea that when subjects were exposed to shame-related conditions or experiences their scores on working memory test are much more lower than individuals exposed to guilt or neutral condition.

4. Conclusions

The results of regressions and correlational analyses are quite unequivocal and support the directional hypothesis that individuals experiencing shame will have large negative effect on working memory performances. In G condition, *state guilt* wasn't uniquely predictive for Δ dual-task retest scores. On the contrary, in S condition *state shame* showed a statistically significant contribution in accounting for dual task scores at both t step 1 and 2. The significant contribution of state shame to the regression suggests that the severity of shame as emotional experience predicts worse working memory performances. These can be due to the fact that reparation tendencies that typically follow guilt emotional experiences could have led to reparative behavior and

could have made the memory of the past situations not so painful anymore. On the contrary, the memory of past shame emotional experiences and the probable following lack of reparative behavior could have determined stronger interferences in working memory processes suggesting shame to be more impairment than guilt. Results in N condition resemble the pattern of relationship found between *Δ dual-task*, *shame-* and *guilt-proneness* in all group.

In fact, *shame-proneness* predicted worse working memory performances after emotional elicitation after the writing of both guilt and shame past experiences in all regression analysis whereas the contributions of *guilt-proneness* were statistically significant but limited in magnitude. These results suggest a greater effort for shame-prone individuals than for guilt-prone individual in managing the memory of negative social emotions: *guilt-proneness* seems to be a protective trait that can help in managing shame experiences.

In both regression analysis trait anxiety didn't seem to be a significant predictors of worse working memory performances. These data suggests that, although trait anxiety showed correlations with *shame-proneness* consistent with previous results (Tangney, Stuewig & Mashek, 2007), it doesn't seem it predicts impairment in working memory performances after the elicitation of past emotional experiences.

The memory of negative social emotion experiences can affect cognitive performances and working memory processes. In particular shame, both as emotional experience and as personal predisposition, seems to have greater negative consequences on working memory and to be therefore a more negative and disruptive emotion than guilt regarding attention and cognitive performances. Most of the times difficulties in understanding and remembering information in school and job contexts are managed through cognitive enhancement. As a result, only by supporting people in coping with social emotions and in particular with shame feelings, the working memory performances might be increased by the general ability to manage negative social emotions.

There are several limitations to this study. The first was the use of a convenience sample of undergraduate female students: future studies should include a larger and, perhaps, a more generalized sample. Moreover, in performing guilt and shame writing task, people arbitrarily selected the negative experiences to write about and this could have led people talking about experiences with different *nuance*. Furthermore, data could have been influences by individual skill in get involved into personal memory about the past. Future replication of these findings with different samples will be needed to finally confirm an association between shame and working memory impairments.

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