



## Comparison of expressive writing after the terrorist attacks of September 11<sup>th</sup> and March 11<sup>th</sup><sup>1</sup>

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**ABSTRACT.** This descriptive study of populations through survey research examined expressive writing in the interval between 3 and 8 weeks after the terrorist attacks on the World Trade Center on September 11<sup>th</sup> 2001, and after a series of bomb attacks on commuter trains in Madrid on March 11<sup>th</sup> 2004 ( $n = 325$  participants from the USA, and  $n = 333$  from Spain). The aim of the research was to analyze expressive writing with regard to pronouns, feelings, thoughts and social processes in the wake of the terrorist attacks. Analysis with the Linguistic Inquiry and Word Count (LIWC) program showed that the Spanish participants reported more social processes and used more second and third-person pronouns, whilst the American participants more commonly used the first person. Correlations of the emotions with the cognitive processes confirmed how the feelings are associated with the thoughts. The results corroborated that the dynamics of sharing and feeling were similar in the two countries in the period from 3 to 8 weeks after the attacks. Implications for possible cultural differences between individualistic and collectivistic societies are discussed.

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**KEYWORDS.** Expressive writing. Terrorist attacks. March eleventh. September eleventh. LIWC. Descriptive study of populations.

**RESUMEN.** Este estudio descriptivo de poblaciones mediante encuesta examina la escritura expresiva tras los atentados terroristas del 11 de septiembre de 2001 y del 11 de marzo de 2004. Las narraciones de 325 estadounidenses y de 333 españoles fueron analizadas a través del programa lingüístico (*Linguistic Inquiry and Word Count* – LIWC). El propósito de este artículo fue analizar, a través de la escritura expresiva, los pronombres, pensamientos, sentimientos y procesos sociales que se generan tras los atentados terroristas. Los análisis lingüísticos constataron que los españoles escribieron más sobre procesos sociales y que en sus textos reflejaron más pronombres de la segunda y tercera persona, mientras que los estadounidenses utilizaron más pronombres de la primera persona. Los análisis correlacionales indicaron que las emociones se vinculaban con los procesos cognitivos, corroborando la asociación entre los sentimientos y los pensamientos. Los resultados también mostraron que, entre ambas naciones, la dinámica del compartir socio-emocional y pensar sobre los atentados terroristas fue similar, para el periodo comprendido entre la 3<sup>a</sup> y 8<sup>a</sup> semana tras los atentados. Finalmente, se analizaron y discutieron las diferencias entre las culturas individualista y colectivista.

**PALABRAS CLAVE.** Escritura expresiva. Atentados terroristas. 11 de Septiembre. 11 de Marzo. LIWC. Estudio descriptivo de poblaciones.

The terrorist attacks in New York on September 11<sup>th</sup> 2001 (S11), in Madrid (train bombings on March 11<sup>th</sup> 2004, M11), and on the London underground in July 2005 perpetrated by Al-Qaeda have provided an opportunity to study the immediate psychological reactions of traumatic events on the general population. Many behaviors and consequences shown by the inhabitants, and which are often described as symptoms of stress and psychological problems, appear to constitute normal reactions in the wake of such abnormal situations. Two studies, carried out after S11 and M11, showed that overall mean intensity of stress symptoms was never above 2 on a 1-5 scale (Vázquez, Pérez-Sales, and Matt, 2006). Furthermore, research on responses to collective trauma have found higher social sharing and solidarity behaviors within the first few weeks, but that solidarity goes into a slow decline, with spontaneous sharing disappearing after two months (Collins, 2004).

The S11 and M11 attacks occurred in the USA and in Spain, respectively, which differ insofar as the US is more individualist than Spain. Various studies have shown that individualist cultures, such as that of North America, have a strong culturally-shared belief in independence of the self from others, while collectivist cultures do not value such strict separation or independence of the self. That is, many non-Western cultures reinforce relationships with others, and individualist cultures prefer uniqueness (*i.e.*, «I enjoy being unique and different») (see Fernández, Páez, and González, 2005; Kitayama, Markus, and Kurokawa, 2000). Moreover, previous research found that cultural individualism emphasized emotional expression, and correlated with higher verbal

and nonverbal expression of negative emotions (Fernández, Carrera, Sánchez, Páez, and Candia, 2000). Examples of collectivist countries are Guatemala and Taiwan, while examples of individualist countries are the USA and the western European nations. Spain has an average score along the individualism-collectivism continuum (Hofstede, 2001).

According to the stereotypes, the use of «we» and «us» is more common in collectivist cultures, while the pronoun «I» is more frequent in individualist cultures (see Lee, Aaker, and Gardner, 2000; Lehman, Chiu, and Schaller, 2004). We shall examine the differences in the use of pronouns between the USA and Spain. Although there are cultural differences in expressive reactions after terrorist attacks (rituals, collective manifestations, group symbols such as flags and emblems, verbal and nonverbal communication, etc.), the negative effects of these two terrorist attacks show some similarities. In case of S11, the national longitudinal study of psychological reactions showed that 17% of the population reported symptoms of post-traumatic stress disorder 2 months after the attacks (Silver, Holman, McIntosh, Poulin, and Gil-Rivas, 2002), while Galea *et al.* (2002) reported that 27% of the participants in their study from New York had depression. Similar data emerged in Spain, with 26.60% of Madrid's inhabitants reporting depression during the first few days after the attacks. Moreover, the prevalence of major depression in Madrid (8%) was comparable to estimates reported in Manhattan (9.70%) 3 months after the events (Miguel-Tobal, Cano-Vindel, Iruarrizaga, González, and Galea, 2004; Miguel-Tobal *et al.*, 2006).

The negative events have the following phases: emergency, inhibition, and adaptation. For instance, a study carried out by Pennebaker and Harber (1993) showed that immediately after the impact of the Loma Prieta Earthquake in the San Francisco Bay Area there was an emergency phase that lasted 2-3 weeks, in which high anxiety was manifested. People also talk profusely about the event, and present repetitive thoughts. On many occasions there is an inhibition phase that lasts several weeks, in which people talk less about the event. At this point victims and family can feel that their need for support is not met, as the social network has been overused due to too much talking. After three months, levels of talking and thinking converge, and gradually decrease until a stage of assimilation of the event is reached. This psychological dynamic was analyzed in the linguistic analyses of disasters, which have shown that written essays reflect these expression phases. Thus, in the first few days after terrorist attacks of S11, participants expressed more negative emotions about the situation than 8 weeks after them (Cohn, Mehl, and Pennebaker, 2004).

Recent work by Pennebaker and his colleagues on expressive writing (see Pennebaker, 1997, 2004; Pennebaker, Francis, and Booth, 2001; Pennebaker and King, 1999; Pennebaker, Mehl, and Niederhoffer, 2003) indicate that individuals who use more cognitive processing words, and more emotion words in their personal narratives, show better subsequent improvement. Through the use of these words, individuals are creating a more causal explanatory framework and greater emotional integration for understanding the event. That is, the ability to create more coherent narratives is highly beneficial for subsequent well-being.

In general, the individuals need to make sense of the traumatic events. The discussions about the causes, the possibility of prevention, and the attribution of responsibilities

are a part of the reactions after the terrorist attacks. More important, expressive writing may permit individuals to understand the extreme negative event, since they make sense of the negative experience, explore sources of emotion, and put the self-regulation feedback system back on track. Specifically, expressive writing allows people to integrate the external and internal aspects of events (who, what, where, and why of the event) (Fivush, Edwards, and Mennuti-Washburn, 2003; Frattaroli, 2006).

In sum, we hypothesize, on the one hand, that writing about the events in an organized narrative would help to understand and cope with the collective traumatic event, and on the other hand, that expressive writing produced after S11 and M11 may be similar, in accordance with the following pattern: in the early days after traumatic events there are high levels of both thinking about them and talking about them; after some three-four weeks, talking decreases, thinking increases and more symptoms appear. After two months, talking and thinking decrease to similar levels and symptoms are few, though here we shall consider only the period between 3 and 8 weeks after the terrorist attacks in question. Thus, the present study has the following goals: to analyze the information about thoughts and feelings after S11 and after M11; to examine the cultural differences influencing use of pronouns and social processes after terrorist attacks; and to analyze the development of communicative language dynamics during the inhibition phase after the terrorist attacks in the USA and Spain.

## Method

### *Design*

The design was non-experimental. In contrast to other written disclosure studies, the present study did not take place within a controlled laboratory setting. The research is a descriptive study of populations through survey research (Montero and León, 2007) edited according to the norms established by Ramos-Álvarez, Moreno-Fernández, Valdés-Conory, and Catena (2008).

### *Participants and procedure*

- Sample 1. The initial American sample consisted of 1121 subjects, though 71.01% of participants were not included because they had not completed the questionnaire between the beginning of the third week and the end of the eighth week after the terrorist attacks, meaning that they were not comparable with the Spanish participants (see below). The final American sample numbered 325. Mean age was 33.58 years ( $SD = 13.52$ ); 69.90% were female, 29.70 % were male and .40 % did not report their sex. They had written for a mean time of 11.76 minutes ( $SD = 4.57$ ). Participants were general population that responded to the questionnaire on the internet. They wrote about their impressions of the S11 attacks on the website designed for the study ([www.psy.utexas.edu/attack](http://www.psy.utexas.edu/attack)). The website was open for 6 days after the terrorist attacks (17/09/2001). Participants also gave information on their sex, age, city and nationality. With a view to being able to make a comparison according to the week in which the narratives were written, they were classified by week. Each group has a minimum of 35 cases

(week 1;  $n = 69$ ), (week 2;  $n = 57$ ), (week 3;  $n = 53$ ), (week 4;  $n = 65$ ), (week 5;  $n = 43$ ), and (week 6;  $n = 38$ ). Participants were asked to write about the terrorist attacks, with the following question: «What are your thoughts and feelings about the event?» The research was conducted by J.W. Pennebaker and Sherlock Campbell.

- Sample 2. The participants were inhabitants of different Spanish cities or regions -Basque Country (23.10%), Burgos (22.50%), Catalonia (8%), Madrid (17.40%), Granada (20%), Salamanca (5%), and Valencia (4%)-. The initial sample consisted of 880 subjects. The study was carried out from 3 weeks after M11 (30/03/2004) until 2 months after the terrorist attacks (25/05/2004). University students of Social and Human Sciences completed a questionnaire during their lessons (34%,  $n = 300$ ) and recruited two other persons from the general population (66%,  $n = 580$ ). All the participants were volunteers and were debriefed after they had completed the questionnaire. The instructions were: «Please write, in as clear and organized way as possible, what you felt, thought and did in relation to the events of March 11th in Madrid. Think for a few minutes before starting to write. Write for a minimum of 10 minutes and a maximum of 15. Do not worry about grammar or formal aspects. Everything you write will be completely confidential. Please use the back of this page if you need more space». Respondents also gave socio-demographic information on their age, sex, city and nationality, and some other data that were not used in the American sample (*e.g.*, emotional activation, well-being, etc. see Fernández and Páez, 2008). That is, the items used in this sample were not comparable with the provided in the sample 1. They were asked about their feelings, thoughts and behaviors after M11. The original sample consisted of three groups randomly assigned: one group being asked to write from their personal perspective about the attacks ( $n = 335$ ) and the other group from the perspective of the general population ( $n = 312$ ); a control group wrote about their recent social life ( $n = 233$ ). Participants were assigned at random to the writing groups. However, for this study, only the first group, those writing from their personal perspective was considered. Thus, 62.16 % of the participants from the Spanish study were excluded from Study 2, for two reasons: a) they had not completed the questionnaire between the third and eighth week after the terrorist attacks (.90%), and b) they did not belong to the personal reactions group (61%). The final sample included 333 subjects, 71.30 % women and 28.70 % men, with an age range of 17 to 69 years ( $M = 30.50$ ,  $SD = 12.98$ ). The set of accounts was classified by week according to the day on which the questionnaire was applied - (week 1;  $n = 95$ ), (week 2;  $n = 71$ ), (week 3;  $n = 50$ ), (week 4;  $n = 42$ ), (week 5;  $n = 39$ ), and (week 6;  $n = 36$ ) -. Participants wrote for a minimum of 10 and a maximum of 15 minutes ( $M = 12.09$ ,  $SD = 3.02$ ). That is, the Spaniards and the Americans showed a similar mean of minutes when writing about the terrorist attacks ( $t_{(658)} = 2.01$ ;  $p > .01$ ).

Thus, finally, there were similar numbers of participants in the two samples ( $n = 325$  USA, and  $n = 333$  Spain), with similar age and sex distribution, since we decided to constitute the second sample in a comparable way. Furthermore, all had written their

accounts between 21 days and 2 months after the respective terrorist attacks. The difference was that the participants from the USA wrote online (internet), while the Spanish texts were written on paper. The online procedure has been dealt with in previous studies, and Cohn *et al.* (2004) noted that research on Internet usage estimates at 8,820,000 the number of Americans who have written on internet at least once (Internet Activities, 2003). Furthermore, in recent research, Pennebaker *et al.* (2003) did not find significant differences in feelings and emotions between online accounts and those written on paper.

### *Linguistic analyses*

To obtain of the linguistic dimensions of the accounts, all texts were analyzed with the computer-based text analysis program Linguistic Inquiry and Word Count (*LIWC*; see Pennebaker *et al.* (2001) for the description of program). This software analyses text files on a word-by-word basis using an internal dictionary of more than 2,200 words for the English dictionary (Pennebaker and King, 1999, p.1298), and more than 2,300 words for the Spanish dictionary (Ramírez-Esparza, Pennebaker, García, and Suría, 2007). These are organized into over 72 language categories, including linguistic dimensions (words per sentence, articles, pronouns, etc.), psychological processes (*e.g.*, affective, cognitive and social reactions), relativity (time and space), personal concerns (occupation, leisure activity, physical states, etc.), and one appendix with the swearwords and fillers. Note also that many of the categories are hierarchically arranged, so that, for example, all the words in the affective category come from the negative (fear, anger, sadness) and positive (happy) emotions. Furthermore, the research could incorporate more categories in the dictionary (*e.g.*, Mehl and Pennebaker, 2003, included «the preoccupation with 9/11»). Finally, each word is assigned to specific linguistic categories. For example, the word «cried» falls into four categories: sadness, negative emotion, overall affect, and past-tense verb. Output is expressed as a percentage of the total words in the text sample. That is, if the number for the category «pronouns» is 9.22, this means that 9.22% of the total words in the text were pronouns. The only categories that do not reflect percentages are «word count», «words per sentence» and «words found by dictionary».

As can be seen, there are many dimensions. Moreover, the program permits users to define their own categories, so that we were able to include a new dimension called «Terrorist attacks», with words such as Atocha (the location of the main attack in Madrid), IFEMA (the Victim Crisis Centre in Madrid), Quaeda, Osama, and so on. This category was taken into account once we had carried out an inter-rater agreement analysis, obtaining a *Kappa* coefficient of .89, which represents significant agreement ( $z = 7.10, p < .01$ ).

### *Analysis strategy*

First, in order to confirm that all texts referred to the terrorist attacks, the accounts were read. The narratives from Spain were transcribed onto computer by research assistants. Second, to determine the degree to which the linguistic processes of the American and Spanish samples were similar or different, we performed a multivariate

analysis of covariance (ANCOVA) on all the LIWC categories as dependent variables, with group (S11 and M11) as the independent variable, and sex and «word count» as covariates. We included the sex variable, because there were more women than men in the samples, and the «word count» dimension was covariate, because there was significant difference between groups  $-M_{(S11)} = 223.13$ ,  $SD=279.16$  and  $M_{(M11)} = 152.31$ ,  $SD=79.42$ ;  $F_{(1, 664)} = 20.41$ ;  $p < .001$ -, that is the American participants wrote more words than the Spaniards. A possible explanation for this is that they used the Internet rather than paper to write their texts, and moreover, the Spanish participants wrote more words of more than 6 letters than the Americans  $-M_{(S11)} = 16.52$ ,  $SD = 7.20$  and  $M_{(M11)} = 22.55$ ,  $SD = 5.28$ ;  $F_{(1, 664)} = 153.40$ ;  $p < .001$ -. Third, to examine the association between psychosocial processes, Pearson correlations by LIWC dimensions were carried out, and to analyze the relation between the sex variable and the LIWC dimensions, Spearman's rho correlations were employed. Correlations were made for each one of the countries separately. Finally, in order to analyze the development of linguistic communication,  $2$  (group: S11; M11)  $\times$   $6$  (week)- the multivariate analysis of variance (MANOVAs) were conducted on the LIWC categories as dependent variables.

## Results

### *Comparison between S11 and M11 in linguistic variables*

All accounts were transcribed and analyzed with the LIWC program. Table 1 presents the results of the multivariate analysis of covariance, including effect sizes. As can be seen, the differences are observed in several categories (.01 level of significance was used for all statistical tests, all  $ps < .01$  or  $< .001$ ).

Taken together, the results offered here indicate that there were more social processes in the Spanish sample. Even so, there was no significant difference between countries in the category «other references to people» (1st person plural, 2nd, and 3rd-person). However, mean of total pronouns used was higher in the US sample than in the Spanish one. US participants used the first person more frequently, while the Spanish participants more often used the second and third-person pronouns.

The analysis also showed that the affective or emotional processes were different for each group: the US participants wrote less about affective or emotional processes than the Spaniards. Even so, the positive and negative emotions showed no significant differences by group in any subcategories *-i.e.*, positive emotions (positive feelings, optimism and energy), and negative emotions (anxiety or fear, anger, and sadness or depression)-. Thus, the significant result of «affective or emotional processes» was obtained by computing the two factors (positive and negative emotions). Furthermore, the effect size  $\eta_p^2$  of all emotional categories was low.

With regard to cognitive processes, the multivariate analyses showed differences for causation (*e.g.*, because, effect, hence), discrepancy (*e.g.*, should, would, could), and certainty (*e.g.*, always, never). The «causation» dimension presented higher levels for the Spanish sample, while the «discrepancy» and «certainty» dimensions were higher for the US sample.

The Spanish participants wrote more about «death and dying» than the USA participants, and the category «terrorist attacks» scored higher in the US sample.

**TABLE 1.** Differences between September 11<sup>th</sup> and March 11<sup>th</sup> on Linguistic Inquiry and Word Count variables.

	<i>September 11<sup>th</sup></i> <i>(n = 322)</i>		<i>March 11<sup>th</sup></i> <i>(n = 329)</i>		<i>F</i> (1, 651)	$\eta_p^2$
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
<i>Standard linguistic dimensions</i>						
Words per sentence	20.41	(.85)	28.87	(.86)	48.26**	.07
% words found by dictionary	71.99	(.77)	82.37	(.78)	87.96**	.12
Total pronouns	11.28	(.24)	7.83	(.24)	100.33**	.13
1st, person singular	5.22	(.16)	2.77	(.16)	116.38**	.15
1st, person plural	2.47	(.12)	.51	(.12)	130.75**	.16
Total first person	7.69	(.17)	3.22	(.18)	322.77**	.33
Total second person	.14	(.04)	.61	(.04)	66.10**	.09
Total third person	1.30	(.10)	3.59	(.10)	262.11**	.28
<i>Psychological processes</i>						
<i>Affective or Emotional Processes</i>						
Positive Emotions	5.86	(.22)	6.75	(.22)	7.89*	.01
Negative Emotions	1.69	(.08)	1.51	(.08)	2.76	.00
<i>Cognitive Processes</i>						
Causation	4.08	(.20)	4.46	(.20)	1.70	.00
Insight	7.43	(.21)	11.32	(.21)	169.22**	.20
Discrepancy	1.04	(.07)	2.10	(.07)	104.09**	.14
Inhibition	2.58	(.10)	2.75	(.10)	1.45	.00
Tentative	2.16	(.10)	.40	(.10)	146.23**	.18
Certainty	.39	(.04)	.30	(.05)	1.85	.00
<i>Social Processes</i>						
Communication	1.96	(.09)	1.97	(.09)	.12	.00
Other references to people	1.17	(.06)	.95	(.06)	6.66*	.01
Friends	7.02	(.21)	10.80	(.22)	151.95**	.19
Family	.83	(.07)	2.13	(.07)	161.17**	.20
Other people	4.19	(.16)	4.70	(.17)	4.82	.01
Relativity	.10	(.03)	.35	(.03)	47.93**	.07
Motion	.31	(.05)	.68	(.05)	33.10**	.05
Personal concerns	1	(.07)	1.31	(.07)	10.59**	.02
Death and dying						
<i>Appendix: terrorist attacks</i>						
September 11 <sup>th</sup> / March 11 <sup>th</sup>	1.05	(.07)	1.16	(.07)	1.41	.00
	.35	(.04)	.57	(.04)	15.62**	.02
	5.45	(.18)	2.28	(.16)	114.40**	.15

*Notes.* Table adjusted means using sex and «word count» as covariates. Shown in *italic* are the hierarchical categories (Pennebaker *et al.* 2001, *pp.* 17-18), All the means refer to the total percentage of words, For example, if the number for the category «pronouns» is 9.22, this means that 9.22% of the total words in the text were pronouns, The only categories that do not reflect percentages are «word count», «words per sentence» and «words found by dictionary». ANCOVA,  $\eta_p^2$  effect size, \* $p < .01$ ; \*\* $p < .001$

Although the most important finding is the higher level of social processes and the second and third-person pronouns in the Spanish sample, it is also important to note the absence of differences in the following cognitive process categories: «insight» (*e.g.*, thinking, considering), «inhibition», and «tentative» (*e.g.*, maybe, perhaps). Furthermore, there was no significant difference between countries in the «motion» factor (*e.g.*, walk, move, go). Finally, with regard to the effect size (Frías, Llobell, and García, 2000), only in the case of four variables («total first person», «total third person», «cognitive processes», and «communication») was the result worthy of note ( $\eta_p^2$  ed .20).

*Correlations among the variables*

To study the relationships between psychological processes we analyzed the correlations between the variables for the USA and Spain (see van de Vijver and Leung, 1997, for proposed guidelines on cross-cultural methodology). An examination of Table 2 suggests that the patterns of psychological processes were relatively similar.

**TABLE 2.** Correlations among Linguistic Inquiry and Word Count variables by September 11<sup>th</sup> and March 11<sup>th</sup>.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) SEX		-.17**	-.03	.07	-.02	-.15**	-.03	-.16**	.14**	-.02	-.05	.06	-.02	.01	-.02	-.08
(2) AFFECT	.10		.15***	.03	.09	.92***	.60***	.69***	.44***	-.07	.06	.03	-.12	-.24***	-.01	.16**
(3) POSEMO	-.04	.31***		.45***	.67***	-.15**	.00	-.14**	-.10	-.02	-.09	-.13**	.08	-.02	-.16***	-.23***
(4) POSFEEL	.07	.13**	.41***		.04	-.12	-.04	-.09	-.12	-.05	-.08	-.04	.13**	-.13**	-.08	-.23***
(5) OPTIM	-.08	.27***	.75***	.12		-.10	-.03	-.14**	.00***	-.01	-.03	-.01	-.02	.04	-.10	-.19***
(6) NEGEMO	.17**	.92***	-.07	-.04	.00		.63***	.71***	.43***	-.05	.11	.07	-.12	-.22***	.07	.18***
(7) ANX	.12**	.21***	-.10	-.09	-.06	.25***		.34***	.18***	-.01	.01	-.04	-.07	-.07	-.07	.14**
(8) ANGER	.02	.76***	-.05	-.05	-.04	.81***	.09		.07	-.13**	.21***	.04	-.14**	-.16***	-.01	.34***
(9) SAD	.14**	.35***	-.02	-.01	.02	.37***	-.08	-.06		-.08	.00	.05	-.13**	-.17***	.01	.07
(10) INSIGHT	.10	-.07	-.06	.00	-.04	-.06	.12	-.07	.00		-.12	.05	.13**	.03	-.04	-.13**
(11) INHIB	-.04	.08	.11	-.09	.02	.04	.04	.20***	-.01	.10		-.04	-.14**	-.08	.00	-.06
(12) TENTAT	.12*	.02	.15***	.16***	.03	-.05	-.04	-.04	.02	.18***	-.05		-.02	-.02	.07	.05
(13) OTHREF	-.02	.25***	.27***	.12	.26***	.16***	-.06	.21***	-.02	.02	.09	.03		-.05	.06	-.12
(14) MOTION	.12*	-.07	-.01	.12	-.06	-.06	-.03	-.10	-.11	.13**	-.06	.00	.22***		-.10	-.07
(15) DEATH	.04	.10	.07	.04	.02	.08	.00	.06	.08	.13**	-.06	.12	.04	.01		.10
(16) ELEVEN	-.05	.11	-.18***	-.20***	-.22***	.14**	.15**	.31***	.04	-.15**	-.05	.02	-.11	-.06	.08	

*Notes.* (1) Sex: (1 = Male and 2 = Female). Linguistic Inquiry and Word Count factors: (2) AFFECT = Affective or emotional processes, (3) POSEMO = Positive emotions, (4) POSFEEL = Positive feelings, (5) OPTIM = Optimism and energy, (6) NEGEMO = Negative emotions, (7) ANX = Anxiety or fear, (8) ANGER = Anger, (9) SAD = Sadness or depression, (10) INSIGHT= Insight, (11) INHIB= Inhibition, (12) TENTAT = Tentative, (13) OTHREF = Other references to people, (14) MOTION = Motion, (15) DEATH= Death and dying, and (16) ELEVEN = Preoccupation with September 11<sup>th</sup> and March 11<sup>th</sup>. Pearson product-moment coefficients and Spearman’s rho correlations between sex and LIWC variables. Correlations for S11 are below the diagonal ( $n = 319-325$ ), correlations for M11 are above it ( $n = 329-333$ ). \*\*  $p < .01$ ; \*\*\*  $p < .001$ (two-tailed test)

Correlations between sex and LIWC factors (negative emotions, anxiety or fear, sadness or depression, tentative, and motion) were significant for the USA participants, while for the Spanish participants sex was negatively associated with affective or emotional processes, negative emotions and anger, though for «sadness or depression» the Spanish women obtained the same pattern of association as the US women (see

Table 2). To examine the average of these psychological processes by sex, ANOVAs were carried out (all  $ps < .01$ ). The results showed that in the US sample there were significant sex differences in affective processes -females  $>$  males ( $M = 4.31$ ;  $SD = 4.50$   $>$   $M = 3.15$ ;  $SD = 2.45$ ), while Spanish males showed more anger -males  $>$  females ( $M = 2.62$ ;  $SD = 2.71$   $>$   $M = 1.77$ ;  $SD = 1.81$ ), and in consequence the category «affective or emotional processes» presented higher values for males.

As regards the correlations among affective or emotional processes, this hierarchical category was associated with its subcategories. Furthermore, negative emotion correlated strongly with affective or emotional processes ( $r = .92$ ;  $p < .001$ ) in both countries. Also, anger and sadness correlated with «affective or emotional processes» similarly for the two samples, that is, the effect size showed a similar pattern of relations: first anger and second sadness.

In accordance with the theory of expressive writing, the negative emotion (anger) correlated significantly with the cognitive process (inhibition) in both countries -  $r_{(332)} = .21$ , and  $r_{(323)} = .20$ ;  $p < .001$ . Furthermore, this negative emotion also correlated with the insight category in the Spanish sample -  $r_{(331)} = -.13$ ;  $p < .01$ . That is, negative emotions words were associated with cognitive processes; these correlations may predict better understanding of negative events, such as terrorist attacks.

As far as cognitive processes are concerned, although the ANCOVA showed differences between the USA and Spain (see Table 1), the analysis between variables showed that the subcategories were associated more or less similarly; in both countries, for example, «tentative» was associated with more study variables than «insight».

The category «motion» showed no significant differences by group, as can be seen in Table 2, but in the Spanish sample it correlated with affective or emotional processes, while in the US sample it was associated with «insight» -  $r_{(324)} = .13$ ;  $p < .01$  and «other references to people» -  $r_{(324)} = .22$ ;  $p < .001$ .

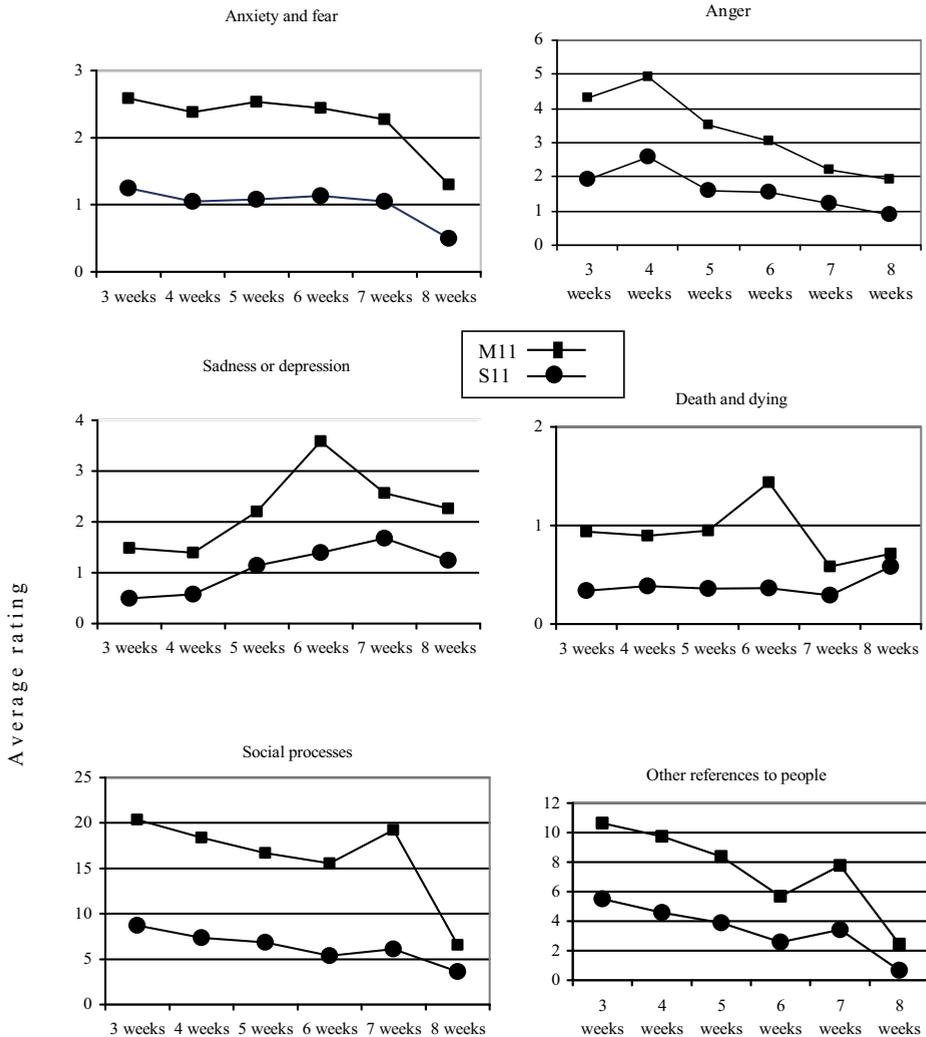
Although the LIWC category «personal concerns» (*i.e.*, occupation, leisure activities, money and financial issues, metaphysical issues, and physical states and functions) was not of central interest in this study, the subcategory «death and dying» was analyzed in view of its connection with the topic in question. Thus, in the Spanish sample it was associated negatively with positive feelings, that is, when participants wrote about death or dying in their accounts they used fewer words about positive feelings -  $r_{(333)} = -.16$ ;  $p < .01$ .

Finally, preoccupation with M11 correlated significantly and positively with «negative emotions», «anxiety or fear», and «anger». This category also showed negative associations with «positive emotions», «positive feelings» and «insight». The results are shown in Table 2, where it can be seen how «affective or emotional processes» correlates positively with preoccupation about terrorist attacks – that is, Spanish participants writing about their preoccupation with terrorist attacks used more words related to negative emotions (anger and fear). Preoccupation with S11 correlated significantly with the same variables, and this indicator was also associated with affective or emotional processes.

*Additional analysis*

To obtain an idea of development in the use of linguistic communication from the third to the eighth week after the terrorist attacks in the two countries, MANOVAs - 2 (nation) x 6 (week) - were carried out. The results are shown in Figure 1.

**FIGURE 1.** Comparison of linguistic categories between September 11<sup>th</sup> and March 11<sup>th</sup> according to expressive writing week.



*Notes.* Average of Linguistic Inquiry and Word Count categories (anxiety and fear, sadness or depression, anger, social processes, other references to people, and death and dying) between the third and eighth week after the terrorist attacks in the two countries. MANOVAs (2 nations x 6 weeks, between the third and eighth week after the terrorist attacks). *F*s and *p*s no significant values (data not shown).

In general terms, for the following six variables («anxiety and fear», «anger», «sadness or depression», «social processes», «other references to people», and «death and dying») no differences were found between the third and eighth weeks, suggesting that communication style is consistent throughout this period, which corresponds to the second phase of reaction to the trauma, the so-called inhibition phase.

### Discussion

The results presented here suggest that expressive writing after the terrorist attacks in the USA and Spain have similar characteristics as regards emotional processes. Thus, women in both countries express greater sadness or depression than men. Participants in the two studies do not differ with regard to the positive and negative emotions expressed in their accounts. As expected, there are more negative emotions, even though participants do also express some positive emotions. The terrorist attacks evoke strong emotions (anger, sadness, fear, etc.), and amid this amalgam of negative emotions, positive emotions seem unwarranted, even inappropriate. Even so, positive emotions are known to co-occur alongside negative emotions during stressful circumstances. Indeed, intermixed experiences of positive emotions were seen as justifiable after the attacks (Fredrickson, Tugade, Waugh, and Larkin, 2003).

Taking into account these results as a whole, it can be inferred that, in the wake of the terrorist attacks, people react similarly in emotional terms, even though it cannot be assumed that there are no cross-cultural differences as regards the written expression of emotions. Future research with representative samples in relation to other terrorist attacks (London, Casablanca, Bali, etc.) would allow a fuller analysis of this question.

The analyses also confirm that greater use of cognitive processes, probably associated with giving a narrative explanation of the events, correlates with anger. This emotion derives mainly from considering the situation as unjust, and is associated with cognitive words such as «block». Across multiple studies (see meta-analysis by Frattaroli, 2006) there is evidence to suggest that the use of certain cognitive words (*e.g.*, cause, know, perhaps, because, effect, block or constrain) in expressive writing is adaptive after a negative event, since expressing feelings in words helps cognitive processing of the traumatic situation.

As regards the differences between the S11 and M11 attacks, and in congruence with the relatively more collectivist Spaniard culture, social processes («communication», «friends», «family» and «other people») were more present in the Spanish texts. This significant difference in the use of language between the Spanish and US participants is also reflected, for example, in the demonstrations that took place in different Spanish cities, and in the way the media repeatedly showed the dramatic images of the M11 events. Such social processes did not occur with the same intensity after the S11 events in the USA.

The linguistic analysis confirmed that the pronoun «they» is more frequent in the Spanish sample, and that the pronoun «I» is more common in the US sample, along with the stereotypes. But differences in the use of pronouns can also be explained by the fact that the Spanish language has a pronoun-drop linguistic structure; thus, the US sample shows higher levels of pronoun use, and specifically, more frequent use of the

first person singular (Ramírez-Esparza *et al.*, 2007). However, associated with the finding of greater use of words related to social processes, this pattern suggests a higher salience of the collective self in the Spanish sample, congruent with a culture that is more collectivist than the USA.

The dynamic of feeling and sharing was largely similar in the two samples during the period between week 3 and week 8 after the terrorist attacks, an illustration of this being the way that the relevance of interpersonal coping with collective trauma was reflected in emotional processes («anxiety and fear», «anger» and «sadness or depression»). These results on the same level of depression in the two contexts corroborate those obtained by Miguel-Tobal *et al.* (2006). Moreover, there were no significant differences either for the categories «social processes» and «other references to people». It should be recalled that the category «social processes» did show differences between S11 and M11, with significant effect size, although, analyzing these processes by weeks confirms that they remain stable in this second, inhibition phase. Finally, the «death and dying» dimension also showed no significant differences, and even though in the sixth week the Spanish participants used more words related to this category, this may be associated with the immolation of the terrorists in Leganes (a suburb of Madrid). In general, these results are important because they show that during this second phase participants maintained the same pattern of expressive writing, though in future studies with representative samples it would be advantageous, on the one hand, to corroborate whether this stability between weeks 3 and 8 is maintained, and on the other, to analyse how expressive writing evolves between this second phase and the adaptation period.

Similarities were substantial between the US and Spanish participants in the affective or emotional content of accounts of reactions to the S11 and M11 terrorist attacks. However, we also found cultural differences: the more collectivist Spaniards reported higher levels of social processes and used more third-person pronouns; the more individualist American participants were more likely to use first-person pronouns. This pattern of results is coherent with those of previous cross-cultural studies (Lee *et al.*, 2000; Lehman *et al.*, 2004). The results also suggest that people sharing collectivist values stress more communal coping as a resource to cope with collective traumatic events. At the same time, interpersonal social support, or references to others, was of similar importance for relatively more collectivist and individualist cultures. Future studies should consider the possibility of comparing these psychological processes related to negative events in different countries and cultures.

There are limitations to this study. For example, there was only one session of writing and we did not include a non-writing control, as was the case in previous research. Another limitation is that this study does not use self-report measures, such as emotions scales, well-being questionnaires and other measures for psychological process after negative events. Moreover, the samples are not representative, so that we cannot generalize these results to the Spanish and US populations.

In conclusion, it is logical to assume that expressive writing across cultures will reflect the social context and the situation in which individuals are immersed. However, we believe that the results of this study have implications for research on this issue, since participants wrote what they felt and thought at the very moment of the event,

without their being specifically asked to recall the terrorist attacks. Moreover, analysis of the linguistic characteristics of expressive writing might reduce some biases associated with self-report measures. In sum, writing about traumatic events could be an adaptive strategy. Accounts that explain what happened, that emphasize the positive (personal growth and improved relations with others –as positive responses to the trauma) and that accept negative emotions without repressing them but without overly stressing them, are beneficial accounts. Therefore, the use of expressive writing would allow us to understand people's feelings and thoughts in the wake of terrorist attacks.

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