

PSYCHOLINGUISTIC MARKERS OF AUTOBIOGRAPHICAL AND TRAUMATIC MEMORY

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Abstract. This study examines psycholinguistic structure of autobiographical and traumatic narratives representing positive emotional and stressful traumatic life events. The research applied the cross sectional, between subjects design utilizing the independent variables of external agent they, space and time and dependent variable of word number in traumatic narratives for multiple regression analysis. The approval letter to recruit the participants through SONA system in 2015–2016 academic year was obtained from Institutional Review Board of Oklahoma State University (USA). 64 undergraduates of nonclinical setting, females (n=37), males (n=27), mean age was 19.43 (SD=1.37) were recruited. PTSD-8: A Short PTSD Inventory assesses PTSD, the Linguistic Inquiry and Word Count (LIWC) analyzes traumatic and autobiographical narratives in terms of linguistic units and psychological meaningful categories. The results indicate that there are significant differences between pronoun *they* as external agent of proposition and psychological categories of *negative emotions* and *anxiety* in traumatic and autobiographical narratives. The frequency of these categories is higher in traumatic narratives compared with autobiographical narratives. External agent *they*, category of *time* and *space* taken together significantly contribute to word number in traumatic narrative. There is a negative correlation between *focus on the past* and word *count*, and positive correlation between *social* category and *word count* in traumatic narrative in nonclinical sample. To sum up, propositional structure of traumatic memory of individuals without PTSD is represented by external agent and context (place and time) taken together. Considering time as a significant negative predictor of creating traumatic narrative, temporal processing without overestimation of time is an important factor of avoiding PTSD. The principal theoretical implication of this study is that traumatic memory might be examined through psycholinguistic markers represented by propositional structures and psychological meaningful categories of traumatic narratives in individuals from nonclinical and clinical settings.

Keywords: *traumatic memory, autobiographical memory, PTSD, propositional structure, LIWC.*

Засєкіна Лариса, Кєннісон Шіліа, Засєкін Сергій, Хворост Христина. Психолінгвальні маркєри автобіографічної й травматичної пам'яті.

Анотація. Мета дослідження полягала в теоретичному й емпіричному вивченні пропозиційної структури автобіографічної й травматичної пам'яті як сховища позитивних та травматичних життєвих подій. Дослідження використовує вивчення наративів незалежних вибірок із використанням регресійного аналізу, де категорії екстернального агента вони, часу і місця є залежними змінними, а кількість слів травматичного наративу – незалежною змінною. Дослідження здійснювалося за згодою Комісії з етики проведення психологічних досліджень Державного університету Оклахоми впродовж 2015–2016 навчального року. У дослідженні взяло участь 64 студенти, дівчат ($n=37$), хлопців ($n=27$), середній вік 19,43 ($SD=1,37$). Для емпіричного дослідження використовувався експрес-опитувальник ПТСР (PTSD-8: A Short PTSD Inventory), а також комп'ютерна програма Linguistic Inquiry and Word Count (LIWC) для визначення лінгвальних і психологічних категорій у тексті. У результаті, встановлено значущі відмінності у показниках категорій екстернального агента *вони* та психологічних категорій *негативних емоцій* та *тривожності* у травматичному та автобіографічному наративах. Травматичні наративи мають вищу частотність цих категорій, так само як і більшу кількість слів наративу загалом. Результати регресійного аналізу показують, що категорії екстернального агента, часу і місця є значущими предикторами кількості слів травматичного наративу, тому ми можемо вважати ці категорії як одиниці пропозиційної структури, і відповідно, психолінгвальні маркєри травматичної пам'яті. Також встановлено негативний кореляційний зв'язок між кількістю слів у травматичному наративі і фокусом на минулому часові, та позитивний кореляційний зв'язок між *соціальною категорією* та *кількістю слів* у травматичному наративі. Отже, отримані результати можуть використовуватися для клінічних і неклінічних досліджень травматичної пам'яті на основі пропозиційних структур, представлених у травматичних наративах. Коректне темпоральне сприймання, уникання переоцінки минулого та переважання екстернальних над інтернальними агентами становлять пропозиційну структуру травматичної пам'яті індивіда, травматичний досвід якого не розвинувся у ПТСР.

Ключові слова: *травматична пам'ять, автобіографічна пам'ять, ПТСР, пропозиційна структура, LIWC.*

1. Introduction

The majority of the literature investigating traumatic memory pertains to Posttraumatic Stress Disorder (PTSD) (Berntsen & Rubin, 2002; Matos & Pinto-Gouveia, 2010) or even identifies traumatic memory with PTSD (Berntsen, Rubin, & Siegler, 2011).

According to epistemological studies of PTSD, association of traumatic memory with PTSD is not so obvious. Only about 11 % of the general population suffers from PTSD as a severe mental disorder following a traumatic event after at least one month (APA, 2013). Notwithstanding the fact that about 40–90 % of the general population experience one traumatic event during their life (Silva da et al., 2016). It means that at least about 29 % traumatized people cope with mental traumas successfully without experiencing PTSD. Together, these studies indicate that traumatic memory might constitute a risk factor for PTSD but does not determine it.

Another much debated question is whether stressful traumatic events and negative emotional life events could be identified (Berntsen et al., 2011; Lorenzoni, Silva, Poletto, & Kristensen, 2014). There is a relatively small body of literature which concerns the difference between traumatic memories (stressful

traumatic events) and non-traumatic experience (positive emotional events, neutral events, and negative emotional events) (Sotgiu & Rusconi, 2014). Several lines of evidence suggest that exposure to traumatic events vs. non-traumatic events interferes with correct encoding and storage of traumatic information, causing flashbacks, isolated sensory modalities, and autonomous mental processes, aligned with implicit memory and PTSD symptoms (Van der Kolk & Fisler, 1995).

Drawing on an extensive range of sources, the authors found different ways in which positive, negative and traumatic events are encoded and recalled. Some findings show the difference in frequency with which participants share the three types of events with their family (Byrne, Hyman, & Scott, 2001). Positive events were discussed more frequently than negative ones, the latter were talked more frequently than traumatic events. The discrepancy of frequency might characterize the different storage and retrieval of information related to these events. While there have been extensive investigations of PTSD symptoms and treatment, little is known about how the autobiographical and traumatic memories are arranged and organized; and what are the mechanisms of transforming traumatic memory into PTSD (Lorenzoni et al., 2014).

The aim of this article is to examine the psycholinguistic structure of autobiographical and traumatic narratives representing positive emotional and stressful traumatic life events, correspondently. In this study we are particularly interested in the distribution of the different propositional units and psychological meaningful categories in traumatic vs. autobiographical narratives, and capture the propositional representation of traumatic experience. Specifically, we are interested in investigating if the distribution of the propositional units amplifies the cognitive and emotional distortions of individuals with traumatic memory. At this point, it is important to admit that verbal expressions are not completely isomorphic to memory representation. Bauer (2015) argues that life story or life narrative shows not autobiographical memory per se, but rather its dynamics. Nevertheless, narrative organization takes autobiographical memory as its raw material and serves as an expression of autobiographical memory structure.

1.1. Mental representations of traumatic and nontraumatic life events in individual memory

Previous research of autobiographical and traumatic memories has established a few contrasting themes: trauma theory, trauma superiority theory; trauma equivalency theory (Berntsen, 2009; Sotgiu & Rusconi, 2014). Data from the first two theories suggest that traumatic memory has specific characteristics, notably vividness, sensory components and memory quality. Trauma memory theory implies that representation of the traumatic event is quite different from autobiographical memory. Traumatic events are encoded with intensive emotional arousal, therefore, they become easily accessible for involuntary recalls and very hard to access for controlled voluntary recalls.

Trauma equivalency theory is linked to general retrieval model (Norman & Bobrow, 1979) and refers to the storage and the recollection of stressful traumatic events in terms of general memory processes. Furthermore, the involuntary

memories are not considered anymore as an exclusively traumatic experience connected with PTSD, but can occur frequently in a daily life among healthy individuals and constitute a part of autobiographical memory (Hague & Conway, 2001; Rasmussen, Ramsgaard, & Berntsen, 2015).

While not all people experience a traumatic event or perceive it as traumatic, all of them are able to recollect the important events from their life and since early childhood develop their autobiographical memory. Autobiographical memory differs from episodic memory for its relevance for an individual's narrative life (Rubin, Dennis, & Beckham, 2011), and discrete, verbal and long-lasting character (Bauer, 2015). Traumatic memory differs, on the one hand, from autobiographical memory, by its fragmented, disorganized and incoherent character, and, on the other hand, from PTSD, by absence of specific symptoms accompanying this mental disorder.

Different theories exist in the literature regarding positive and negative emotional life events as main components of autobiographical memory (Nourkova, Bernstein, & Loftus, 2014). Positive emotional events satisfy the individual's needs and goals and refer to pleasant feelings (e.g. going to a party, receiving present, passing an exam). Negative emotional events ruin an individual's expectations and plans and determine unpleasant feelings (e.g. arguing with a friend, failing an exam) (Sotgiu & Rusconi, 2014). Some events have no distinct hedonic value and can be emotionally neutral (e.g. everyday actions: going to school, university) or having at the same time pleasant and unpleasant feelings. However, these events, firstly, occur very rarely (Scherer, Wrantik, Sangsue, & Tran, 2014) and secondly, the autobiographical memory contains the events which are meaningful for the person's life, having positive and negative values for the individual (Rubin et al., 2011).

Evidence consistently suggests that there are no reliable criteria to differentiate negative emotional and traumatic stressful events. However, a number of studies have defined different kinds of mental trauma based on the type of traumatic event (natural disasters, technological disasters, automobile accident) and on the specific victim population (combat veterans, rape victims, victims of domestic violence, victims of child sexual abuse, crime victims) (Meichenbaum, 1994). It is now well established from a variety of studies that a traumatic event is a stressful situation which is characterized by a high risk for individual life and safety, or threat to others' lives (Sotgiu & Rusconi, 2014).

Kubany et al. (2000) investigated the organization of traumatic memory with the Traumatic Life Questionnaire (TLEQ). It includes 22 types of potentially traumatic events, particularly natural disasters, motor vehicle accident, other accidents, warfare or combat, sudden death of close friend or loved one, severe assault by an acquaintance or stranger, witness to severe assault, threat of death or serious bodily harm, robbery involving a weapon, child physical abuse and being stalked, physical abuse by an intimate partner, witness to family violence, life threatening illness for oneself or loved one, miscarriage, and abortion. While TLEQ could assess traumatic memory and stressful traumatic (not negative) life events, it is not an appropriate measure for testing PTSD, since healthy individuals also

possess traumatic memory if their life was threatened in traumatic situations but they have coped successfully with it (Cohen, Mannarino, & Deblinger, 2006).

As noted by Brewin (2007), only appropriate methodology could determine the difference between traumatic and non-traumatic memories among the clinical and nonclinical population. The current study uses the methodology of psycholinguistics to assess autobiographical and traumatic memory in the nonclinical population.

1.2. Autobiographical narrative: how it works

The autobiographical narratives are appropriate material for the assessment of autobiographical memory and traumatic memory. There is a consensus among psychologists that autobiographical narratives, firstly, are able to create the canonical cultural forms and chronological sequence of events describing all thoughts and feelings aligned with them, secondly, express essential attitudes of the person towards self, others and the world (Fivush, Habermas, Waters, & Zaman, 2011). For Miller (1995), narratives express universal human need to communicate with others and to make the world meaningful. Moreover, Miller infers that language can describe even more than people want to tell about themselves.

The majority of studies apply methods and measures used to obtain autobiographical data; particularly the life line interview method, diary studies, life stories, the word-cue method. Narratives express the discursive nature of remembering and have a great potential for deconstructing traumatic memory turning it into autobiographical memory (Bietti, 2014; Zasiakina, 2014). It is in line with the main idea of Vygotsky's sociocultural theory (1978) that cognitive processes are mediated by language; therefore, the "higher mental functions", might be examined through language.

Traumatic narrative is one of the main tools for PTSD treatment in trauma focused cognitive and behavioral therapy (Jensen et al., 2014). In a broader perspective, the traumatic memory may serve as a container for traumatic experience and should be integrated into autobiographical memory through creating traumatic narrative. However, creating event-based traumatic narrative is not enough for reconstructing traumatic memory and enhancing mental health, it is essential to express all thoughts and feelings aligned with the traumatic events and give them meaningful experience (Pennebaker, 1993). Furthermore, distress is not determined by the event per se, but by personal attitude and emotional response to this event. Studies of traumatic narratives emphasize on the importance of cognitive verbs (e.g. to think, to understand, to now) and causal words in reconstruction of traumatic memory and enhancing well-being, since these lexical units capture how deeply individuals reflect over the traumatic event (Pennebaker & Seagal, 1999).

1.3. Propositional structure of individual memory

Anderson & Bower (1974) argue that proposition is defined as an abstract memory representation based on a certain structure and a truth value. Proposition differs from the sentence by its abstract entity and concepts. The propositional model of long-term memory is based on the distinction, on the one hand, between propositions and sentences, and, on the other hand, between concepts and words. We assume that propositional models for autobiographical and traumatic memories

discover the representation of nontraumatic and traumatic events based on a strong imagery and semantic elaborations of propositions of the narratives.

The model of retrieval of propositional information presupposes two options, firstly, accessing memory from all key concepts, connected with propositions, secondly, the searching from one concept for all propositions, defining the target one (Anderson & Bower, 1974). We assume that former processes refer to retrieval of nontraumatic information in autobiographical narrative, whereas the latter processes are associated with reconstructing of traumatic events by individuals with PTSD. Hence PTSD is accompanied with cognitive distortions of traumatic situation, individual attention is focused on a certain element of the event, which triggers involuntary memories or intrusions. Therefore, the majority of propositions in the traumatic narrative can be concentrated around the concept denoting the most painful or vulnerable element of the traumatic event. This concept can be represented as the most frequent unit of propositional structure in traumatic narrative.

Each propositional tree is divided into two sub-trees: a context sub-tree and a fact sub-tree. Further, fact is divided into agent (they, he/she/it) and predicate. The context is represented by time and place. Considering a significant role of self and others in traumatic stressful events, we differentiate internal agents (I, we) and external agents (they, he/she/it). The structure of proposition is aligned with the structure of autobiographical memory proposed by Bauer (2015, p. 206) as a support system of formation, retention and later retrieval of specific events which are spatially and temporally localized and self-erred.

Figure 1 contains the classical example: *In the park, the hippy touched the debutante* for propositional model (Anderson & Bower, 1974).

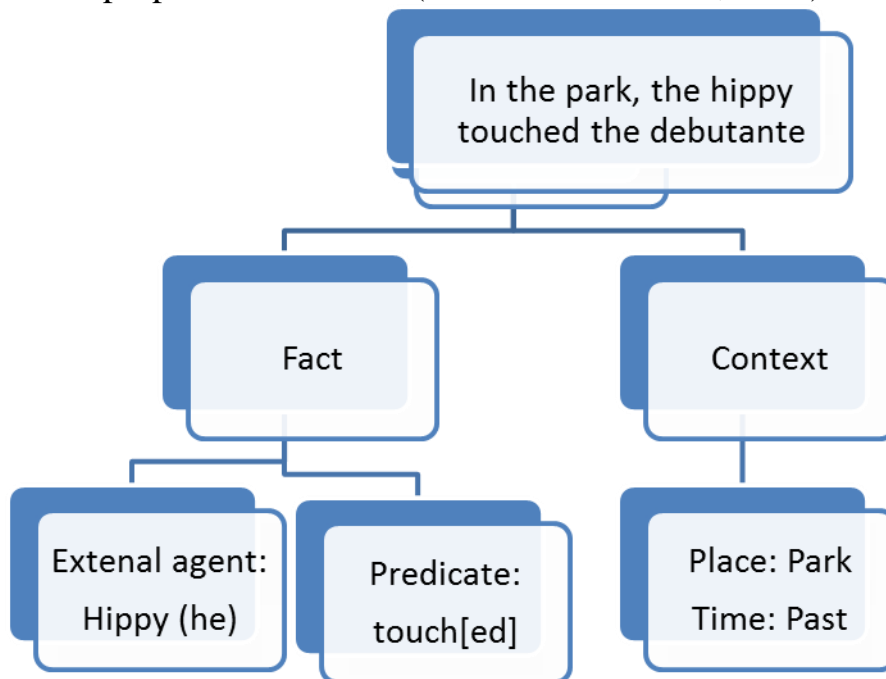


Figure 1. The example of propositional model

Anderson and Bower (1974) argue that past time is explicated by ending *ed* in the Past Indefinite Tense. Since the most autobiographical information is referring to the past because of its retrospective nature, we define time concepts as words aligned with category of time, *day*, *month*, *moment* amongst others.

In the regard of differences between autobiographical and traumatic memory and structure of propositions, the following research questions arise:

RQ1: Are there any significant differences between (propositional structures (linguistic categories of internal/external agents, predicate, place and time) and psychological meaningful categories (positive/negative emotions and anxiety) in traumatic and positive narratives in nonclinical sample?

RQ2: Do external agents, place and time contribute to the word number in traumatic narrative?

RQ3: Are there any associations between word number and linguistic and psychological meaningful categories in traumatic narratives in nonclinical sample?

2. Method

2.1. Participants

The approval letter to recruit the participants through SONA system in 2015–2016 academic year was obtained from Institutional Review Board of Oklahoma State University (USA). 64 undergraduates of nonclinical setting, females (n=34), males (n=27), mean age was 19.43 (SD=1.37) from the Department of Psychology were recruited.

2.2. Measures

PTSD-8: A Short PTSD Inventory assesses PTSD (Hansen et al., 2010). Based on diagnostic criteria from DSM-IV, PTSD-8 consists of four intrusion items, two avoidance items and two hyper-arousal items. The participants gave the responses about their behaviour and assessed 8 items anchored from 1 = not at all to 4 = most of time. Scoring key for PTSD-8 is assessing each subscale (intrusion, avoidance, and hyper-arousal) at least with one item of a score ≥ 3 . The PTSD-8 is shown to have good psychometric properties in three independent samples of whiplash patients (n=1710), rape victims (n=305), and disaster victims (n=516) with the internal consistencies measured by Cronbach's alpha ($\alpha = 0.83$; 0.84; 0.85 for three groups respectively) (Hansen et al., 2010).

The Linguistic Inquiry and Word Count (LIWC) analyzes traumatic and positive narratives (Tausczik & Pennebaker, 2010). Applicable to the present study, we assume that psychological meaningful categories and linguistic characteristics defined by LIWC might be psycholinguistic markers of propositional structures of traumatic and non-traumatic narratives in nonclinical population. More specifically, first-person pronouns *I*, *we* are associated with internal agents, third-person pronouns (*she/he/it*, *they*) are considered to be the external agents; verbs are defined as predicate, and category of time and place as relevant propositional units. The LIWC 2015 analyzes the words and administer them according with the pre-defined categories of positive and negative emotions, motivation, thinking styles and social relationships (Pennebaker, Boyd, Jordan, & Blackburn, 2015). The present study

examines the psychological meaningful categories of negative emotions and anxiety, since they are aligned with traumatic memory and PTSD (Zasiiekina, 2014).

2.3. Procedure

The participants completed the study in a computer laboratory with computers providing access to the Internet. After the consent forms were obtained, all participants completed a Short PTSD Inventory to test PTSD and confirm that they belong to nonclinical settings. After this assessment 3 students with PTSD were excluded from the study. Considering the possibility of re-traumatization, all participants were provided with the list of accessible psychological services and counselling centers. Questions were presented and responses collected using a Professional License of SurveyMonkey.com. Participants were randomly assigned to write about any traumatic or positive event that happened to them in the past and were instructed to write at least 20 sentences.

2.4. Design

The study applied the cross sectional, between subjects design utilizing the independent variables of external agent *they*, *space and time* and dependent variable of *word number* in traumatic narratives for multiple regression analysis. The study also applies t-test to compare distribution of linguistic and psychological meaningful categories in autobiographical and traumatic narratives in nonclinical sample; and correlation analysis to examine any associations between word number and psychological meaningful categories, and linguistic units in traumatic narratives.

Out of the 61 narratives, 13 narratives, which are approximately account for 20 % of the data, were randomly chosen for testing inter-rater reliability. An independent assistant analyzed the structure of propositions to capture distribution of propositional units in the narratives. The independent assistant was blinded to the research questions. Cohen's kappa between the author and independent assistant for propositional units of internal/external agents, predicate, time and place was found between 0.61–0.80, which indicates a substantial agreement.

3. Results

The results of descriptive statistic of the sample is in Table 1.

Table 1

Descriptive information for participants creating positive narratives (n=32) and traumatic narratives (n=29)

	Positive narratives		Traumatic narratives	
	Frequency	Percentage	Frequency	Percentage
Gender	20/12	62.5/37.5	14/15	48.3/51.7
Female/male				
Marital status				
Single	31	96.9	27	31.4
Married	1	3.1	29	54.3
Divorced	-	-	-	-

Ethnicity				
White	16	50.0	11	37.9
Black	-	-	6	20.7
Mixed	16	50.0	12	41.4
Occupational status				
Full-time worked	-	-	-	-
Part-time worked	24	82.8	17	58.6
Student	29	100	32	100
		Mean (SD)	Min-Max	
Age		19.43 (1.4)	20.14 (2.8)	

Note. Data are means (SD) for age.

Regarding RQ1, differences in propositional structures (internal/external agents, predicate, time and space) between positive and traumatic narratives are presented in Table 2.

Table 2

Means, standard deviations and significant t-test differences for propositional units and psychological meaningful categories of all subjects with positive narratives (n = 32) and traumatic narratives (n = 29)

Variables	Total (n=61)		Positive narratives (n=32)		Traumatic narratives (n=29)		t	p
	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max		
IA (I)	9.46 (2.94)	2.22 17.27	9.09 (2.84)	2.22 13.51	9.87 (3.04)	4.32 17.27	1.029	.308
IA (We)	1.25 1.27	.00 7.62	1.47 (1.96)	.00 2.07	2.00 (.81)	.00 3.49	- 1.138	.260
EA (he/ she/it)	9.12 (7.03)	8.00 25.00	1.32 (1.86)	.00 6.89	2.02 (0.34)	.00 6.05	1.475	.146
EA (they)			.33 (.45)	.00 1.31	.57 (.58)	.00 2.1	1.898	.048
PI	7.72 (2.58)	3.54 17.90	7.46 (2.41)	3.54 14.46	8.00 (2.76)	4.51 7.90	0.814	.419
T	7.91 (2.65)	.00 15.24	7.91 (2.98)	0.00 15.24	7.90 (2.27)	3.72 13.22	-.007	.995
P	17.51 (3.29)	11.86 25.00	16.88 (3.14)	12.59 25.00	18.21 (3.36)	11.86 24.81	1.599	0.115
PE	3.26 (2.29)	.00 13.64	2.03 (1.15)	0.00 13.64	4.37 (2.31)	.00 7.63	- 4.657	

NE	2.04 (1.51)	.00 6.71	1.15 (0.94)	.00 3.47	3.02 (1.41)	0.58 6.79	6.151	.001
Anx	.55 (.72)	.00 4.04	.38 (.53)	.00 4.04	0.75 (.85)	.00 2.47	2.067	.043
WN	349.1 (140.8)	8.00 645.0	309.5 (123.3)	8.00 588.0	392.8 143.1	110.0 645.0	3.141	.020

Note. EA = external agent, IA = internal agent, P = predicate, T=time, Pl=place, PE=positive emotions, NE=negative emotions, Anx=anxiety, WN=word count

Regarding RQ2, the contribution of propositional units of external agent (they) and context, represented by space and time, is illustrated in Table 3. Multiple regression analysis has been used to predict the value of continuous variable *word number* based on other independent continuous variables, namely third-person pronoun *they* and *place*, and *time* in traumatic narratives. The assumptions of linear relationship, homoscedasticity, independence of residuals (Durbin Watson $d=1.19$), multicollenarity (average Tolerance= $1.11 > 0.2$, and average VIF= 1.11 , thus $1 < VIF < 10$) were met. Finally, assumptions regarding normal distribution of data are also met.

The results of the regression with a forced enter method show that three variables (pronoun *they*, *space* and *time*) explained 31.8 % of word number in traumatic narrative, $R^2 = .318$, $F(3, 25) = 3.88$, $p = .021$. The results also show that category of *time* significantly predicts word number, $b = -26.47$, $t(25) = -2.43$, $p = .023$. Pronoun *they*, $b = 15.54$, $t(25) = .36$, $p = .72$ and category of *space*, $b = -3.40$, $t(25) = -1.49$, $p = .15$ do not significantly predict word number in traumatic narrative (see Table 3).

Table 3

Summary of multiple regression analysis for variables predicting word count for all subjects with traumatic narratives (n = 29)

Variables	B	SEB	β	t	p
They	15.54 (-73.96, 105.03)	43.45	0.63	.36	.724
Space	-13.40 (-31.93, 5.12)	8.99	-.26	-1.49	.150
Time	-26.47 (-48.910 4.021)	10.89	-.42	2.43	.023

Considering normal distribution of data, Pearson product moment correlation assesses the associations between word number and psychological meaningful categories in traumatic narratives, which is aligned with RQ3 (Table 4).

Table 4

Correlations (2-tailed Pearson r) between word number and psychological meaningful categories in traumatic narratives ($n = 29$)

Variables	Word Count	Focus on Past	Social	Adjectives
Word Count	-	-.285	0.534**	-.377*
Focus on Past	-.285*	-	.100	.100
Social	.534**	.100	-	-.134
Adjectives	-.377*	-.216	-.134	-
Mean (SD)	349.1(140.8)	9.91(2.79)	8.93(4.41)	4.41(2.66)

Note. * = $p < .05$, ** = $p < .01$

4. Discussion

This study set out with the aim of exploring traumatic and autobiographical memory through traumatic and autobiographical narratives in nonclinical settings. The study was also aimed at finding psycholinguistic markers of traumatic memory, represented by propositional structures and psychological meaningful categories in traumatic narratives.

With respect to the first research question, there are significant differences between the pronoun *they* as an *external agent* of proposition and psychological categories of *negative emotions and anxiety* in traumatic and positive narratives. The results indicate the higher frequency of these categories in traumatic narratives compared with positive narratives. The study also found the higher *word number* in traumatic narratives compared with autobiographical narratives. Surprisingly, no differences were found in category of *internal agents* and *category of time*, since these categories are aligned with traumatic memory. Tausczik & Pennebaker (2010) argue that the narrator uses more first-person pronoun and fewer third person pronouns when describing the event from the perspective of being victim. Furthermore, evidence consistently suggests that whilst negative narratives mostly focus on the past, positive narratives focus on the present and future events (Gunsch, Brownlow, Haynes, & Mabe, 2000). Contrary to expectations, this study did not find a significant difference between the first-person pronoun as an *internal agent* and category of *time* in traumatic and autobiographical narratives.

This result may be explained by the fact that although the participants have experienced a traumatic event, they have coped with it successfully and are not diagnosed with PTSD. Therefore, we can assume that the focus on the *external agent* instead of the *internal agent* is linked to a decrease in personal responsibility for the event, which is important to prevent PTSD. Furthermore, the ability to express *negative emotions and anxiety*, and create traumatic narratives with a high *word number* might be robust predictors of successful coping with a traumatic event and prevent it developing into PTSD. This finding broadly supports the work of

other studies in this area relating prevention of PTSD to creating traumatic narratives with detailed experience, feelings and emotions aligned with the traumatic event instead of avoiding traumatic memories (Pennebaker, 1993).

The present study also aims to examine propositional structure and psychological meaningful categories represented in traumatic memory through traumatic narrative. Regarding the second research question, our findings suggest that the external agent *they*, and categories of *time* and *place* taken together, significantly contribute to *word number* in traumatic narrative. However, only the category of *time* is a significant negative independent predictor of *word number*. Therefore, getting stuck in time whilst describing a traumatic event has a poor impact on the length of traumatic narrative and spontaneous self-expression in terms of feelings and emotions. These results corroborate the findings of a great deal of the previous work in the strong relationship between PTSD and a poor temporal processing, notably time overestimation during stressful experience (Vicario & Felmingham, 2018).

Consistent with the literature, this research found that participants who reported a traumatic event, however, cope with it successfully without PTSD, are not stuck in time and do not overestimate it. Therefore, the most obvious finding to emerge from the analysis is that the propositional structure of traumatic memory of individuals without PTSD is represented by *external agent* and context (*place and time*) taken together. Considering *time* as a significant negative predictor of creating traumatic narrative, we can assume that appropriate temporal processing is an important factor of avoiding PTSD.

Another important finding is linked to the third research question and suggests a significant negative correlation of *word number* in traumatic narrative and focus on the past, which supports our previous findings and is consistent with the literature. Evidence consistently suggests that traumatic narratives of individuals with PTSD focus mostly on the past and have a poor perception of present and future time (Pennebaker, 1993; Zasiiekina, Khvorost, & Zasiiekina, 2018).

The study also found the positive correlation between social category and word number in traumatic narrative. This result is consistent with previous literature regarding the crucial importance of social support after a traumatic event and considering social support as a robust predictor of preventing PTSD after a traumatic event (Cohen, Mannarino, Deblinger, 2006). It is somewhat surprising that there is a negative correlation between *word count* and *adjectives* in traumatic narrative. A possible explanation for this might be that individuals without PTSD avoid evaluating the traumatic event, instead they focus on other propositional units, notably *external agents* and *place* of the traumatic event.

5. Conclusion

In sum, the study introduces a novel psycholinguistic approach for autobiographical and traumatic memory study and the connection of two types of memory with propositional structures. Previous research has focused on traumatic memory of individuals with PTSD and does not compare it with autobiographical

memory in the nonclinical population. Therefore, the mechanisms of transforming traumatic experience into PTSD were not examined. It was not clear before if the negative changes in traumatic memory, which related to PTSD, could be examined in the propositional structure of traumatic memory. The findings of our research suggest that *external agent, place and time* represent the propositional structure of traumatic memory, however *time* is a negative predictor of an individual's spontaneous self-expression in traumatic narrative. The traumatic memory of individuals who experienced a traumatic event and successfully coped with it without PTSD, focuses on the *external agent* instead of the *internal agent*, and shifts focus from the past, avoiding overestimation of time linked with the traumatic stressful event. The principal theoretical implication of this study is that autobiographical and traumatic memory might be examined through psycholinguistic markers, represented by propositional structures and psychological meaningful categories in individual narratives.

Being limited to a nonclinical sample, this study lacks the assessment of propositional structures of traumatic memory in individuals with PTSD. Notwithstanding these limitations, the study suggests psycholinguistic methodology as an appropriate tool for examining traumatic memory in individuals with PTSD. This would be a fruitful area for further work.

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