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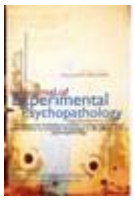

Eye for Detail: Local Versus Global Visual Processing Style Predicts the Development of Re-experiencing after Analogue Trauma

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Abstract

Cognitive theories of posttraumatic stress disorder (PTSD) posit that peritraumatic data-driven processing plays a role in the development of intrusive trauma-related memories (i.e., re-experiencing). Peritraumatic processing may be determined by a pre-existing attentional processing style. This study tested whether a general attentional processing style (relative preference for local or global processing of visual stimuli) was associated with re-experiencing symptoms after analogue trauma. Participants completed measures for neuroticism and reappraisal and an emotional Local-Global Processing task. The next day, they watched an aversive film and indicated horror and perceived control during the film. PTSD symptoms were assessed one week later. A relative preference for local processing was associated with less reappraisal and with less perceived control and more horror during the film. Moreover, it predicted re-experiencing of the film, even after controlling for neuroticism, horror, control, and re-appraisal. The results are a first step in exploring the role of pre-trauma cognitive processing styles on trauma-memory development and may benefit the identification of risk factors for PTSD.

Keywords: attention; information processing; posttraumatic stress disorder; PTSD; trauma; re-experiencing; anxiety; intrusions; memory; trauma film paradigm

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Introduction

Posttraumatic stress disorder (PTSD) is a disorder that can be developed after trauma, with symptoms including intrusive memories, avoidance, and negative alterations in cognitions, mood, arousal, and reactivity (American Psychiatric Association, 2013). Theoretical frameworks that aim to understand factors linked to PTSD suggest that cognitive processing during a traumatic event plays an important role in the development of PTSD (Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa, Steketee & Rothbaum, 1989; Holmes & Bourne, 2008). Generally, two forms of cognitive processing are distinguished: one focuses on perceptual details (data-driven processing), and the other on context, conceptualization and meaning (conceptual processing; Roediger, 1990, Ehlers & Clark, 2000). Dominant data-driven processing would result in the storage of trauma information as vivid sensory-rich, intrusive memories with a “here-and-now” quality (i.e., re-experiencing). In case of predominant conceptual processing, trauma-related information would be integrated into autobiographical memory, including spatial and personal context and meaning (Brewin, Gregory, Lipton & Burgess, 2010; Ehlers & Clark, 2000). In support, several experimental studies have manipulated cognitive processing style of an aversive film (e.g., by enhancing data-driven processing or hindering conceptual processing), and have found that a predominant focus on data-driven processing was associated with the development of intrusive memories (e.g., Hagenaars, Van Minnen, Holmes, Brewin, & Hoogduin, 2008; Halligan, Clark, & Ehlers, 2002; Holmes, James, Kilford, & Deeprose, 2010; Kindt, Van den Hout, Arntz & Drost, 2008; but see Krans, Näring & Becker, 2009). Moreover, data-driven processing predicted PTSD in longitudinal studies (Halligan, Michael, Clark & Ehlers, 2003; Michael, Ehlers, Halligan, Clark, 2005).

A commonly used distinction that resembles the peritraumatic perceptual-conceptual processing concept discriminates local and global processing of visual information. Research has found that individuals can have a relative preference for “local processing” of a stimulus (i.e., increased focus on local perceptual details) or “global processing” (i.e., increased focus on the Gestalt or global context) (Derryberry & Reed, 1998; Navon, 1977). One can have a relative preference for local or global processing. Global perceptual processing has been suggested to entail abstraction; that is, “reflecting a construal or meaning-making process whereby people distill the essence or gist of some stimulus” (Darwent, Fujita & Wakslak, 2010, pp 199). It is assumed to require a broader focus of attention, i.e., a more spatially distributed attentional scope (Navon, 1977), which resembles conceptual processing in PTSD theories (i.e., a more abstract memory including spatial context and meaning; Brewin & Burgess, 2014; Ehlers & Clark, 2000). Local processing on the other hand, has been associated with a smaller focus of attention (Navon,

1977), resembling data-driven processing in PTSD theories (i.e., dominant processing of sensory details; Brewin & Burgess, 2014; Ehlers & Clark, 2000).

Research on information processing and PTSD development has mainly investigated the dominant focus on perceptual details *during* trauma (reflecting a state-processing mode induced by the emotional impact of the traumatic event). However, peritraumatic information processing may reflect a more general, pre-existing processing style, which becomes a risk factor once it is prolonged or intensified during trauma (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van IJzendoorn, 2007; Mogg & Bradley, 1998). The proposed association between peritraumatic pre-dominant data-driven processing and the development of re-experiencing symptoms (Brewin et al., 1996; Ehlers & Clark, 2000) may thus partly be determined by a pre-existing preference for local processing of visual details.

Several empirical findings suggest such an association between local/global processing and memory. For example, trait anxious individuals show a relative preference for local processing during negative states (i.e., during games where points could be lost; Derryberry & Reed, 1998). In addition, attentional narrowing (focussed attention) is related to anxiety and emotion intensity (Caparos & Linnell, 2012; Easterbrook, 1959; Gable & Harmon-Jones, 2010; Noguchi & Tomoike, 2016). Moreover, it has been suggested that attention, memory and interpretation biases influence each other, which has been corroborated empirically (Blaut, Paulewicz, Szastok, Prochwicz & Koster, 2013; Everaert, Koster & Derakshan, 2012; Hirsch, Clark & Mathews, 2006).

The current study is the first to use the local-global paradigm in a trauma-analogue setup, so we explored key concepts that reflect data-driven/conceptual processing described by PTSD theories. The first key concept is the presence of intense fear or horror during the traumatic event (Ozer, Best, Lipsey, & Weiss, 2003). As a faster local processing was found during negative games that probably elicited state anxiety (Derryberry & Reed, 1998), we expected that it would also be positively related to horror that participants experienced while watching the analogue trauma (i.e., a trauma film). We explicitly selected horror and not fear or anxiety because the trauma film paradigm used here typically elicits horror rather than fear or anxiety (e.g., Hagenaars, Brewin, Van Minnen, Holmes & Hoogduin, 2010), and retrospective reports of peritraumatic horror predicted PTSD independent of peritraumatic fear (Engelhard, Olatunji & De Jong, 2011).

A second important concept is controllability. Over two decades ago, Foa, Zinbarg & Rothbaum, (1992) wrote an intriguing article bridging the animal fear conditioning literature and the etiology of PTSD, and it showed a major role for controllability on the effects of a conditioned stimulus or traumatic event. It is unclear whether more local processing is associated with less perceived control. However, studies have found that more global processing is related to high social power (Smith & Trope, 2006) and psychological distance (Liberman & Förster, 2009), which seem to be related to a sense of control.

Finally, post-trauma appraisal of the trauma and its sequelae is proposed to be an important factor in PTSD development (Ehlers & Clark, 2000). As global processing reflects a more abstract way of processing visual stimuli, it should leave more room for cognitive reappraisal of a stressful event, compared to local processing.

Local versus global processing style can be assessed using hierarchical composite stimuli, usually consisting of a large (global) letter or geometric figure that is made up of small (local) letters or geometric figures (Chamberlain, McManus, Riley, Rankin & Brunswick, 2013; Colzato et al., 2010; Derryberry & Reed, 1998; Navon, 1977). We used an adjusted local-global attentional processing task that provides an emotional context by presenting global happy or sad smiley face figures that are made of small happy or sad smileys. We chose to use these stimuli because unlike most previous studies, we investigated attentional processing during a trauma film (i.e., processing of emotional information). The local-global task (or “Navon task”) can be administered in two ways, assessing either divided or focused attention/inhibition (Fink, et al., 1996). We used the latter version because attention narrowing and impaired inhibition are considered important predictive factors in threat processing and PTSD development (Easterbrook, 1959; Janovic & Ressler, 2010; Mickley Steinmetz, Scott, Smith & Kensinger, 2012).

In summary, the present study aimed to investigate the impact of a pre-existing relative preference for local versus global processing on the development of re-experiencing symptoms after an analogue trauma, using the well-established trauma film paradigm (James, et al., 2016). We predicted that a relative preference for local processing (i.e., relatively more interference from local then from global distractors) in the focused attention version of the local-

global task, would be positively associated with re-experiencing an analogue trauma. We explored the impact of local-global processing for avoidance and arousal symptoms. We also expected that a relative preference for local processing would be associated with more horror and less perceived control during the film as well as less use of re-appraisal as a coping strategy. Furthermore, because the effect of processing style on re-experiencing might be explained by enhanced emotional impact of the film or reduced reappraisal, we tested whether it predicted re-experiencing symptoms independently, i.e., after covarying these factors. We also covaried neuroticism scores in order to rule out a general negativity factor linked to PTSD (Breslau, Davis, Andreski, & Peterson, 1991; Engelhard, Van den Hout, & Lommen, 2009; Van den Hout & Engelhard, 2004).

Method

Participants

Participants were recruited at the university campus. Exclusion criteria were: having experienced a serious road traffic accident, current or lifetime major depressive episode, PTSD, and blood phobia. Seventy-four students were included in the experiment. Four did not show up for the follow up session, leaving a total sample of 70 participants (26 males; mean age = 19.6, *SD* = 1.50, range = 17 to 25). All participants gave written informed consent and received course credits or money for their participation. The study was approved by the local ethical committee.

Material

A 10-minute aversive film was used as an analogue for trauma (Steil, 1996). The film consisted of four scenes of real life footage depicting the horrible aftermath of road traffic accidents and has shown to be successful in eliciting horror (Hagenaars et al., 2008).

Measures

Mood ratings.

Participants indicated how horrified and in control they felt before and during watching the film on two scales ranging from 0 (not at all horrified / not in control at all) to 10 (completely horrified / completely in control), to check whether the film indeed elicited negative affect.[1]

Posttraumatic Stress Symptom Scale, Self Report (PSS-SR).

The PSS-SR is a 17-item self-report questionnaire that measures the frequency of PTSD symptoms (Foa, Riggs, Dancu, & Rothbaum, 1993). Each item corresponds to one of the DSM-IV criteria for PTSD. The three subscales assess re-experiencing symptoms, avoidance symptoms and arousal symptoms in the preceding week. Each item is answered on a 4-point Likert scale (0–3), with a total score ranging from 0 to 51 (Re-experiencing: 0-15; Avoidance: 0-21; Arousal: 0-15). Analyses showed a high internal consistency (Cronbach's alpha for the total score was .91), and a good test-retest reliability of the overall severity (.74) (Foa et al., 1993). The items were adjusted for the present study so that they referred to the film and not a traumatic event (e.g., "How often in the past week did upsetting thoughts or recollections about the film come into your mind when you did not want them to?"). In our sample, Crohnbach's alpha for the total score of this adjusted version was .62.

[1] Anxiety was assessed in a similar way, but we chose to analyze horror for reasons mentioned in the Introduction. However, when anxiety was included in the analyses, the results were similar to the ones reported here. For example, regression analyses on PSS-Re-experiencing with all independent variables included (p.12) revealed a significant effect for Local Interference Dominance (β = .35, p = .008), and no significant effect for anxiety (β = .10, p = .50).

Reappraisal coping.

The Reappraisal subscale of the Thought Control Questionnaire (TCQ; Wells & Davies, 1994) was used to assess to what extent participants used Reappraisal as a strategy to control intrusive or unwanted thoughts. The 6 items of the Reappraisal subscale are rated on a 4-point Likert scale ranging from 1 (never) to 4 (almost always), with a total score ranging from 6 to 24. An example item of this scale is "…I try to interpret the thought differently". Internal consistency coefficients for this subscale was .67 (α = .60 in our sample), and test-retest reliability .83 in a student population (Wells & Davies, 1994).

Neuroticism.

The Neuroticism subscale of the Revised Eysenk Personality Questionnaire (EPQ-N; Eysenk, Eysenk, & Barrett, 1985) was used to assess neuroticism. The 12 self-report items of the EPQ-N are scored on a no (0) / yes (1) scale, with a total score ranging from 0 to 12. Cronbach's alpha for the total score was .84 in our sample. The median EPQ-N score in our sample (5.00) was similar to the means of Dutch norm groups (Sanderman, Arrindell, Ranchor, Eysenck & Eysenck, 2012), indicating half our sample scored above and half below the mean scores of those norm groups.

Task

The emotional Local-Global Processing task (LGP) was designed to assess a preference for local versus global visual processing. Stimulus elements were modelled after Filoteo and collegues (Filoteo et al., 1992, 1995), and adapted into emotional stimuli (Figure 1).

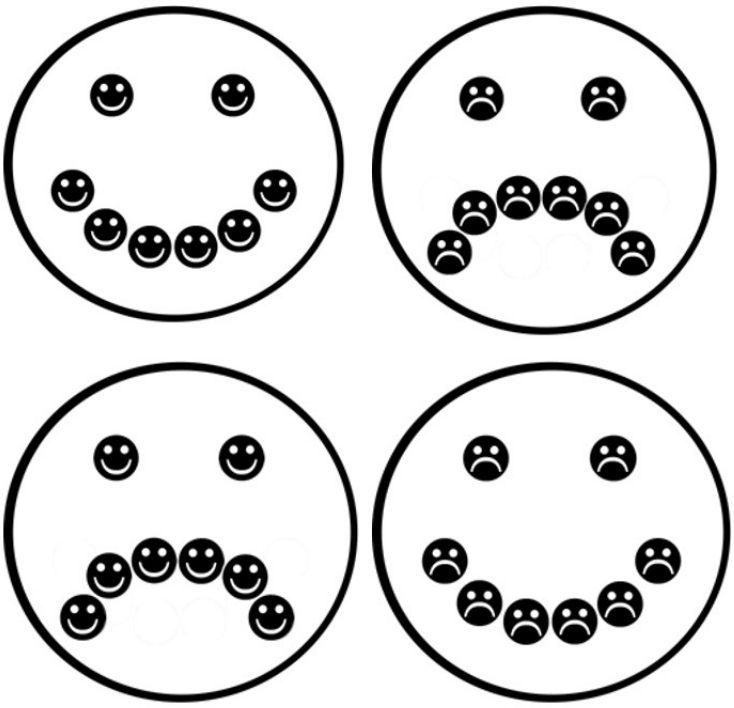

Figure 1: The four composite stimuli, congruent (top panels) and incongruent (bottom panels). In the Local trials, the targets would be Happy (left panels) and Sad (right panels).

The four stimuli consisted of hierarchical combinations of smileys. In the global trials, participants had to discriminate the emotion of the large smileys (targets; happy or sad), which were composed of small smileys (distractors; happy or sad); vice versa for the local trials. Trials were congruent (same emotion for target and distractor) or incongruent (different emotion for target and distractor). The experiment consisted of two blocks of 80 trials, in which participants had to respond to either the global or local targets as fast as possible by pressing Z (happy) or Q (sad). These response keys were counterbalanced as well as the order of the global and local blocks. Note that with these

instructions, require inhibition of distractor stimuli and the task therefore assessed focussed attention or inhibition and not divided attention. Within each block 50% of the trials were congruent and 50% were incongruent; 50% of the targets were sad and 50% were happy. Each block was preceded by 12 practice trials, because we were interested in local versus global processing, and not in switching between these strategies. Inter-trial intervals varied between 1.5 and 2 seconds. The task took approximately 15 minutes and was presented on a 17 inch computer screen.

LGP tasks fall in the class of interference tasks, which measure (in)efficiency of the goal-directed cognitive control system (i.e. attentional inhibition, see Miyake et al., 2000). The outcome measure of interest is interference: increased response time to incongruent as compared to congruent trials. Higher interference is assumed to indicate less efficient goal-directed attentional inhibition of goal-incompatible but stimulus-driven or habitual distractor processing (Derakshan & Eysenck, 2009). Thus, for our LGP task, relative greater interference from local distractors compared to global distractors reflects a stronger automatic preference for local than global distractors.

Procedure

Participants gave their written informed consent after being informed about the study. They then executed the LGP task and completed EPQ and TCQ-Reappraisal on day 1. The next day (day 2), they returned to the laboratory, completed pre-film mood ratings and watched the aversive film. They received instructions for watching the film, which emphasized that they had to imagine being present at the scene and that they were not allowed to close their eyes or look away. The room was dimly lit during film presentation. Immediately after the film, they rated their mood during the film. Exactly one week later (day 9), they came back to complete the PSS after which participants were debriefed and received course credits.

Analyses

In order to enable comparisons across studies, we first tested effects for the LGP task using a Level (local, global) x Congruency (congruent, incongruent) x Valence (sad, happy) rmANOVA.

For testing the hypotheses, correlational and regression analyses were done, using a predefined composite score as a measure for interference from local versus global distractors (thus, a preference for local versus global processing): the Local Interference Dominance score. For the computation of the Local Interference Dominance score, we first calculated overall interference from local distractors (average of interference from local distractors for sad and happy targets respectively) and overall interference from global distractors (average of interference from global distractors for sad and happy targets). The Local Interference Dominance score was then calculated as overall interference from local distractors minus overall interference from global distractors, thus higher scores presenting relatively more interference from local distractors (i.e., a relative preference for local processing).

Effects of distractor valence were explored by calculating Local Interference Dominance scores for sad and happy distractors separately in order to check if valence affected local/global (prediction) effects.

Results

Three participants were excluded from further analyses, scoring more than 3 standard deviations above the mean on the Local Interference Dominance score and one participant was excluded because of extreme slow overall performance with RTs of more than 3 standard deviations above the mean.

Film-impact

Means and SDs for all measures are listed in Table 1. Paired samples t-tests showed that horror-ratings increased ($t(65) = -16.47$, $p < .001$) and control ratings decreased ($t(65) = 7.44$, $p < .001$) from before to during the film, indicating that the film was successful in evoking feelings of horror and reducing feelings of control.

Table 1: Mean (SD) scores on questionnaires and mean reaction times on the congruent and incongruent trial of the Local Global Processing task (N = 66)

	Mean	SD	Range
EPQ-Neuroticism	5.67	3.60	0 - 12
TCQ-Reappraisal	14.31	2.45	8 - 18
Horror			
Before the film	.39	.96	0 - 6
During the film	5.24	2.57	0 - 10
Control			
Before the film	7.18	2.02	1 - 10
During the film	4.70	2.82	0 - 10
PSS-SR			
Re-experiencing	1.64	1.62	0 - 7
Avoidance	1.73	1.61	0 - 5
Arousal	1.83	1.47	0 - 6
Total	5.20	3.33	0 - 14
LGP task			
Local target congruent distractor	602 ms	97.57 ms	447.75 – 909.25
Local target incongruent distractor	666 ms	85.13 ms	488.75 – 923.50
Global target congruent distractor	503 ms	69.40 ms	366.00 – 650.75
Global target incongruent distractor	507 ms	62.78 ms	379.50 – 695.25

Note. EPQ = Eysenk Personality Questionnaire. TCQ = Thought Control Questionnaire. PSS-SR = PTSD Symptom Scale-Self Report. LGPT = Local Global Processing Task

Local-global processing task

Mean RTs for congruent and incongruent trials are listed in Table 1. The Level x Congruency interaction was significant ($F(1, 65) = 47.29$, $p < .001$, $\eta_p^2 = .42$), indicating delayed RTs for incongruent distractors, but only if the target was local. The Level x Valence interaction was significant too ($F(1, 65) = 9.53$, $p = .003$, $\eta_p^2 = .13$), indicating that RTs were delayed for sad distractors (congruent and incongruent), but only if the target was local. The Congruency x Valence and the Level x Congruency x Valence interactions were not significant (both Fs < .88, both ps > .35). The main effects of Level ($F(1, 65) = 346.65$, $p < .001$, $\eta_p^2 = .84$), Congruency ($F(1, 65) = 60.79$, $p < .001$, $\eta_p^2 = .48$) and Valence ($F(1, 65) = 4.53$, $p = .04$, $\eta_p^2 = .07$) were all significant, indicating faster RTs for global, congruent and happy targets, respectively.

The mean Local Interference Dominance score was -59.21 ms ($SD = 69.95$, range -270.25 to 197.50), indicating that on average, participants had a preference for global processing (i.e., more interference from global than local distractors).

Local-global processing style and PTSD symptoms

In order to examine the effects of local-global processing style on the development of re-experiencing symptoms bivariate correlations were calculated between the Local Interference Dominance score and the three PSS subscales (see Table 2 for correlations between all variables). In line with the hypothesis, a relative preference for Local processing was associated with higher levels of PSS-Re-experiencing ($r = .42$, $p < .001$), but not with PSS-Avoidance ($r = .17$, $p = .17$) or PSS-Arousal ($r = .09$, $p = .46$), indicating that a higher tendency towards local processing resulted in higher levels of re-experiencing the film. Local Interference Dominance score was also related to PSS-total ($r = .33$, $p = .007$).

There were no effects for distractor valence. That is, all correlational and regression results reported above and below were similar for Local Interference Dominance scores for either sad or happy distractors, indicating that emotional valence was not a critical factor.

Table 2: Bivariate correlations between all variables (N = 66)

Variable	1	2	3	4	5	6	7	8	9
1. EPQ-N	-								
2. TCQ-R	.06	-							
3. Horror	.12	-.03	-						
4. Control	.04	.12	-.45***	-					
5. PSS-R	-.18	-.20	.21*	-.24*	-				
6. PSS-Av	-.09	-.01	.01	-.33**	.22*	-			
7. PSS-Ar	.08	.15	.02	-.12	.15	.38**	-		
8. PSS-Total	-.10	-.03	.12	-.32**	.66***	.76***	.70***	-	
9. LID-score	-.10	-.27**	-.24*	.25**	.42***	.17	.09	.33*	-

Note. *p < .10, **p < .05, ***p < .001

EPQ-N = Eysenk Personality Questionnaire, Neuroticism. TCQ-R = Thought Control Questionnaire, Reappraisal. Horror = horror during the film. Control = Control during the film. PSS-R = PTSD Symptom Scale, Re-experiencing. PSS-Av = PTSD Symptom Scale, Avoidance. PSS-Ar = PTSD Symptom Scale, Arousal. PSS-Total = PTSD Symptom Scale, Total score. LID-score = Local Interference Dominance score.

Global-local processing style, film impact, and reappraisal

The Local Interference Dominance score was negatively related to perceived control during the film (r = -.25, p = .04), while the positive correlation with horror was almost significant (r = .24, p = .055), indicating that a preference for local processing was associated with less perceived control and tended to be associated with more horror during the film. The Local Interference Dominance score was also negatively correlated with TCQ-reappraisal (r = -.27, p = .04), indicating that a relative preference for local processing was associated with less cognitive reappraisal as a coping strategy.

As the effect of processing style on PSS-Re-experiencing might be explained by the enhanced emotional impact of the film or reduced reappraisal, a hierarchical regression analysis was carried out with horror, control, TCQ-reappraisal and the Local Interference Dominance score entered as predictors in the second block and EPQ entered in the first block to control for effects of neuroticism. EPQ did not predict re-experiencing symptoms (β = -.18, p = .17). The total model was significant (R^2 = .23, F(5, 55) = 3.87, p = .004), with the Local Interference Dominance score explaining most of the variance (β = .39, p = .003). Horror, control and TCQ-reappraisal did not predict re-experiencing (Horror: β = .13, p = .37; Control: β = -.05, p = .73; TCQ-reappraisal: β = -.07; all ps > .36).

Discussion

The purpose of this study was to test whether pre-trauma processing style would predict the development of re-experiencing symptoms and to explore key concepts that reflect data-driven/conceptual processing described by PTSD theories. Although participants generally showed dominant processing of global information, reduced global dominance (i.e., relative increased focus on local stimuli) was indeed associated with later re-experiencing an analogue trauma after controlling for neuroticism scores. It was also associated with less perceived control during the film and less reappraisal as a coping strategy, and related to more horror during the film on a non-significant trend-level. Moreover, it remained a significant predictor of re-experiencing symptoms after these factors were partialled out as covariates.

This study represents a novel exploration which shows that a pre-existing relative local processing preference is associated with the development of re-experiencing symptoms. It adds to previous findings showing that attentive processes, such as reduced attentional control and attentional avoidance are associated with anxiety (Derryberry &

Reed, 2002; Putman, 2011) and re-experiencing (Bardeen, Fergus & Orcutt, 2015; Hagenaars & Putman, 2011; Verwoerd & Wessel, 2007; Verwoerd, Wessel & De Jong, 2009), and that a relative preference for local processing is associated with negative emotional states (Derryberry & Reed, 1998).

Theories of PTSD posit that predominant processing of trauma-related sensory details during trauma –in contrast with conceptual processing- results in storage of trauma information as vivid intrusive memories (i.e., re-experiencing symptoms; Brewin et al., 1996; Ehlers & Clark, 2000). Our results suggest that a general attentional processing style may also contribute to the formation of such memories. Previous studies also studies showed that changes in the scope of attention affected memory. More specifically, a manipulation of distributed or *global* attention was related to enhanced recognition (Macrae & Lewis, 2002; Srinivasan, Mukherjee, Mishra & Kesarwani, 2013). A preference for global processing allows rapid evaluation of a relatively large visual area, which saves processing resources and may therefore be adaptive (Navon, 1977). Therefore, dominant global processing or "looking at the bigger picture" may enhance optimal processing of trauma information and later voluntary retrieval. Note that recognition is considered to assess explicit or voluntary memory, whereas especially involuntary memory (such as re-experiencing) is suggested to be impaired in PTSD (Brewin, 2015). Future studies may further examine specific effects of global and local processing on the development of voluntary and involuntary memories.

Exploratory analyses showed that a relative preference for local processing was not associated with avoidance or arousal symptoms. Avoidance is often seen as a way of coping with distressed trauma memories, and thus not expected to be related to processing style. Arousal could also be a way of coping with distressing symptoms, although it may very well be that a laboratory setting, with a moderate stressor and a healthy sample, is not sufficient to evoke arousal symptoms. Note that our design was set up to target intrusive memories, and that the PSS avoidance and arousal scales include DSM-IV symptoms that do not specifically refer to a traumatic/aversive event (e.g., numbing, sleeping problems, irritability; Engelhard, Arntz & Van den Hout, 2007). In addition, avoidance symptoms may not be sensitive to the effects of exposure to an aversive film.

Previous studies found that local processing was related to mood factors such as trait anxiety and depression (Basso, Schefft, Ris, & Dember, 1996; Derryberry & Reed, 1998; Fockert & Cooper, 2014). In addition, relative local processing in our study was associated with factors that are considered to characterize data-driven processing: more sensory details, less control, and more threat-related emotion. Earlier studies have shown that global processing is related to positive mood (Gasper & Clore, 2002) and better processing of pleasant stimuli such as happy faces (Srinivasan & Gupta, 2011; Srinivasan & Hanif, 2010). The present study found an association between a pre-existing relative preference for local processing and a diminished use of reappraisal as a coping strategy. This might be relevant, because elaboration and providing meaning and context to a traumatic event are proposed to prevent PTSD development (Brewin et al., 2010; Ehlers & Clark, 2000). It remains unclear whether processing during the trauma is simply a prolonged processing style that was present at pre-trauma, whether these processes run in parallel, or whether pre-trauma processing predicts peritraumatic processing.

Future research may further examine these relationships, as well as similarities and differences between global-local and perceptual-conceptual processing. Future studies may also examine the role of specific attentional processes such as divided attention versus focused attention. For example, enhanced global processing was found in PTSD patients in a previous study using a similar local-global processing task (Vasterling, Duke, Tomlin, Lowery & Kaplan, 2004), which may seem contradictory to our findings. However, the authors used the divided attention version whereas we applied the focused attention (interference) version. The different versions of the LGP task tap into distinct attentional processes associated with distinct neurobiological correlates (Fink et al., 1996). PTSD patients are hypervigilant and possibly as a result perform well at divided attention tasks, but at the same time have problems inhibiting irrelevant local information. Attention is a broad concept with many aspects and only specific attentional processes may be associated with (the development) of psychopathology, whereas other aspects may be intact.

Several limitations should be mentioned. First, the experiment was set up as an analogue for trauma and re-experiencing, using the trauma film paradigm. Watching such a film does not meet the DSM-5 criteria for a traumatic event, although events in the film involved actual or threatened death and serious injury (APA, 2013). Future longitudinal designs may be used in order to confirm the effects found here. Second, it could be useful to use different instruments to assess re-experiencing - such as a diary (e.g., Holmes, Brewin, & Hennessy, 2004) or the impact of

events scale (e.g., Nixon, Nehmy, & Seymore, 2007) - in order to be able to make better comparisons across studies. The LGP task was primarily used to assess local versus global processing. However, we introduced an emotional component in order to increase its relevance for threat processing. Although there were no moderating effects of valence, we cannot conclude that emotion affects are irrelevant. It would therefore be interesting to replicate the findings with traditional stimuli. Finally, because this was the first exploration of processing style affecting the development of PTSD-like symptoms, we used a naturalistic quasi-experimental design. Future research may use positive films and manipulate processing style in order to replicate the results, distinguish valence and arousal effects, and draw inferences about causality.

In sum, the present study examined whether pre-trauma attentional processing style would be associated with memory of an analogue trauma (aversive film). A relative preference for local processing was indeed associated with more re-experiencing of the analogue trauma. This effect was independent of emotional responses to the film and reappraisal as a coping strategy, suggesting a direct link between local/global processing and memory phenomena. Moreover, this association was specific for re-experiencing and demonstrates the importance of further research in pre-trauma information processing styles. Our results are a first step in exploring the role of pre-trauma visual processing in the development of re-experiencing symptoms. The results may imply an important extension of PTSD theories and could possibly benefit the study of risk factors for PTSD development. Clinical, longitudinal and experimental studies may be performed to confirm the results and further explore the exact mechanisms.

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