Characteristics of Traumatic Memories in Normal Subjects

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In recent years, there has been considerable debate about how accurately people remember emotionally significant information. Early studies concerned with "flashbulb memories" claimed that emotional memories are accurate and persistent. However, recent studies indicate that flashbulb memories are subject to deterioration over time. This finding fits with the idea that individuals who have experienced a traumatic event do not retain all the details of the trauma equally well. Instead, they have relatively good memory for central detail information and relatively poor memory for peripheral details of the traumatic situation. Using self-report data of a normal, healthy sample, Christianson and Loftus (1990) found evidence for this idea. The current study is an attempt to replicate Christianson and Loftus' finding in a normal student population ($N = 106$). Subjects were asked to describe their most traumatic situation. They rated the vividness of the memory, the intensity of emotion at the time of the trauma and at the time of recall, the amount of reliving, and the amount of central and peripheral detail information remembered. Results indicate that subjects who reported strong emotion at the time of the trauma remembered significantly more central detail information than subjects with relatively low past emotionality ratings. However, no differences in the amount of peripheral detail information remembered were found.

Introduction

There are conflicting ideas about the effect of traumatic incidents on memory. Some authors have claimed that traumatic events potentiate memory. An example of this position can be found in early studies of flashbulb memories (e.g. Brown and Kulik, 1977; Pillemer, 1984). Brown and Kulik (1977) found that people claim having remarkably vivid memories (flashbulb memories) for the circumstances in which they learned about a shocking event. The observation that some people even report remembering trivial details of those circumstances led the authors to propose an under-
lying, biologically adaptive "now print" mechanism: in times of stress, the brain would take a "picture" of the event. Though Brown and Kulik (1977) explicitly stated that these pictures are far from complete, their "now print" hypothesis implies that flashbulb memories are indiscriminate with respect to detail category. A further implication of this hypothesis is that flashbulb memories are accurate and not subject to deterioration over time. Most studies on flashbulb memories have looked at memories for newsworthy events (e.g., the assassination of John F. Kennedy; see Brown and Kulik, 1977; Winograd and Killinger, 1983). Yet, Brown and Kulik (1977) suggested that the flashbulb memory phenomenon also occurs when aversive incidents of a more idiosyncratic nature are involved. This notion is supported by the results of a field study conducted by Yuille and Cutshall (1986). These authors studied the memory of witnesses to a shooting incident and found that memories for this event showed little loss of accuracy and detail over a five to six month period. However, recent studies on flashbulb memories cast doubts on the tenability of the "now print" hypothesis and indicate that the accuracy of flashbulb memories deteriorates over time (Bohannon, 1988; Christianson, 1989; Neisser and Harsch, 1992).

Some authors have gone even further by arguing that emotional events are less well retained than neutral events (Kopelman, 1987; Schachter, 1986). According to these authors, emotional events may disrupt rather than enhance memorization processes, thus resulting in amnesia. There are some laboratory studies that sustain this notion (e.g., Loftus and Burns, 1982). In addition, amnesia following psychological trauma (i.e., psychogenic amnesia) has been described in several clinical case reports (e.g., Christianson and Nilsson, 1989; van der Kolk and Kadish, 1987; Schachter, Wang, Tulving and Freedman, 1982). Furthermore, the DSM-III-R (APA, 1987) describes psychogenic amnesia as a possible symptom of Post Traumatic Stress Disorder (PTSD).

An attractive hypothesis that reconciles both the flashbulb memory and the amnesia phenomena was forwarded by Christianson and co-workers (see Christianson, 1992). Following Easterbrook's (1959) cue-utilization hypothesis, Christianson (1992) argued that arousal causes narrowing of attention. Thus, in a traumatic situation the attentional focus is on information that is relevant and directly related to the event (central details). In addition, less attention will be directed to information that is not relevant and directly associated with the traumatic event (peripheral details). Christianson (1992) further speculated that narrowing of attention is associated with more elaborate processing of the details attended to. Consequently, central detail information is better retained than peripheral information.

There is some empirical evidence for Christianson's line of reasoning.
begin with, laboratory studies by Christianson and Loftus (1991) show that normal subjects recall central details of an aversive slide better than peripheral information of that slide. Second, Christianson and Hübimette (1993) investigated the memory of witnesses to robberies. They found that accuracy rates were high for memories about details associated with the robbery itself, such as weapon or clothing of the robber. In contrast, low accuracy scores were obtained for certain, perhaps not so visible details (e.g., eye-colour of the robber) and for the specific circumstances (time, date etc.) under which the event took place. Third, Christianson and Loftus (1990) asked college students about the characteristics of their most traumatic memories. They found that the subjects reported remembering more central details than peripheral details of idiosyncratic traumas. In addition, negative emotion at time of the event was positively correlated with the amount of central rather than peripheral detail information remembered.

Christianson’s (1992) hypothesis is of particular interest as it may shed light on the aetiology of psychogenic amnesia. A common view among clinicians is that psychogenic amnesia is the result of repression of traumatic memories. In order to avoid psychological pain, the individual would block memories of the traumatic event (e.g., van der Kolk and Kadish, 1987). However, the repression hypothesis does not account for the observation that some detail information of the trauma is remembered quite well (Christianson, 1992). The attentional narrowing hypothesis offers an alternative and more parsimonious account for the origins of psychogenic amnesia.

Given the relevance of Christianson and Loftus’ (1990) study to the phenomenon of psychogenic amnesia, the present study aimed at replicating their findings in a Dutch population. Thus, undergraduate students were asked to describe their most traumatic memory and to report a number of characteristics of this memory (e.g., amount of emotion experienced during the traumatic event and at recall; amount of central and peripheral detail information remembered).

Method

Subjects

Subjects were 106 undergraduate students at Limburg University: 86 (81.1%) subjects were women and 20 (18.9%) were men. Mean age of the subjects was 21.4 years (range: 19–31 years).

Procedure and assessment

Data were collected as part of a larger survey, in which subjects also completed questionnaires concerning such things as smoking habits and
fear of small animals. As these questionnaires are not relevant to the current topic, they are left out of consideration here. The questionnaires were completed in groups of approximately 10 subjects. Subjects were given the opportunity to participate anonymously and were paid for their participation.

Subjects were instructed to think about the most traumatic experience they had ever encountered. A traumatic event was defined as an extremely sudden and disturbing incident in which the subject was overwhelmed by negative emotions (see Christianson and Loftus, 1990). Next, subjects had to answer four questions, using 100 mm Visual Analogue Scales (VASs). The questions concerned vividness of the memory (0="extremely vague", 100="extremely vivid"), intensity of emotional reactions (0="not intense at all", 100="extremely intense") both at the time that the event took place (past emotion) and at the time of retrieving the memory (present emotion), and the number of times the subject relived the event (0="never", 100="extremely often"). Reliving was defined as having intrusive memories, thoughts, or nightmares about the traumatic event. In addition, subjects were asked whether one specific detail of the situation was remembered better than other details. If this question was answered affirmatively, subjects were asked to give a short description of this detail and to classify it as either central (i.e., important for and directly related to the event itself) or peripheral (i.e., not important or directly related to the event itself).

Next, the subjects scored the amount of central and peripheral detail they remembered about the event on two 100 mm VASs (0="none", 100="all"). Finally, subjects were asked to write down how long ago the event occurred, and to give a brief description of the event.

Results

Table 1 summarizes the traumatic experiences reported by the subjects. Almost a third of the traumatic experiences involved death of either a family member (22.6%) or a friend or acquaintance (8.5%). Other traumas concerned relational problems involving the subject (10.4%) or the subject's parents (5.7%), illness or injury of either the subject (10.4%) or a family member (7.6%), being threatened, robbed or attacked (8.5%), being in accidents (5.7%) and failing an exam (5.7%). Four subjects (3.8%) refrained from giving a description. The remaining 11.3% of the memories pertained to various situations, including having a conflict with a parent or a landlord, confrontation with an intoxicated parent, death of a pet and being rejected during a job interview. The mean time elapsed since the events was 44.4 months (SD=43.4, range: 1–243 months).
Subjects reported their memories being reasonably vivid ($m=58.6$, $SD=28.3$) and the incidents were perceived as highly emotional at the time (past emotion: $m=75.2$, $SD=19.8$). The present emotionality scores were significantly lower ($m=44.0$, $SD=25.4$; $t(105)=11.12$, $p<0.01$, two-tailed). By and large, subjects recalled more central ($m=56.5$, $SD=24.9$) than peripheral details ($m=45.9$, $SD=28.3$). Fifty-one subjects (48.1%) reported remembering one specific detail better than other details. Of this subgroup, the majority (74%) classified the outstanding detail as central. Examples of outstanding details that were rated as central are "getting the bad news", "the gun against my cheek" and "seeing my grandfather lying in his coffin". Details that were rated as being peripheral were, for example, "the sun was setting", "the place where it happened and the faces of the people present" and "the colours of the clothes".

Table 2 presents the Pearson product-moment correlations between the various VASs. As can be seen in this table, present emotion was more strongly associated than past emotion with vividness, reliving, and memory for both central and peripheral details. In order to look more closely at the effects on memory of negative emotion at the time of the traumatic event, a group of subjects who reported relatively low past emotion was compared with a group of subjects reporting relatively high past emotion. In order to control for possible time effects, the sample was restricted to those subjects who reported that the event occurred within the past five years ($n=79$). On the basis of the distribution of past emotion scores in this sample, subjects scoring in the lower 30th percentile (Low Past Emotion Group, LPEG) and subjects scoring in the upper 30th percentile (High Past Emotion Group, HPEG) were selected. Both groups contained 23 subjects. As for the type of traumatic incidents, HPEG subjects more often reported death
TABLE 2. Pearson p-m correlations between vividness, past and present emotion, reliving, and central and peripheral details

<table>
<thead>
<tr>
<th></th>
<th>Vividness</th>
<th>Past emotion</th>
<th>Present emotion</th>
<th>Reliving</th>
<th>Central details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past emotion</td>
<td>.36**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present emotion</td>
<td>.51**</td>
<td>.20*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliving</td>
<td>.36**</td>
<td>.15</td>
<td>.64**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central details</td>
<td>.61**</td>
<td>.28**</td>
<td>.42**</td>
<td>.35**</td>
<td></td>
</tr>
<tr>
<td>Peripheral details</td>
<td>.55**</td>
<td>.21*</td>
<td>.46**</td>
<td>.39**</td>
<td>.60**</td>
</tr>
</tbody>
</table>

* p<0.05, ** p<0.01, two-tailed


<table>
<thead>
<tr>
<th>Variable</th>
<th>High past emotion (n=23)</th>
<th>Low past emotion (n=23)</th>
<th>Statistic (DF)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months since event</td>
<td>27.2 (17.8)</td>
<td>28.7 (16.6)</td>
<td>t(44)</td>
<td>ns</td>
</tr>
<tr>
<td>Past emotion</td>
<td>95.8 (3.3)</td>
<td>52.8 (18.2)</td>
<td>t(44)</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Present emotion</td>
<td>55.7 (26.3)</td>
<td>41.8 (26.5)</td>
<td>t(44)</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Amount of central details</td>
<td>67.0 (24.7)</td>
<td>43.7 (27.4)</td>
<td>F(43)</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Amount of peripheral details</td>
<td>54.6 (31.8)</td>
<td>42.4 (26.7)</td>
<td>F(43)</td>
<td>ns</td>
</tr>
<tr>
<td>Outstanding detail</td>
<td>14</td>
<td>8</td>
<td>X^2(1)</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>No outstanding detail</td>
<td>9</td>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

of a family member than LPEG subjects (frequencies being 5 and 2, respectively). Similarly, HPEG subjects more frequently reported illness or injury than LPEG subjects (frequencies being 3 and 1, respectively). On the other hand, LPEG subjects more often remembered death of an acquaintance, and being in an accident than HPEG subjects (frequencies being 3 and 2 versus 0 and 0, respectively).

VAS scores and other relevant data of HPEG and LPEG are summarized in Table 3. The mean scores on the past emotion VAS were 52.8 and 95.8 for LPEG and HPEG, respectively. The difference between these mean past emotion scores was highly significant (t(44) = -11.13, p<0.01, one-tailed). The time elapsed since the traumatic situation was comparable for both groups (m=28.7 and m=27.2 months for LPEG and HPEG, respect-
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The difference between LPEG and HPEG concerning present emotion scores reached borderline significance ($t(44) = -1.78, p = 0.08$, two-tailed). Therefore, differences between LPEG and HPEG with regard to central and peripheral detail information were analysed by means of ANCOVA with present emotion as covariate. The results indicated that HPEG subjects remembered significantly more central details than LPEG subjects ($F(1,43) = 5.06, p < 0.05$). With respect to peripheral details, there was no significant difference between both groups ($F(1,43) = 0.34, p > 0.05$). Although more subjects in the HPEG than in the LPEG reported remembering an outstanding detail (14 vs 8 for HPEG and LPEG, respectively), this difference attained only borderline significance ($X^2(1) = 3.14, p = 0.08$). In the HPEG, 11 subjects classified this outstanding detail as central and 3 subjects categorized it as peripheral. In the LPEG, the outstanding detail was classified as central by 4 subjects and as peripheral by 3 subjects. One subject in the LPEG did not classify the outstanding detail.

Discussion

A large proportion of the subjects reported vivid memories of quite emotional life events involving deaths, relational difficulties including divorce, or situations perceived as threatening. Emotion at the time of experiencing the trauma was rated higher than emotion at the time of recall, and subjects reported remembering more central than peripheral detail information. As for the influence of emotion on detail memory, the results somewhat unexpectedly showed that the correlations of past emotion with memory for the amount of central and peripheral details were lower than the correlations of present emotion with both detail categories. Note that the correlations reported by Christianson and Loftus (1990) showed a different pattern. In their study, both past and present emotion correlated moderately and significantly with the amount of central detail information remembered. Christianson and Loftus also found that the association between past emotion and central detail memory was stronger than that of present emotion and memory for central details. Additionally, the correlations between both original and present emotion with memory for peripheral details were low and not significant.

There are several explanations for the discrepancies between Christianson and Loftus’ (1990; experiment 1) results and the current findings. First, discrepancies may be related to different ways in which emotion was assessed. Christianson and Loftus asked their sample about the valence of their emotional feeling at the time of the event; subjects were asked to what
extent their feelings were pleasant or unpleasant. In the current study, subjects were asked about the strength of their emotions at the time. Note that Bradley, Greenwald, Petry and Lang (1992) view the concepts of valence and arousal as two orthogonal dimensions that define emotional behaviour. Furthermore, in their laboratory study, these researchers found evidence suggesting that the main predictor of future memory performance is the intensity, rather than the valence of the emotion.

Second, it may well be that the number of years that passed since the traumatic event plays a confounding role in reports of traumatic memories. The time that elapsed since the traumatic events may have been longer in the subjects of the current study than in the sample studied by Christianson and Loftus. Unfortunately, Christianson and Loftus (1990; experiment 1) provide no data on the age of the traumatic memories. However, the results of experiment 2 of their study suggest that the memories in the current sample were slightly older than those studied by Christianson and Loftus.

In order to control for possible time effects, the analyses of the association between intensity of past emotion and central versus peripheral memory were restricted to those subjects who reported that the traumatic event occurred less than five years ago. In addition, the influence of present emotion on detail memory was controlled for. These analyses showed that there was a significant difference in the amount of central detail information reported: high past emotion subjects remembered more central details than low past emotion subjects. With respect to peripheral detail information, no significant differences between both groups emerged. Though high past emotion subjects more often reported remembering one outstanding detail than low past emotion subjects, this difference reached only borderline significance. In sum, the results support the general notion from the experimental literature (e.g., Christianson and Loftus, 1991) that after emotional stress, people tend to remember central details of a traumatic event relatively well. However, the current data do not confirm the idea that memory for the peripheral detail information is impaired, i.e. is prone to amnesia.

The current study is retrospective, and focuses on what people think they remember from the most traumatic event they experienced in their life. No conclusions can be drawn about the accuracy of those memories. However, the notion that memory, as a belief system, is the result of reconstructive processes rather than a reflection of a “now print” mechanism that indiscriminately stores information as it originally occurred (Bohannon, 1988; Christianson, 1989; Neisser and Harsch, 1992; Winograd and Killinger, 1983) was supported in two ways by the current data. First, the correlations between present emotion and vividness, reliving, and the amount of central and peripheral detail information remembered were larger than the corre-
lations of any of those variables with past emotion. One way of interpreting these results is that emotion experienced at the time of retrieving a traumatic event influences what is remembered to a greater extent than the strength of the original emotion. However, there is some evidence that reports of past emotion do not accurately reflect the emotion that was originally experienced during the event (Neisser and Harsch, 1992). Second, the majority of subjects in the current sample that recalled one outstanding detail classified this detail as central. This casts doubts on the assumption of the “now print” hypothesis that traumatic information is stored indiscriminately. Yet, it should be noted that this kind of retrospective research is not free of the peril of circularity: that is to say, details may have been judged as “central” by the subjects, for no other reason than that they were remembered.

To conclude, with respect to the memory of central detail information the results of the current study are in line with the results of laboratory studies that show that emotion promotes the memorization of central rather than peripheral information of an aversive event (Christianson, 1992; Christianson and Loftus, 1991). It would be of interest to see whether these findings can be extrapolated to clinical populations, e.g., PTSD patients. Possibly, the re-experiencing symptoms in PTSD reflect the memorization of central detail information.

References


