Memory for Traumatic Events

SVEN-ÅKE CHRISTIANSON
University of Umeå, Umeå, Sweden

and

ELIZABETH F. LOFTUS
University of Washington, Washington, U.S.A.

SUMMARY

This research compares memory for traumatic events with memory for non-traumatic versions of the same event. In Experiment 1, subjects watched an event depicted in slides while focusing and rehearsing the central detail of each slide. They were tested after a short or a longer retention interval (20 min or 2 weeks). Subjects who watched the traumatic version were better able to recall the central details that they had rehearsed, but were less well able to recognize the specific slides that they saw. Better recall for the traumatic group did not occur because the words used to describe the recalled details were inherently more memorable, as shown in Experiment 2. In Experiment 3, subjects watched either a traumatic or non-traumatic version of a filmed event and about 6 months later they were asked to remember the essence of the film. Subjects who saw the traumatic version were better able to recall the essence of the film. A similar finding was obtained with a group of subjects from Experiment 1 who were also contacted about 6 months after their initial participation. These results suggest that some information (the essence, the theme) of a traumatic event might be relatively well retained in memory, while memory is impaired for many of the specific, and especially peripheral, details.

This research begins with the observation of an apparent paradox concerning memory for traumatic events. On the one hand a number of empirical studies indicate that recollection is poorer for details of violent events than for details of non-violent versions of those events (Clifford and Scott, 1978; Clifford and Hollin, 1981; Loftus and Burns, 1982). In the Clifford and Hollin study, for example, subjects saw a black and white videotape of an event that was staged by members of a dramatic society. The tape showed a female walking alone toward the camera. In the violent version a male grabs her arm, forces her back against a wall, and then tears her bag from her grasp. He then runs away, leaving the female sobbing and alone. In the non-violent version the male approaches the female and asks for directions. After viewing the tape the subjects were asked to recall the incident, and to identify the male from a set of photographs. The results showed that accuracy of memory was consistently poorer in the violent condition. While studies using a paradigm similar to that of Clifford and Hollin sometimes show retrograde amnesia (Loftus and Burns, 1982) and sometimes show anterograde amnesia without retrograde amnesia (Christianson and Nilsson, 1984), they are fairly uniform in showing some detrimental memory for the details of violent events.
Contrast this empirical work with the observation that certain traumatic events seem subjectively to be well remembered. Most individuals born before 1956 can remember where they were when they heard about the assassination of President Kennedy (Brown and Kulik, 1977; Winograd and Killinger, 1983). They often remember their location upon first hearing, what they were doing, how they found out, and how they felt. Thirty-three years after the assassination of President Lincoln, similar sorts of vivid memories were elicited (Colegrove, 1899). Images of such public events (Pillemer, 1984), and more private events such as witnessing an auto accident (Rubin and Kozin, 1984) are said to persist with little subjectively experienced loss of clarity. The presumably more mundane experiences that occurred the day before Kennedy was shot, or the day before the witnessed auto accident, are not readily accessible with the passage of even a few weeks.

While some investigators have questioned the accuracy of these so-called flashbulb memories (Neisser, 1982), the specialness of the flashbulb memories (Rubin and Kozin, 1984), or the extent to which their apparent longevity is anything more than a rehearsal effect (Linton, 1979), the fact remains that some information seems to be retained rather vividly from a highly emotional event that is not retained from a more ordinary or pallid event.

For purposes of this research it is helpful to distinguish between whether people remember that an even occurred at all, and, if they do, the degree to which they accurately remember the details of the event. In the 'eyewitness-type' studies cited above, people remember that the events occurred since the retention intervals are usually quite short. The impairment seems to be in terms of the details of the events when those events are relatively traumatic. In the 'autobiographical-type' studies cited above, people seem to be able to recall that a highly emotional event occurred, and to recall some details that surround the event. While it may be relatively safe to presume that these events did in fact occur, we cannot be sure about the accuracy of memory for details. Of course, the fact that any details are reproduced from events that occurred a very long time ago does, in some sense, make these events special.

Another source of information about people's memories for emotional events comes from studies comparing reports of crime incidents in surveys with actual police records. For example, in one study interviews were conducted in San José, California with persons who were known to have been victim of crimes during the 12-month period preceding the interview (San José methods test, 1972). Information obtained from each respondent during the interview was compared with data in police files. Victims did not always report their victimizations to survey interviewers; in fact, they did so in only 74 percent of the cases. Some of the underreporting could be due to a lack of willingness to report an embarrassing crime such as rape, so it is probably worth examining the underreporting of relatively non-sensitive crimes. In fact a fairly high percentage of property crimes such as burglary and larceny were recalled (86 per cent). Thus, people were reasonably good at remembering that the crime, a presumably emotional event, did happen—at least if they were asked within a year of its occurrence. Their ability to recall certain details, such as the dollar loss or the month of occurrence, was not particularly good.

In another study researchers began with the victimization survey and tried to match crime recollections to police records. Over 200 crime incidents reported to survey interviewers in Portland, Oregon in 1974 were matched with official crime reports of
the same incidents (Schneider, Griffith, Sumi and Burcart, 1978). In the survey, respondents were asked about crime victimizations occurring during the previous 12 months. About half of the reported incidents could be successfully matched with police reports. While respondents seemed to remember reasonably accurately the details of what happened during the crime, such as whether the victim was attacked or whether medical attention was needed, poor recollection occurred for other details, such as the dollar loss from the crime, the exact month in which the crime occurred, and the police response time.

Based upon these data, it appears that the occurrence of at least one type of emotional event, a crime incident, is fairly well remembered. While some aspects of those events may also be well remembered, other details are not particularly well remembered. Of course we have little means of comparing these recollections to the recollections of more mundane events.

While a number of theoretical perspectives can be brought to bear to explain the deficits in memory for emotional events (e.g. increased cognitive activity such as self-preoccupation, worry or distraction, (Eysenck, 1983; Naatanen, 1973; Sarason, 1975)), these do not easily encompass the notion that some aspects of emotional events are well remembered while other aspects suffer. One theoretical perspective that seems to capture a portion of this idea is that of Easterbrook (1959), which emphasizes the effects of emotionality on the selectivity of attention. According to this view a highly emotional event is accompanied by attentional narrowing, which could mean that fewer details are processed. Attentional selectivity could conceivably improve memory for the main theme of the event, and perhaps some of the central details, at the expense of other peripheral details. For a more comprehensive discussion of the relationship between attentional focusing and memory for emotional material, see Christianson (1984).

An event that is sufficiently traumatic that it causes a person to focus on the main theme of the event, and a few of the outstanding details, is undoubtedly an event that is likely to be rehearsed, either overtly or covertly. Rehearsal would be expected to improve the persistence of the information initially extracted. In fact there is ample evidence that our most vivid memories (e.g. memories for an injury or an accident) tend to be ones that are rehearsed (Rubin and Kozin, 1984).

In the current research we explored the hypothesis that, compared to a non-emotional event, people are better able to remember that an emotional event did in fact occur and to remember aspects of the event that were focused upon and rehearsed. At the same time the more peripheral details of an emotional event are remembered less well than the peripheral details of a non-emotional event. In Experiment 1 we showed people a traumatic or a neutral event depicted in slides. We forced subjects to focus upon some central aspects of the event they saw, and to 'rehearse' those aspects. This forced rehearsal was accomplished by having subjects write down the most distinguishing feature of each slide. Later, when tested for their ability to recall the rehearsed features, subjects who saw the traumatic version performed better than subjects who saw the neutral version. However, on a recognition test which primarily measured ability to distinguish peripheral details, subjects who saw the traumatic event performed less well than subjects who saw the non-traumatic event.

Could it be that the words written down by subjects who saw the traumatic version were simply more memorable in their own right than the words written down by those who had seen the non-traumatic version? In Experiment 2 we addressed this issue by
having a different group of subjects study and recall words obtained in Experiment 1. The words produced by subjects who had viewed the traumatic event were not inherently more memorable.

In Experiment 1, subjects were tested a short time after the events; thus it was not a problem for subjects to recall that the events happened. To explore the notion that subjects who experience a traumatic event are better able to remember that the event did indeed happen, we needed to use a longer retention interval. This was instituted in Experiment 3. Subjects saw a traumatic event or a non-traumatic version of the same event. Approximately 6 months later, subjects were telephoned and asked whether they remembered the events they had seen. Those subjects who had seen the traumatic version were better able to remember the event itself. A similar finding was obtained with a group of subjects from Experiment 1 who were also contacted about 6 months after their initial participation.

Taken together, these studies tell a story about memory for traumatic events. We now unfold that story in detail.

EXPERIMENT 1

Method

Subjects
The subjects in this experiment were 60 undergraduates from the University of Umeå. They were paid the equivalent of $5 for their participation. Subjects were tested in groups of four or fewer. None of the subjects had any prior knowledge of psychology courses; nor had they participated in any psychology experiments.

Materials
The stimulus materials consisted of two series of 15 colour slides: one traumatic series and one neutral series. Both series consisted of three phases, with five slides per phase. The neutral series began with a mother and over 7-year-old son leaving a house. They walked through a park, across a bridge, and then through a downtown area. The second phase showed the mother and son looking for a taxi, going to school in the taxi, and finally it showed the mother leaving her son at school. The third phase showed the mother making a phone call and eventually returning to her neighbourhood and her house. Half the subjects saw this series.

The remaining subjects saw a traumatic version of the slide sequence. The traumatic version was identical to the neutral version in the first and third phases. The middle phase, however, was different; it showed the boy being hit by a car, lying on the bonnet bleeding heavily from an eye injury. Next the boy is transported by an ambulance to a hospital, and in the last slide the mother leaves her son at the hospital.

The slides actually used in phase 2 of the neutral and traumatic events were selected from a large pool of slides. Every effort was made to equate slides chosen for complexity and distinctiveness. In fact a pretesting procedure using 20 independent subjects indicated that there were no appreciable differences between the phase 2 slides on these dimensions. In the pretest the slides had been shown in random order and subjects simply rated each slide on complexity and distinctiveness.
The slides used in this research, and the events that they depicted, were quite realistic. The entire pool of slides was constructed with the cooperation of actors, police, ambulance staff, and emergency room personnel from the local hospital. Thus although the slides were not as realistic as filmed or live events might be, a genuine attempt was made to create a slide sequence that was as meaningful and professional as possible.

Other slides from the total slide pool were used to create recognition tests. The recognition tests consisted of four slides that focused on the same central object, but were taken from a different angle. A sample recognition test for the first slide in phase 2 of the traumatic series is shown in Figure 1. The photograph in the upper left corner was actually used in the initial event, and the other three served as distractors. The photographic angle used in the target slide during the study phase had been chosen randomly for all 15 slides.

*Design and procedure*

Subjects were randomly assigned to one of four conditions. They viewed either the traumatic or the neutral version of the event. They were tested either after a short (20 min) or a long (2 weeks) retention interval.

All subjects began their experimental participation by being escorted to a partitioned room that held four chairs. Subjects sat 3 m from the screen, resulting in an image size of 60 × 70 cm for each slide.

Before the presentation of the slide series, subjects were handed a pad and paper. They were instructed to pay close attention to the slides, and for each one to write down the most distinguishing features. To the slide shown in the upper left-hand corner of

![Figure 1. A sample recognition test for the first slide in phase 2 of the traumatic series used in Experiment 1.](image-url)
Figure 1, many subjects wrote blood or 'eye injury'. After writing down the feature selected, the subjects were told to turn the page and wait for the next slide. Subjects were not permitted to communicate with each other, and were not told about forthcoming memory tests. The slides were presented via a Prodovit colour slide projector and Hunter electronic shutter. The exposure time was 3 sec/slide with a 7 sec unfilled interval between slides.

Immediately after the series of slides the written responses were collected. A 15 min filler task followed which required subjects to copy eight common objects (e.g. a cube, a cylinder) that had been projected on slides.

Next, depending upon the retention interval condition to which subjects had been assigned, they were tested after the filler activity (thus 20 min after the slides) or they left the laboratory and returned later for testing. Those in the immediate testing conditions were asked to recall in writing all of the features of the slides that they had previously written down. They were allowed 5 min to do this. Next, subjects were given a four-alternative, forced-choice recognition test of the 15 slides. One of the four alternatives for each slide had actually been presented before, and the others were distractors. Each test slide (containing the four alternatives) was exposed for 15 sec, with a 5 sec interval between the test slides. Subjects were instructed to respond by writing down either A, B, C, or D to indicate their choice. The position of the target item among its distractors had been determined at random.

Half of the subjects were tested after 2 weeks instead of 20 min after presentation. When they returned to the laboratory they did so under the belief that they were participating in a totally different experiment. They were given the same recall and recognition task that the other half of the subjects had been given.

After testing, all subjects received a questionnaire which asked for a global rating of the pictures along a dimension of pleasantness-unpleasantness, where 1 = very pleasant and 7 = very unpleasant. They also judged their affective experiences to the content of the pictures using a number of mood states: relaxed, sad, happy, nauseated, angry, surprised, depressed, interested, afraid, puzzled, nervous, disgusted, and bored. Ratings were made on a seven-point scale, where 1 = not at all and 7 = very much. Although we knew from prior research (Christianson, 1984) with these materials that the traumatic and neutral versions of the events produce large differences in tonic skin conductance levels and electrocardiographic measures, we still included affective measures to ensure that the specific subjects used in this study were being differentially affected by the materials.

Results

Memory data

Remember that subjects first tried to recall the details that they had earlier listed (e.g. blood, taxi, eye injury). Then they attempted to recognize the specific slides that they had seen before.

In scoring the recall data we counted as correct any response that was identical to, or synonymous with, what was earlier recorded, regardless of the order in which subjects produced the response. The recall data are shown in the left-hand panel of Figure 2, for each of the three phases. The upper curves are for those subjects who were tested after the short retention interval, and the lower curves are for those who were tested after the
Figure 2. Recall (Rc) and recognition (Rn) performance in Experiment 1 (for subjects shown the traumatic, T, or neutral, N, slides) after 20-min (short) and 2 week (delayed) retention intervals.
delayed retention interval. Not surprisingly, subjects were better at recalling their previously recorded details after a short rather than long passage of time. Performance levels of roughly 78 per cent correct were obtained after the short interval, but by 2 weeks they dropped to roughly 38 per cent.

Notice further that, at both retention intervals, subjects were more accurate at recalling the phase 2 details when they saw the traumatic event rather than the neutral event. Collapsed across the two retention intervals, subjects were correct 50 per cent of the time on the phase 2 details when they saw the neutral event, but 77 per cent of the time when they saw the traumatic event.

The recall data were analysed using a $2 \times 2 \times 3$ mixed analysis of variance. The first factor refers to the retention interval, for which there was a significant main effect $F(1,56) = 183.2, MS_e = .98, p < .001$. The second factor refers to the type of event (traumatic versus neutral) for which there was not a significant main effect, $F(1,56) = 1.11, MS_e = .98, p < .10$. The third factor was the phase of the slide series, a within-subjects’ factor, for which there was a significant main effect, $F(2,112) = 19.48, MS_e = .86, p < .001$. A significant two-way interaction emerged between type of event and phase, $F(2,112) = 8.60, MS_e = .86, p < .001$. A posteriori Tukey test was used to trace the source of the significant event $\times$ phase interaction. This test revealed that the difference between the two groups in phase 2 was statistically significant at the .01 level. All other interactions were non-significant ($F$’s approximately $= 1$).

The recognition data are shown in the right-hand panel of Figure 2, for each of the three phases. Again, the upper curves are for those subjects who were tested after the short retention interval and the lower curves are for those who were tested after the delayed retention interval. Again subjects were better at recognition after a short rather than a delayed retention interval. They were approximately 81 per cent correct after the short interval, but only 51 per cent correct after a delay.

Notice further that, at both retention intervals, subjects were less accurate at recognizing the specific phase 2 slides when they saw the traumatic event. Collapsed across the two retention intervals, recognition performance for phase 2 slides was 71 per cent for the neutral event but only 50 per cent for the traumatic event.

The recognition data were analysed using a $2 \times 2 \times 3$ mixed analysis of variance. The retention interval was a significant factor, $F(1,56) = 79.43, MS_e = 1.29, p < .001$. Type of event was not significant, $F(1,56) = 2.08, MS_e = 1.29, p > .10$. The phase of the slides, a within-subjects’ factor, was significant, $F(2,112) = 3.95, MS_e = .85, p < .03$. A significant two-day interaction emerged between type of event and phase, $F(2,112) = 8.24, MS_e = .85, p < .001$. A posteriori Tukey test was used to trace the source of the significant interaction. This test revealed that the difference between the two groups in phase 2 was statistically significant at the .01 level. All other interactions were non-significant.

Affective ratings
Self-rating data were collected to show whether the two versions of the event created different emotional experiences, and thus constitute a manipulation check. One might have predicted that the traumatic pictures would become less unpleasant over time. However, subjects’ ratings were not appreciably influenced by when they were tested. Thus the ratings were collapsed across the two retention intervals. The mean values of pleasantness—unpleasantness were 4.0 and 5.0, respectively, for subjects in the neutral and traumatic conditions. This difference was statistically significant by a one-way analysis of variance, $F(1,56) = 26.47, p < .01$. 
Discussion

We have demonstrated that subjects who viewed a traumatic event and were induced to focus and rehearse the critical features of the event were better able to later recall those rehearsed features than were subjects who viewed a neutral event under the same instructions. But the act of focusing and rehearsing came with a significant cost. Those subjects who saw the traumatic event were less able to recognize the specific slides they had seen.

The results of this study show that, if an event is remembered in the first place, some aspects of it are better remembered if it is traumatic and some aspects of it are not remembered as well. For the moment, let us consider precisely what was better remembered. In Experiment 1, subjects wrote down a word or words describing the most distinguishing feature of each slide (e.g. blood, taxi, building, eye injury). Later, subjects tried to recall these words, and were better able to do so in the traumatic condition. One possible explanation for this superior performance is that the words themselves were inherently more memorable or salient. To explore this, Experiment 2 was conducted.

EXPERIMENT 2

Method

Subjects
The subjects in this experiment were 60 students from the University of Umeå who had not participated in Experiment 1. They were tested in small groups on a voluntary basis.

Materials
The materials used in Experiment 2 came from the responses of Experiment 1 subjects. Each of the 60 subjects in Experiment 1 had produced a list of 15 words. Thus 60 15-word lists were obtained, half from those who had seen the traumatic version and half from those who had seen the neutral version of the event.

Design and procedure
Each subject in this study was handed a piece of paper containing one of the word lists (in the same order) that had been produced in Experiment 1. The subject was given 45 sec to read through the list of words, at which time the sheet of paper was removed. Next a 3 min filler task was given, in which subjects attempted to solve as many arithmetic problems as possible from a set of 21. Finally subjects tried to recall, in writing, the words from the previously presented list. The total duration of this experiment was 10 min.

Results
As a point of interest, subjects who received the 'traumatic' word lists solved as many arithmetic problems as those who had received the neutral word lists. The central finding, however, was that recall of the words was not influenced by whether the list was traumatic or neutral. The mean proportions of words recalled from the three phases...
were .75, .73, and .46 for subjects who received the traumatic lists, and .74, .68, and .49 for subjects who received neutral lists.

A 2 × 3 analysis of variance (type of word list versus phase) showed a significant main effect of phase, $F(2,116) = 9.88$, $p < .01$. The main effect of type of material was not significant, $F(1,58) < 1$, nor was the interaction, $F(2,116) < 1$.

**Discussion**

These results provide some support for the contention that the superior recall in Experiment 1, phase 2, demonstrated by subjects who saw the traumatic slides, is not due to the fact that the words themselves are inherently more memorable. Rather, the memorability value of the words produced by subjects in the traumatic condition becomes significant only when there is a personal reference to the traumatic event itself. It appears that these words then achieve higher cue valency to the main essence of the event. Said differently, revival of the traumatic event itself seems to be associated with a revival of central features and the relatively easy retrieval of the words describing those features. It may also be the case that there is something distinctive about the connection between the traumatic slides and their corresponding labels that makes these connections less susceptible to forgetting or interference. More research is needed to determine precisely how this process takes place.

While the data from Experiment 2 provide preliminary evidence that the words produced by subjects who viewed the traumatic event were not inherently more memorable, we must acknowledge a potential problem with this study, namely the problem of item selection artifacts. What is a salient item for one subject may not be so for another subject. For example, the word ‘blood’ may simply be much more memorable to a subject who generated it than the same word given to another subject. This problem would be partially circumvented by having the slide labels be selected by the experimenter, rather than permitting the subjects to select them. However, this procedure would not capture the phenomenon we hoped for, namely to have subjects generate their own ‘gist’ of an event.

Another important difference between the conditions of recall in Experiments 1 and 2 is that in Experiment 2 the word list learning is intentional, whereas in Experiment 1 it is incidental. This could conceivably have influenced the failure of traumatic words to be better remembered in Experiment 2. This observation suggests yet another way in which the words produced by the two groups could be empirically compared to one another.

As it stands, the data from Experiment 1 shed no light on an issue raised earlier—namely whether an event itself is more likely to be recalled if it is traumatic. This seems plausible on the surface. But because the retention intervals in Experiment 1 were quite short, all subjects—whether they viewed a traumatic or a neutral event—were able to remember the event, and to recall at least a few details from it. We have yet to demonstrate that the mere occurrence of an event is better remembered when the event is traumatic. This was the purpose of Experiment 3.

**EXPERIMENT 3**

In Experiment 3, subjects saw a traumatic or a neutral event and approximately 6 months later were telephoned to see whether they could recall the event. This
experiment was conducted with new materials and a new subject population, and this work is described as Experiment 3a. In addition, a number of subjects who had participated in Experiment 1 were contacted; results with these subjects are described as Experiment 3b.

EXPERIMENT 3a

Method

Subjects
The subjects were 164 students at the University of Washington. They participated in small groups, and this participation satisfied a course requirement. They were told that they were free to leave the experiment at any time and still receive full credit, but none of them chose to do so.

Materials
Subjects viewed a film of a bank robbery lasting approximately 2.25 min. The film is part of a training programme designed to instruct employees on how to react in the event of a robbery. The film clip was taken from ‘3:57 Friday Afternoon’, produced by the Idaho First National Bank in 1977. The robbery portrayed in the film is the type that occurs most frequently, in which a robber holds up a single teller. After robbing the teller the robber walks quickly out of the bank. The teller shouts that she has been robbed, and two male employees chase the robber into a parking lot where two young boys are playing.

In the traumatic version of the film, as the robber runs toward a getaway car he turns and fires a shot toward the two men in pursuit. The shot hits one of the boys in the face and he falls to the ground clutching his face. In the non-traumatic version the events are identical until just prior to the shooting, when the film flashes back to the inside of the bank, where the manager is informing the employees and customers about what has happened and asking everyone to stay calm. The two endings are approximately 15 sec in length.

Design and procedure
The film was shown using a .75 inch video cassette player. Half the subjects saw the traumatic version of the film and half saw the non-traumatic version. Immediately after viewing the film, subjects were asked a question about how upsetting they found the viewing of the videotape to be. Subjects answered on a scale from 1 to 5, where 1 indicated ‘not upsetting’ and 5 indicated ‘very upsetting’. Subjects participated in several other experiments unrelated to the purpose of this study. Their names and telephone numbers were collected and they were partially debriefed and thanked for their participation.

Between 6.6 and 7.8 months later a researcher attempted to contact the subjects again by telephone to ask some additional questions. The researcher was able to reach 88 subjects. Each subject was reminded that he had participated in an experiment in which a videotape had been shown. The subject was then asked if he or she remembered participating in the experiment, and what the tape was about. When the researcher began the call he was blind as to the version of the tape that the subject saw (although
the version was occasionally revealed in the responses of the subject). The researcher did not record the verbatim responses, but took notes that captured the essence of the response. Thus, if the subject said ‘It was a film of a bank robbery,’ the researcher wrote down ‘bank robbery’. The researcher also noted ‘don’t remember’ responses. If the subject recalled any information about the tape, the researcher asked whether the subject recalled how long the videotape had lasted. These retrospective time estimation data were gathered in conjunction with an ongoing project on time estimation.

Results

The responses of subjects were used to classify subjects according to whether they recalled the essence of the tape or did not. Any response that mentioned a bank robbery or something about a bank, or even that it involved a crime, were counted as a correct recall for both the traumatic and non-traumatic subjects. For traumatic subjects, responses which mentioned a boy being injured were also counted as a correct recall.

When all efforts to recontact subjects had been exhausted, we matched interviewed subjects with their earlier response sheets. This matching process revealed that 41 of the interviewed subjects had seen the traumatic version and 47 had seen the non-traumatic version. Of the subjects who had seen the traumatic version, 19 (or 46 per cent) could recall the essence of the event. Of the subjects who had seen the non-traumatic version, 10 (21 per cent) could remember the essence of the event. These percentages were significantly different by a z-test for proportions, \( z = 2.60, p < .01 \).

We should acknowledge that our scoring procedure did bias the results in favour of greater accuracy for the traumatic group. Since the traumatic group had an additional way to be correct (mentioning a boy being injured or shot), this gives an advantage to that group. Subjects in the non-traumatic group never said ‘injury’. The modal response for the traumatic group was the mention of the injury, whereas the modal response for the non-traumatic group was the mention of the bank robbery, which is just what one might expect.

Subjects freely produced very little information about the events that they saw. The only question that was explicitly asked of them about the event was how long the videotape had lasted. While subjects invariably overestimated the duration of the tape, the subjects who had seen the traumatic version thought it had lasted longer (mean estimate of 5.8 min for traumatic subjects versus 4.4 min for non-traumatic subjects, \( t(86) = 7.4, p < .01 \)). This replicates prior research showing greater retrospective overestimation of time for relatively stressful events (Loftus, Schooler, Boone and Kline, 1987).

Finally, to verify that the interviewed subjects who had seen the traumatic version of the event had indeed found that version more upsetting, we analysed the ratings that these subjects had given us 6 months earlier. As expected, subjects who saw the traumatic version rated it as more upsetting than subjects who had seen the nontraumatic version (3.6 vs 1.7, \( t(86) = 8.21, p < .01 \)).

EXPERIMENT 3b

Method

The subjects in this study were participants from Experiment 1 who could be contacted by telephone 6 months later. The experimenter was able to contact 23 subjects who had
been presented with the neutral series of slides and 19 subjects who had been presented with the traumatic version. Subjects were reminded that they had participated in a study in which a thematic series of slides had been shown. After the reminder they were asked to describe the content of the slides. The experimenter was blind as to the version of the slides that the subjects had seen. As in Experiment 3a, the experimenter did not record the full verbatim responses, but took notes that captured the essence of the responses and preserved key phrases, such as 'a mother and her son walking in the downtown area, and the boy being hit by a car' or 'a boy run over by a car' (traumatic version), or 'mother and son in a downtown area looking for a taxi' or 'a mother and son on their way to school' (neutral condition).

Results

The responses of the subjects were used to classify subjects according to whether they recalled the essence of the event. Of subjects who had seen the traumatic version, 17 of 19 (or 89 per cent) could recall the essence of the event. Of subjects who had seen the neutral version, 12 out of 23 (52 per cent) could remember its essence. These frequencies were significantly different, chi-square (1) = 6.77, p < .01.

Discussion

Both studies showed that subjects who saw a traumatic event were better able to recall the essence of the event after a relatively long retention interval than subjects who saw a neutral event. We noticed that subjects in Experiment 3b demonstrated better recall than those in Experiment 3a. This could have occurred for many reasons, unrelated to the main purpose of this research. The subjects in Experiment 3b rehearsed the critical details once earlier, because they were all being tested for the second time, while the subjects in Experiment 3a were being tested for the first time. The subjects in Experiment 3b were tested after a somewhat shorter retention interval than those in Experiment 3a. The subjects in Experiment 3a came from a subject pool at a large university and had participated in numerous experiments during a 3 month period. Subjects in Experiment 3b had not participated in other experiments so presumably the experience was more unique and/or salient to them.

GENERAL DISCUSSION

These experiments provide information about the recollection of traumatic events. When subjects witness a traumatic event some information about the event is better retained than it would have been if the event had been non-traumatic. Subjects are better able to retain the essence of the event over relatively long retention intervals (Experiment 3). Moreover, if they are induced to focus upon some central features and rehearse those features, they are better able to retain that information, even over relatively short retention intervals.

The act of focusing, and the consequent better retention of the focused details, comes at a cost, however. Subjects performed less well on a recognition test of the specific slides (Experiment 1). Since the recognition tests were designed to tap primarily retention of peripheral visual details from the slides, the inferior performance suggests that this type of information was less well stored or retained, or both.
We conclude, cautiously, that these experiments demonstrate some possible aspects of recollection of traumatic events. Our conclusion remains tentative for several reasons. First, we cannot say that we have demonstrated something special about traumatic events that is different from any ‘high priority event’ of the sort that shows a von-Restorff-like effect (e.g. Tulving, 1969). Similar effects could occur whenever a to-be-remembered target event is distinctive, surprising, one to which subjects are instructed to pay special attention, or even an emotional event that is positive in valence. Compared to these events there could conceivably be little that is unique or peculiar about memory for traumatic events.

A second reason that our current hypotheses about traumatic events are only tentatively supported arises from a nagging problem with the study of memory for traumatic events that has plagued our research, as well as the research of others. We have tried to induce a laboratory equivalent of real-life trauma, and to do this we constructed two different versions of the same event. Almost by necessity the two versions were quite different. Thus, there is always the possibility that the details in the traumatic version were more salient or unique or in some way different from the corresponding details in the non-traumatic version. Moreover, it is conceivable that the recognition tests used in the two cases differed in sheer difficulty arising from distractor similarity. To say something unequivocal about recollection of traumatic versus non-traumatic events, it would be ideal to study memory for the identical event made traumatic or non-traumatic by its surrounding and not-to-be remembered context. Designing the stimulus materials for such an ideal study has heretofore eluded researchers, but warrants our sustained attention and effort.

In sum, we have demonstrated the selectivity of memory and captured what subjectively seem to be some essential features of traumatic events. Assuming that they are not life-crippling traumas alleged to produce clinical repression (Eysenck, 1983), the fact of the occurrence of the event can be relatively well remembered over extended periods. Mundane experiences may not be readily accessible long after they occur, but a small subset of specific, highly important episodes probably do persist (Pillemer, 1984). Some central features that capture the theme of these important events are also concomitantly well preserved. What suffers in memory is the many details that are not part of the privileged set.

ACKNOWLEDGEMENTS

This research was supported by a grant from the Swedish Council for Research in the Humanities and Social Sciences, and by grants from the U.S. National Institute of Mental Health and National Science Foundation. Lars Fallman made invaluable contributions to the research. Requests for reprints should be sent to Sven-Åke Christianson, Department of Psychology, University of Umeå, Radhusesplanaden 2, S-902 47 Umeå, Sweden, or to Elizabeth Loftus, Department of Psychology, University of Washington, Seattle, Washington, USA, 98195.

REFERENCES