REMEMBERING EMOTIONAL, CENTRAL AND PERIPHERAL INFORMATION: HOW DIFFERENT MEMORY TASKS AND INDIVIDUAL DIFFERENCES INFLUENCE EYEWITNESS TESTIMONY

Gurjog Bagri, Ph.D. and Tomazia Galhardo

Few researchers have explored how individuals remember details of criminal events in the context of eyewitness testimony. With more detailed information, jurors, for example, could deduce psychological causality and attribute responsibility more accurately. Memory research reveals that remembering specific details is dependent on the type of task used. When using recall, individuals have difficulty remembering emotional details that could provide insight into the intentions of the criminal. However, recognition favors memory for emotional details, providing greater depth of knowledge. Differences in personality, such as emotional intelligence, can influence memory as well. We explored these factors by testing memory of a fictional rape scene using three categories of information: emotional, central and peripheral. For recall and recognition, there were significant differences between emotional, central and peripheral details. Recognition favored emotional details; recall favored central and peripheral details. In addition, we found advantageous processing of information for emotionally intelligent individuals. Our research reveals how individuals possess a range of knowledge about criminal events, which provides valuable information to jurors for deducing psychological causality. We show how individual differences and the type of memory task used can impact remembering, which has implications for the cognitive interview.

When an individual is an eyewitness to a crime he or she tends to remember more information central to the event rather than information that is peripheral to the event. The increased amount of attention people allocate toward central information is best ex-

plained by the Easterbrook hypothesis, which states that arousal leads to the "narrowing" of attention. This effect reduces memory for the stimuli's periphery and increases memory for the "gist" of the event. Although various studies have documented this "memory narrowing" effect (1), other studies have revealed contradictory findings (2). The inconsistencies in the recall of central and peripheral information across studies within eyewitness testimony may be due to the use of a category that allocates all information from the event into a single category called central information. This can be problematic if, for example, a far more accurate, detailed memory of a witnessed crime is needed for juror decision making.

In eyewitness testimony the use of a set of categories using a greater range of information is important, since the existence of emotional content within the central part of the scene could influence what we remember as a witness to an event. For example, Heuer and Reisberg's (2) study showed that much of the central, thematic, and plot-relevant information was emotional in nature. Christianson (3) pointed out that the central information represented the source of emotional arousal, which included the relevant information that allowed participants to extract and understand the emotional significance of the event. In the past, researchers have neglected other subtle information that may exist within the central part of the scene. Studies such as Heath and Erickson's (4) have used only central and peripheral categories to measure memory after varied post-event presentation, which again neglects the existence of other information such as emotional details. However, other researchers have explored additional criteria revealing successful recall for other types of details.

Overall, it is clear that the use of additional criteria that can measure what we remember from a criminal event has been neglected for some time. Those who witness a crime would remem-

ber a greater range of information which can be valuable since it can reduce the obscurity around attribution of responsibility and clarify psychological causality in criminal cases. Indeed, researchers such as Wiener and Rinehart (5) have shown how the evaluation of a mental state, in legal cases, is based on people's judgment of motivation, intention, and rationality, assessed from the attacker's behavior. This suggests that within a criminal event there are important details relating to the mental state or subjective information about the perpetrator and victim. This type of information would be invaluable for jurors, for example, who could then deduce psychological causality such as psychological dispositions, and thought patterns. This would allow the jurors to better understand the reason why a perpetrator committed a particular crime, enabling jurors to make accurate judgments in criminal cases.

Importantly, information that can be used to deduce psychological causality and attribute responsibility will be of greatest benefit in legal cases where criminal intent is blurred, none more so than in the crime of rape which involves an underlying act that, under moral situations where the intent of both partners is clear, can be both pleasurable and necessary to individuals (6). The intent and perceptions of the participants may be ambiguous and conflicting, which can determine whether the act crossed the line between lawful, consensual intercourse and unlawful, forcible rape. The verbal and nonverbal cues present are open to misperception resulting in distortion between the sender's intent and the receiver's interpretation (7); however an eyewitness to a sexual assault can be a valuable source of information in providing additional information, such as intention of the criminal and victim. Furthermore, research on the bystander effect and sexual assault reveals how bystanders who remain as passive viewers without intervening are present in one third of sexual assaults (8). Research has suggested that bystanders who have passively witnessed a sexual as-

sault will remember important details about the event which requires further exploration (9).

In general, an individual who has witnessed an emotional event will have greater memory for emotional details. Research has revealed how emotional information in an event can evoke greater feeling in us, drawing our attention further toward emotional parts of the event (10). If central information in a crime scene contains information relating to facial expressions, nonverbal cues, intentions and feelings of the victims, then we would be able to remember and discriminate between these types of emotional details later on when asked to recall them. This supports both the work of Louw and Venter (11) and Heur and Reisberg (2) where individuals shifted focus toward the center of the scene, which was the site of emotional arousal resulting in the recall of specific emotional information. This shows how emotional information is distinctive, which enhances recall, resulting in the ability to discriminate between details, leading to a far more accurate memory of the event.

Since greater attention is shifted toward the emotional part of the scene, it appears that those who are more proficient at perceiving and understanding emotions would then have an even greater advantage at directing their attention toward emotional information. This has been demonstrated by several researchers, such as Ciarrochi et al. (12) and Mikolajczak et al. (13), who showed that during negative emotionally arousing events, individuals with high emotional intelligence remembered more negative information than low emotional intelligent individuals. To explain these effects, Aspinwall and colleagues (14), state that personality traits, such as emotional intelligence, will allow individuals to detect threat and danger more quickly. In general, emotional intelligence is a measure of how well individuals can perceive and analyze emotions in others. In the case of high emotional intelli-

gent individuals they will have a greater ability to perceive and analyze emotional expressions than low emotional intelligent individuals, resulting in increased recall of emotional details. In relation to eyewitness accounts we see a great deal of variation in recall scripts, and the abundance of subjectivity in recollections may be due to individual differences in processing arousing events that contain emotional information.

Thus, we wanted to explore various issues related to eyewitness testimony. First, we wanted to test whether individuals could discriminate between emotional information and other central information but also remember both types of information leading to a far more accurate memory of a criminal event. We created three categories: emotional details, central details and peripheral details and tested whether individuals could discriminate and remember details from each category. A primary concern for eyewitness testimony is the category central information, which appears to blur the boundary with other types of information that co-exist centrally to an event. However, by having a strict criterion that defines emotional information from other information in a crime we can then see how individuals are allocating attention to specific emotional information, such as intentions of the perpetrator or feelings of disgust in the victim.

Second, we used two different types of memory tests: recall and recognition. This is because recall appears to be the standard memory task that is used, for instance, in the cognitive interview (15). The impact of emotional information has not been measured using both recall and recognition tasks, thus any effects from emotional details have been neglected. We used both a recall task and a recognition task since we predicted that successful remembering would be dependent on the type of memory task used. This has important implications for the cognitive interview since this procedure relies on coding subjective information through a proce-

dure that relies on recall. However, emotional information can be abstract and complex and so more difficult to remember when asked to recall, as opposed to physical details such as the type of clothes the perpetrator wore (16). Important information such as intention and feelings of the victim or perpetrator will not be remembered as well if recall is used as a standard procedure in investigative cases. However, in memory research, a different type of memory task called recognition leads to greater remembering of emotional information. This is because when individuals are presented with a cue word during recognition tasks, they will have a feeling of familiarity for that item resulting in rapid remembering of information. Attention appears to be focused automatically and preferentially on emotionally arousing stimuli and, as a result, arousal subjects display greater performance overall (17). Also, since we were measuring differences between emotional, central and peripheral details we selected a fictional rape scene as stimuli. We wanted to see if participants could discriminate emotional details from central and peripheral details for a scene that contained ambiguous and complex behaviors that would require the analysis of intentions and feelings of the individuals based on facial expressions and non-verbal cues and any other cues in a scene.

Finally, we wanted to explore whether individual differences can influence the remembering of emotional information. If investigators are asking questions related to emotional details from a witnessed crime, then certain individuals may be better at remembering intentions of the victim or perpetrator than other individuals. In our study, we tested whether recall or recognition of emotional information, as well as other information, is influenced by emotional intelligence levels across individuals.

METHOD

Participants

A total of 70 undergraduate students from the University of Huddersfield (27 male [38.6 %] and 43 female [61.4 %]) were recruited to participate in the study through the psychology department's SONA system and opportunity sampling. Fifteen of them classified themselves as White British (21.4%); twelve of them as Lithuanian (17.1%); nine as Portuguese (12.9%); nine as Greek (12.9%); six as Chinese (8.6%); four as Indian British (5.7%); four as Czech (5.7%); four as Spanish (5.7%); two as Nigerian (2.9 %); one as Venezuelan (1.4%) and one as Syrian (1.4%). Furthermore, a small percentage of them (4.3%) reported to suffer from an anxiety disorder.

Materials and Apparatus

A three-minute long clip portraying a scene of rape was displayed through a computer screen to each participant. The clip begins with a young woman arriving at a photography studio to pose for photos. There are two men present who are different in appearance (age, hair, clothes and height). After a brief conversation among the three of them, the young man decides to leave. The woman remains with the older man who begins the photo session. He asks her to remove her clothes, but she is reluctant. He approaches her to ask again, but when she hesitates he grabs her and forces her to the floor. He removes her clothes as she struggles. Following the attack, the man leaves the studio and the young woman is left alone. She is visibly traumatized as the film ends.

In order to have the participants' undivided attention and minimize background distractions, each participant was given a pair of headphones to listen to the film sequence.

The Trait Emotional Intelligence Questionnaire TEIQue (18) is a self-reported and valid measurement instrument predicated on trait EI theory. In this study, for the purposes of acquiring a global comprehension of the individual's emotional intelligence, the

short form of the TEIQue (TEIQue-SF) was used. This version, based on the long form (19), consists of 30 items rated on a 7-point Likert scale. These items represent each of the 15 subscales of the TEIQue and present a broad coverage of the domain and the person's general emotional functioning.

In order to evaluate the participants' memory performance, they completed a free recall test. The recall test was scored by attributing one point to each element of central, peripheral and emotional information recalled. The scoring methodology was based on a prior categorization of all central, peripheral and emotional information featured on the sequences of the film. Independent judges evaluated the sequences of the film as central, peripheral and emotional.

The recognition consisted of 24 sentences that presented a coherent narration of the events of the film clip in chronological order. They included both factual information and false information in equal amounts, as well as an equal amount of central, peripheral and emotional information (eight sentences for each type of information).

Information was classified in terms of being central, peripheral or emotional. A detail was considered central if 1) it was related to the main characters involved in the film clip or if its contents could not be replaced without altering the course of the story (e.g., the attacker kissed the girl on her shoulders). A detail was classified as emotional if it was expressed by the victim or attacker, such as sadness, shock, or satisfaction (e.g., the girl had a look of anguish on her face). Any details related to the background, or to any other characters that were not essential to the course of action, were classified as peripheral (e.g., the room walls were painted pink and white).

After each sentence there was a 5-point scale to measure participant's confidence, where 1 meant "Not confident at all" and 5 "Absolutely confident."

Design

This experiment used a repeated measures design for the recall and recognition task with three levels for emotional, central and peripheral information. The experiment used a repeated measures ANOVA for the analysis for the three levels of information and then paired t-tests for further analysis.

Procedure

Participants in groups of ten or less were called to carry out an experiment on memory accuracy and eyewitness testimony. They were briefed about the experiment. After consent was obtained, each participant was positioned in front of a computer and asked to put the headphones on. Once they had done this they were asked to play the film clip on their screens.

Following this, participants were asked to remain silent. They were then given their first task, which was a free recall test. This task asked them to write down as much content as they recalled from the film clip. Participants were given as much as time as they needed to complete this task. Once they had finished the recall task, they were given a five-minute break.

Afterward, participants were given the recognition test. In this task, participants were asked to indicate whether they believe each of the sentences to be true or false and to rate the confidence level of their responses. As soon as all participants had completed this task, they were given the TEIQue and asked to rate their responses.

Finally, all participants were debriefed about the aims of this research as well as given an explanation about how their data will be used. Since they had watched a crime of a violent nature, they

were also provided with a counseling services number in case it had caused them any psychological distress.

RESULTS

Recall

The participants' responses for the recall test were analyzed using a repeated measures ANOVA with type of information as a variable.

Participants were found to recall more central information (M = 3.94; SD = 2.19) than peripheral information (M = 3.55; SD = 2.21) and more central than emotional information (M = 2.30; SD = 1.36). In addition participants recalled more peripheral information (M = 3.55; SD = 2.21) than emotional information (M = 2.30; SD = 1.36). A repeated measures ANOVA revealed significance between the type of information recalled $F(2, 138) = 17.24$, $p < 0.001$, $\eta^2 = 0.20$. Further paired t-test analyses were done between type of information and revealed that central information was significantly higher than emotional information, $t(69) = 6.14$, $p < 0.001$, but was not significantly higher than peripheral information, $t(69) = 1.33$, $p = 0.19$. However, peripheral information was significantly higher than emotional information, $t(69) = 4.08$, $p < 0.001$.

To understand the difference in the recall of information based on emotional intelligent levels (EI), we performed a repeated measures ANOVA for each category among low, medium and high emotionally intelligent groups. A tertile split was performed and participants were assigned to a low (<33rd percentile, n = 23), moderate (33rd to 66th percentile, n = 23), or high (>66th percentile, n = 24) group. For emotional information there was a significant difference between low (M = 1.83; SD = 1.15), medium (M = 2.87; SD = 1.25) and high EI groups (M = 2.13; SD = 1.46), $F(2, 44) = 4.96$, $p = 0.01$, $\eta^2 = 0.18$. Further paired t-tests revealed

a significant difference between low and medium groups only, $t(22) = 3.29$, $p = 0.003$. However, for both central and peripheral information there was a non-significant difference between low, medium, and high EI groups ($p > 0.05$).

Errors

Participants were found to make more errors for central information ($M = 0.74$; $SD = 1.12$) than peripheral information ($M = 0.51$; $SD = 0.86$) and more errors than emotional information ($M = 0.10$; $SD = 0.30$). In addition, participants made more errors for peripheral information ($M = 0.51$; $SD = 0.86$) than emotional information ($M = 0.10$; $SD = 0.30$). A repeated measures ANOVA revealed significance between errors made for type of information recalled $F(2, 138) = 10.49$, $p < 0.001$, $\eta^2 = 0.13$. Further paired t-test analyses were done between type of information and revealed that central information was significantly higher than emotional information, $t(69) = 4.66$, $p < 0.001$ but was not significantly higher than peripheral information, $t(69) = 1.30$, $p = 0.20$. However, peripheral information was significantly higher than emotional information, $t(69) = 3.96$, $p < 0.001$.

A repeated measures ANOVA was performed for each category between low, medium and high EI individuals. For emotional information there was a non-significant difference between low ($M = 0.04$; $SD = 0.21$), medium ($M = 0.13$; $SD = 0.34$) and high EI groups ($M = 0.13$; $SD = 0.34$), $F(2, 44) = 0.66$, $p = 0.52$, $\eta^2 = 0.03$. However, further paired t-tests revealed a significant difference between low and medium groups only, $t(22) = 11.02$, $p < 0.001$. For both central and peripheral information there was a non-significant difference between low, medium, and high EI groups ($p > 0.05$).

Recognition

The participants' responses for the recognition test were analyzed using a repeated measures ANOVA with type of information as a variable.

Hit Rates

Hit rates revealed that participants were found to recognize less central information ($M = 0.76$; $SD = 0.12$) than peripheral information ($M = 0.82$; $SD = 0.13$). However, hit rates for emotional information ($M = 0.87$; $SD = 0.08$) were higher than peripheral information ($M = 0.82$, $SD = 0.13$) and higher than central information ($M = 0.76$, $SD = 0.12$). A repeated measures ANOVA for hit rates for the recognition task revealed significance between the type of information, $F(2, 138) = 17.74$, $p < 0.001$, $\eta^2 = 0.21$. Further paired t-test analyses were done between type of information and revealed that hit rates for emotional information was significantly higher than central information, $t(69) = 6.15$, $p < 0.001$ and significantly higher than peripheral information, $t(69) = 2.66$, $p = 0.01$. In addition, peripheral information was significantly higher than central information, $t(69) = 3.19$, $p = 0.002$.

To understand the difference in the hit rates, we performed a repeated measures ANOVA for each category between low, medium and high EI groups. For central information there was a significant difference between low ($M = 0.75$; $SD = 0.13$) medium ($M = 0.70$; $SD = 0.11$) and high EI groups ($M = 0.84$; $SD = 0.12$), $F(2, 44) = 6.51$, $p = 0.003$, $\eta^2 = 0.23$. Further paired t-test revealed there was significant difference between medium and high EI groups for central information, $t(22) = 4.09$, $p < 0.001$ and significant difference between low and high EI group for central information, $t(22) = 2.14$, $p = 0.044$. For emotional and peripheral information, there was a non-significant difference between low, medium, and high EI groups ($p > 0.05$).

False Alarm Rates

False alarm rates revealed that participants made more false alarms for central information ($M = 0.24$; $SD = 0.12$) than peripheral information ($M = 0.18$; $SD = 0.13$) and more than emotional information ($M = 0.13$, $SD = 0.08$). Overall emotional information contained the least false alarms for the recognition task. A repeated measures ANOVA for false alarm rates for the recognition task revealed significance between the type of information, $F(2, 138) = 19.10$, $p < 0.001$, $\eta^2 = 0.22$. Further paired t-test analyses were done between type of information and revealed that false alarm rates for emotional information was significantly lower than central information, $t(69) = 6.46$, $p < 0.001$ and significantly lower than peripheral information, $t(69) = 2.62$, $p = 0.01$. In addition, peripheral information was significantly lower than central information, $t(69) = 3.38$, $p = 0.001$.

To understand the difference in the false alarms, we performed a repeated measures ANOVA for each category between low, medium and high EI groups. For central information there was a significant difference between low ($M = 0.25$; $SD = 0.12$) medium ($M = 0.29$; $SD = 0.13$) and high EI groups ($M = 0.17$; $SD = 0.11$), $F(2, 44) = 5.59$, $p = 0.007$, $\eta^2 = 0.20$. Further paired t-test revealed there was a significant difference between medium and high EI groups for central information, $t(22) = 3.27$, $p = 0.003$ and significant difference between low and high EI groups, $t(22) = 2.22$, $p = 0.037$. However, for emotional information and peripheral information there was a non-significant difference between low, medium, and high EI groups ($p > 0.05$).

Confidence

Analyses revealed that there was a significant difference in confidence ratings between central ($M = 4.08$), peripheral ($M = 3.55$) and emotional ($M = 3.39$), $F(2, 136) = 10.96$, $p < 0.001$, $\eta^2 = 0.14$. In addition, subjects placed greater confidence on their correct answers ($M=4.36$, $SD=0.06$) in comparison to the incor-

rect ones (M=2.98, SD= 0.13), F (1, 68) = 132.57, p <0.001, η^2 = 0.66.

DISCUSSION

Our findings reveal how participants are able to differentiate and successfully recall and recognize emotional details, central details and peripheral details, all of which were represented in a rape scene. Rather than blurring of information, individuals can remember and distinguish emotional content, which contained valuable information relating to motives, feelings and thoughts, from other central details in a crime scene. However, during the recall task, the remembering of emotional details was lower and had the highest number of errors compared to central and peripheral details. In addition, the recall task revealed the highest recall and lowest intrusions for central details, followed by peripheral details, which was consistent with past findings. In contrast, during the recognition task the remembering of emotional details was higher than both central and peripheral details and also emotional details had the least amount of false alarm rates. Furthermore, since the task involved remembering emotional information, we measured individual differences in the processing of emotional content and found an advantageous processing for emotionally intelligent individuals in both recall and recognition tasks.

Our research shows how emotionally arousing criminal events direct our attention to the central part of the scene, which does result in the prising of emotional information from central actions. This means that individuals are able to quite successfully distinguish emotional information from other information occurring in a crime scene. However, we have shown that a commonly used method for remembering details within investigative procedures, such as recall, results in lower remembering of emotional information due to cognitive constraints during the recall task. The reason we saw lower recall of emotional details compared to cen-

tral details during recall was because memory involves a complex, reconstructive process, which requires some degree of effort (20). Second, the construction of a complex mental image that is abstract, such as emotional information, will take longer to form, maintain and inspect (21). Both these stages would result in an increasing amount of effort on processing during recall since in our experiment participants had to recall physical details, emotional, cognitive, and spatial information. Furthermore, attention would be needed to retrieve, maintain and inspect the face. The subsequent and successful assignment of a corresponding emotional trait to a face would involve the analysis of the facial expression, placing further demands on the ability to identify and categorize an emotion. Both the recall data and error rates for emotional information confirm this explanation. In support of this, we found that peripheral details were recalled more than emotional details since this category contained physical details, which required less effort to analyze and inspect the mental image (21).

This has important implications for the cognitive interview, which relies on remembering emotional information, such as mental states or feelings of the perpetrator, using recall, which will be lower and result in higher intrusions (15). We have shown that when subjective information is required during investigative procedures, and in particular if higher levels of accuracy are needed, then a recognition procedure would be more effective. For recognition, we predicted the opposite effect—where individuals would rely on familiarity resulting in greater memory for emotional details. Research in recognition reveals that when individuals are presented with a cue word they can have a feeling of familiarity for that item resulting in rapid retrieval. This type of task favors the remembering of emotional details. Recognition tasks that involve remembering emotions in faces, or emotional behavior that involves fear or anxiety automatically activates regions of the

brain associated with processing emotional behavior (22). Of all the details in our study, the victim's facial expression of pain and suffering evoked empathy in the viewer. As a result, when presented with a cue word relating to this emotional detail, a feeling of familiarity was immediately evoked, resulting in retrieval of further emotional information. This explanation is confirmed by data on central details, which were lower than emotional details. Further support for this comes from the errors for emotional information, which was lower than central or peripheral, but also from confidence ratings for emotional information, which were higher than central and peripheral.

We have shown how individuals encode a range of knowledge about a crime scene, which can be extremely valuable for jurors or investigators, particularly for ambiguous cases (23). However, our results also show how valuable knowledge about a crime case will remain untapped due to constraints placed by the type of memory task used, which will influence retrieval. At present, eyewitness testimony information is characterized as either central or peripheral, with little or no criteria for accurately recording information pertaining to intention, feeling or motivation in an empirical setting. With verification through experimental work, psychological causality and attribution of responsibility in ambiguous cases can lead to greater accuracy for the legal justice system. This will be particularly useful for sexual assaults as research reveals how a third of sexual assaults are witnessed by passive bystanders. In the present research, the participants acted as passive bystanders witnessing a sexual assault. The findings reveal how passive bystanders remember valuable emotional information and other details that could be used to aid the legal system and investigators but also support bystander intervention programs for sexual assault.

In relation to how we remember past events, research has revealed how an event consists of a range of knowledge that in-

cludes sensory details, emotional details and cognitive details (20). We have shown that witnessing a crime is similar to experiencing any other episodic event, in that individuals have a potential source of emotional knowledge relating to intention, feelings and thoughts from a crime scene. As individuals witness such emotional events their attention will be directed toward specific emotional content, resulting in a memory bias. As a result, an emotionally arousing scene will enhance the subjects' range of attention, to produce richer, more detailed memory (2) which, as we have shown, can be coded into separate categories.

Finally, we predicted that emotional intelligence will mediate the remembering of emotional information, resulting in differences between high, medium and low emotional intelligent individuals. Our data for emotional intelligence suggests there was selective processing of emotional information for emotionally intelligent individuals. The research shows that one of the key personality aspects that has a strong impact on emotional processing and remembering has some effect on eyewitnesses during emotionally distinctive criminal events. This coincides with the research by Petrides and Furnham (24) who showed that high emotional intelligent individuals are able to perceive emotional expressions far more than low emotional intelligent individuals during a recognition task. This also confirms the work of Mikolajczak et al. (13) on how emotionally intelligent individuals tend to remember more details from unpleasant events. This suggests that individual differences in eyewitnesses influence the memory of an event which could have an impact on investigative cases and the subsequent jury decisions. In general, jurors, in their role as legal decision makers, construct their own summary or "story" of what occurred based on their own schema, but will do so when presented with information from an eyewitness testimony at trial (25). Our work shows that eyewitnesses can present different information based

on their personality traits, which could influence jury decisions. To accommodate the complexity of cases where psychological causality is difficult to deduce, we suggest researchers in eyewitness testimony first broaden the categories that are required to accurately represent the detailed information that we encode during experiences, to include intentions, facial expressions, and other nonverbal cues, which are contained within central information. In addition, researchers within this field will need to consider the impact of individual differences on eyewitness testimony.

In the past, research has shown little sex differences in recall for sexual assaults, for example; however, where differences are seen, conclusions have been ambiguous (26). This may be because the criteria for recall have been too broad and have included only central and peripheral information with other more detailed information remaining undetected. The benefit for the legal system of creating more specific criteria relating to intentions of the victim versus criteria relating to the intentions of the attacker would allow us to see possible distortions in memory mediated by sex or other factors. Further benefits of having specific criteria in a controlled experimental condition for measuring details that were witnessed would involve researchers and legal practitioners to construct a chronological order of emotional and action based details, which would enable a juror to understand the dynamics of the relationship and attribute responsibility accurately (27). In terms of practical application, for instance in a legal case, investigators could collate valuable objective and subjective information from the cognitive interview, which can then be categorized into a set of questions and given to the eyewitness in a recognition paradigm, for example.

Overall, our findings reveal that for recognition emotion is favored over central actions, whereas for recall central actions and peripheral actions are favored over emotional details. This sug-

gests knowledge about a crime scene is dependent on the type of memory task used and any informative value inherent in emotional information can be enhanced by individual differences in emotional processing ability. Our work suggests that central events not only contain actions pertaining to the criminal or victim, but also other, far more subtle and complex emotional information conveyed through facial expressions. It is advantageous for the legal system to use the information that we encode on facial expressions and non-verbal cues that convey important information about intentions, motives and feelings of both the attacker and victim. Therefore, it is imperative for those working in the investigative field or criminological research to construct additional categories. Further work will then need to be conducted to understand how different type of memory tasks can influence the remembering of a criminal event, which will provide greater clarity in court cases or police investigations.

REFERENCES

1. Christianson SA, Loftus EF, Hoffman H, Loftus GR: Eye fixations and memory for emotional events. Journal of Experimental Psychology: Learning, Memory, and Cognition 1991; 17:693-701
2. Heuer F, Reisberg D: Vivid memory of emotional events: the accuracy of remembered minutiae. Memory and Cognition 1990; 18:496-506
3. Christianson SA: Emotional stress and eyewitness memory: a critical review. Psychological Bulletin 1992; 112:284-309
4. Heath WP, Erickson JR: Memory for central and peripheral actions and props after varied post-event presentation. Legal and Criminological Psychology 1998; 3:321-346

5. Wiener RL, Rinehart N: Psychological causality in the attribution of responsibility for rape. Sex Roles 1986; 14:369-382
6. Massaro TM: Experts, psychology, credibility, and rape: the rape trauma syndrome issue and its implications for expert psychological testimony. Minnesota Law Review 1985; 69:395-470
7. Abbey A, Melby C: The effects of nonverbal cues on gender differences in perceptions of sexual intent. Sex Roles 1986; 15:283-298
8. Planty M: Third party involvement in violent crime, 1993-1999. Bureau of Justice Statistics Special Report. Washington, D.C. U.S. Department of Justice. NCJ189100
9. McMahon S: Rape myth beliefs and bystander attitudes among incoming college students. Journal of American College Health 2010; 59:3-11
10. Kensinger EA, Corkin S: Memory enhancement for emotional words: Are emotional words more vividly remembered than neutral words? Memory and Cognition 2003; 31:1169-1180
11. Louw DA, Venter A: The relationship between memory and the recall of specific details. Medicine and Law 2004; 23:625-655
12. Ciarrochi J, Chan A, Caputi P: A critical evaluation of the emotional intelligence construct. Personality and Individual Differences 2000; 28:539-561
13. Mikolajczak M, Roy E, Verstrynge V, Luminet O: An exploration of the moderating effect of trait emotional intelligence on memory and attention in neutral and stressful conditions. British Journal of Psychology 2009; 100:699-715
14. Aspinwall LG, Richter L, Hoffman RR: Understanding how optimism works: an examination of optimists' adaptive moderation of belief and behavior, in Optimism and Pessimism: Impli-

cations for Theory, Research and Practice. Edited by Chang EC. Washington DC, American Psychological Association, 2001

15. Vrij A: Criteria-based content analysis: a qualitative review of the first 37 studies. Psychology, Public Policy, and Law 2005; 11: 3–41
16. Anderson SJ, Conway MA: Investigating the structure of specific autobiographical memories. Journal of Experimental Psychology: Learning, Memory and Cognition 1993; 19:1178-1196
17. Kahneman D: Attention and Effort. Englewood Cliffs, NJ, Prentice Hall, 1973
18. Petrides KV: Technical Manual for the Trait Emotional Intelligence Questionnaires (TEIQue). London, London Psychometric Laboratory, 2009
19. Petridesi KV, Furnham A: Trait emotional intelligence: behavioural validation in two studies of emotion recognition and reactivity to mood induction. European Journal of Personality 2003; 17:39-57
20. Conway MA, Plyedell-Pearce CW: The construction of autobiographical memories in the self-memory system. Psychological Review 2000; 107:261-288
21. Berger GH, Gaunitz SCB: Self-rated imagery and encoding strategies in visual memory. British Journal of Psychology 1979; 70:21-24
22. Morris JS, Frith CD, Perrett DI, Rowland D, Young AW, Calder AJ, Dolan RJ: A differential neural response in the human amygdala to fearful and happy facial expressions. Nature 1996; 383:812-815.

23 Sawyer RG, Desmond SM, Lucke GM: Sexual communication and the college student: implications for date rape. Health Values 1993; 17:11-20

24. Petrides KV, Furnham A: Trait emotional intelligence: behaviour validation in two studies of emotion recognition and reactivity to mood induction. European Journal of Personality 2003;17:39-57

25. Hastie R, Pennington N: Explanation based decision making, in Judgment and Decisions Making: An Interdisciplinary Reader. Edited by Connolly T, Aders HR, Hammond K. New York, Cambridge University Press, 2000

26. Bottoms BL: Individual differences in perceptions of child sexual assault victims, in Child Victims, Child Witnesses: Understanding and Improving Testimony. Edited by Goodman GS, Bottoms BL. New York, Guilford, 1993

27. Deitz S, Byrnes L: Attribution of responsibility for sexual assaults: the influence of observer empathy, criminal occupation, and attractiveness. The Journal of Psychology 1981;108: 17-29

ABOUT THE AUTHORS

Dr. Gurjog Bagri is a Senior Lecturer in Psychology at the University of Huddersfield. His publications and research interests are in the memory of personal events. Tomazia Galhardo has completed research in investigative psychology and is currently working in the field of forensic psychology.