FORENSIC EVALUATION OF THE FALLIBILITY OF HUMAN MEMORY AND THE RELIABILITY OF EYEWITNESS TESTIMONY

By

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Abstract

Several studies have noted that eyewitness testimonies are often inaccurate, and inaccurate eyewitness testimonies have been identified as constituting one of the major causes of wrongful convictions in the courtroom. In some countries numerous convicted persons have been exculpated using DNA evidence and most of these wrongful convictions were caused by inaccurate eyewitness testimony. This study evaluates how memory theories and researches about the fallibility of human memory relates to eyewitness memory and whether eyewitness testimony should be considered reliable in the courtroom. In doing this, it adopted secondary research method wherein several theoretical conceptions and research paradigms relating to only two eyewitness memory phenomena: weapon focus effect and post-event information were reviewed. Finally, the study recommends that although, studies of the mechanisms of human memory indicate that due to several factors eyewitness testimonies are often inaccurate, the criminal justice system relies most of the time on eyewitness accounts as the only evidence available for the resolution of criminal cases due to unavailability of DNA evidence in most cases, therefore it is critical in crime investigation and prosecution and should be considered reliable in the courtroom. However, the criminal justice system should adopt numerous recommendations of memory researches, such as the use of cognitive interview by police investigators and attorneys, avoiding long memory retention intervals in criminal matters and warning eyewitnesses about potential misinformation prior to the misinformation phase etc. These recommendations will help to eliminate most of the problems which cast doubts over the reliability of eyewitness evidence.

Keywords: *Eyewitness, Fallibility, Memory, Post event information, Reliability, Testimony, Weapon focus.*

Background of the study

Several researchers have observed that eyewitness testimonies are oftentimes inaccurate, due to several reasons such as the encoding process being inundated with errors during the original event or the memory of the event was subconsciously transformed during the retention process (Nelson, *et al.,* 2010, Wells & Olson, 2003, Loftus, 1996). It has also been revealed that inaccurate eyewitness testimonies have constituted one of the main causes of wrongful convictions in the courtroom (Overbeck, 2005). For example, about 246 convicted persons in United States of America have been exculpated since 1992 by "the innocence project" (www.innocenceproject.org)using DNA-rich biological evidence and 75 percent of these wrongful convictions were caused by defective or inaccurate eyewitness testimony (Nelson, *et al.,* 2010).

Eyewitness testimony is the recollection from memory made by an individual, of an event or occurrence which the individual witnessed, and it is frequently associated with criminal events such as description of a robbery or road accident (Melrose *et al.*,2020); Junnarkar and Lakhani, 2021). Memory refers to the inherent mental capacity of the human brain to encode, store and recall information about events, places and persons whenever they are needed. It usually consists of short-term or working memory and long-term memory (Jaccard, 2020). The storage capacity and durability of short-term memory is limited (Forsberg *et al.,* 2021), while long-term memory has enormous storage capacity and durability (Scoville and Milner, 2000).

Loftus (1996) contends that memory process consists of three stages: the acquisition stage, the retention stage and retrieval stage. At the acquisition stage the witness chooses which features of the event to pay attention to and this is usually condensed into better sequences of decisions which helps to determine where to make the next eye fixation. At the retention stage, some of the encoded information stay in the memory unchanged, whereas others undergo unanticipated changes arising from the witness engaging in postevent activities such as attending interviews/interrogations, holding discussions or watching video clips, of the witnessed event. At the retrieval stage, the witness uses both the information acquired during the original experience and information acquired afterward to reconstruct the piece of the event needed, from the long-term memory (Loftus, 1996).

Failure to retrieve information may occur as a result of either event factors during the acquisition, like exposure time, frequency, detail salience, type of fact and violence or witness factors, like stress, expectations and perceptual activity. It may also occur because the information may have been interfered with during retention as a result of factors like length of retention interval, postevent information, memory enhancement, intervening thoughts of a witness, labelling, guessing, nature of detail, freezing effect and compromise memories. Finally, it may become inaccessible during retrieval because of factors like the retrieval environment, type of retrieval, question wording, who is asking the questions, confidence in recollection and hypnosis. Therefore, the three stages are important because failure at any stage can lead to errors in memory (Loftus, 1996).

Some people especially the operators of the criminal justice system such as judges, jurors, magistrates and attorneys insist that eyewitness accounts are of utmost importance in determining the culpability of accused persons in criminal trials while, some other people especially victims of miscarriage of justice on account of faulty eyewitness testimony and their relations contend that eyewitness testimony should be dispensed with in criminal proceedings because of the irreversible damage it has done to some innocent accused persons. Yet a third group of persons acknowledge that although eyewitness reports have on several occasions caused the miscarriage of justice; however, they posit that this problem can be mitigated by addressing the problems which create cause eyewitnesses to render inaccurate accounts of a crime they witnessed. Therefore, this paper aims to forensically evaluate the fallibility of human memory and the reliability of eyewitness testimony in the courtroom, with a view to ascertaining its overall relevance in criminal prosecution and ways through which it can be made more reliable considering the shortcomings associated with the human memory. in doing so the paper will review some of the extant theories and research paradigms relating to two eyewitness memory phenomena, which are weapon focus effect and post-event information. These theoretical and research paradigms will include the attentional focus approach, the arousal/threat hypothesis, the unusual item hypothesis, as well as the source monitoring approach and the retroactive interference theory.

Review of Extant Literature

Cognitive and social psychologists have recognised numerous factors that could account for inaccurate eyewitness testimonies (Wells & Olson, 2003), and they fall into two broad categories which are estimator variables and system variables. Estimator variables refer to features which cannot be manipulated in real crime investigation scenarios, such as witness characteristics while system variables refer to factors that are controllable in real crime investigations such as the construction of police line-up (Smith *et al.,* 2020).

One of the estimator variables identified by psychologists is weapon focus effect and this refers to the memory impairment caused by the presence of a weapon such as gun, at a crime scene (Fawcett *et al.,* 2013). This phenomenon is supported by three theoretical explanations, first, the attentional focus approach which distinguishes between central and peripheral details of an emotional event in addressing the impact of the presence of a weapon at a crime scene (Kocab and Sporer, 2016). Second, the arousal/threat hypothesis which observes that there is heightened physiological awakening at the sight of a weapon, by virtue of its threatening nature, causing a narrowing in the number of observed signs and reducing the application of marginal stimulus occasioned by fixation of attention on the weapon (Głomb, K., 2021). Third, the unusual item hypothesis which posits that given the content of the scene the observer's attention will be drawn to unexpected objects more readily than usual objects expected at the scene (Bainbridge *et al.,*2019).

Cullen, (2020) argues that because eyewitnesses' attention are usually concentrated on the weapon to the exclusion of other details at the scene of a

crime, the features, accuracy and the identification accuracy are neglected. Ahola, (2012) notes that the impairment for marginal details and synchronised enrichment for the fundamental details of an incident can be explained by the fact that narrowing of attention and memory consolidation are reduced by physiological arousal. Harris and Pashler, (2005) contend that the clarity of memory of an event can be heightened by an emotionally arousing event, while Luna *et. al.,* (2018), posit that emotional arousal impairs memory for marginal details but improves memory for details vital to an incident. Christianson and Engelberg, (2006) observe that the critical and detailed information of a violent event and the violent event itself persist in memory.

However, Reisberg (2006) notes that the presence of something else that catches our attention rather than emotion causes the contraction of memory. Nonetheless, Brainerd et al., (2008) explain that higher levels of false memory may be caused by recalling undesirable events while neutral and positive materials elicit intermediate and lowest levels respectively. Ahola, (2012), contends that conventional and less emotional events tend to become prominent in the memory than those events with high degree of specificity as the retention interval between encoding and retrieval widens. Therefore, individuals will during the process of retrieval rely more on the less emotional information in tweaking their memory.

Shapiro *et al.,* (2018) posit that the so-called weapon focus effect is not created by the presence of a weapon at a crime scene but that any other unique/unusual item can produce the same deleterious effect on human memory and referred to the effect as general attentional effect. Harada *et al.,* (2020), argue that the

unanticipated nature of weapons is the reason for weapon focus effect rather than fear, and usually there is the tendency for witnesses to fix more attention on weapons and less on other details because of the unusualness of weapon in most of the contexts. Mitchell *et al.,* (1998) contend that, if the claim of weapon focus effect were to be factual, it would undoubtedly be more evident in real crime scenarios than in laboratory studies, because of the likely salience of a weapon at a real crime scene, yet results of field researches do not indicate much effect of weapon on eyewitnesses.

Meanwhile, Kocab and Sporer (2016) argue that,

> *the large heterogeneity of outcomes in both the weapon focus effect and unusualness studies clearly indicate that these robust effects may be affected by situational circumstances that have to be taken into consideration (p.109).*

Nonetheless, a meta-analysis conducted by Fawcett *et al.,* (2013) revealed that the results of real-world studies of the effect of weapon focus and experimental results are at variance. While there was no evidence of memory impairment in the archival and field researches, there were compelling evidence of the effect in the laboratory and simulation studies they reviewed. The meta-analysis also indicated that whereas the outcomes of the laboratory and simulation studies indicated occasional effects on identification accuracy, they showed that the effects were obviously damaging to features accuracy (Fawcett *et al.,* 2013).

Pickel, (2007) notes that suspect identification is a less sensitive task than recalling descriptive details of the features of an event. In addition, the complexities inherent in real-world crime appears to be concealing the weapon focus effect, although this effect has been in existence all the while. (Fawcett *et*

al., 2013). Pickel, (2007) argues that several reasons could be responsible for the perceived lack of effect of the weapon focus in real-world studies, such as the removal of the weapon from the field of vision of the victim as a result of the proximity between the victim and perpetrator. The perpetrator could have been seen by the victim before the presentation of the weapon and the perpetrator may have weakened the weapon focus effect by spending more time at the crime scene and acting less prudently because the weapon makes him feel less susceptible.

One of the system variables recognised by psychologists is post-event information (Gabbert *et al.,* 2018). The phenomenon of post-event information is supported by two theoretical explanations. First, the source monitoring approach which posits that memory errors occur when a previous experience is wrongly attributed with being the source of another known information or event (Lindsay and Johnson, 2000). Secondly, the retroactive interference theory which postulates that impairment of retrieval of some target information from memory results from intrusion caused by acquisition of new knowledge (Meir and Wolf, 2018).

Loftus (2005) contends that when eyewitnesses receive post-event information by discussing with other witnesses, attending interviews/interrogations or viewing video coverage of an event they have experienced first-hand, distortions may arise which could taint the memory they hold of that event. Wixted *et al.,* (2018) observe that eyewitnesses sometimes misidentify the source of memories of misleading information as memories derived from the original event, while

Johnson *et al..,* (1993) posit that since source monitoring processes occur swiftly and automatically during decision making, once the process of retrieval of information becomes fraught with errors, misattribution of memory may occur. This causes the attribution of the views, descriptions and moods of what transpired in the original source to the source of the postevent information (Antonio, 2015).

Loftus, (1996) postulates that post-event information adds another source of information to the source of information gathered during the original event and over time these sources of information become unified into one memory in such a way that it becomes difficult to differentiate the sources of some specific information. MacLean *et al.,* (2019) argue that post-event information affects the ability of the witnesses to remember the original information and could cause witnesses to confuse the different sources of specific information.

Sutherland and Hayne, (2001) argue that the performance of witnesses in recalling details of witnessed event after they have been exposed to post-event information is determined by the explicitness of interrogative technique, essential qualities of the original information and inherent features of the postevent information. The recollection of information about an event witnessed can be reinforced or altered by questions posed to the witness and could make witnesses claim witnessing non-existent object (Dando, 2020). The method of questioning a witness has significant relationship with the accuracy of responses from the witness and more accurate responses are achieved with open-ended questions (Venter and Louw, 2005), while "a leading question, either in its

content or the way it is phrased, suggests to witnesses what answer is desired, or leads them to the desired answer" (Loftus and Palmer, 1996).

Paterson and kemp, (2006), contend that the influence of co-witness information is strong and outweighs the effect of any other source of post-event information such as news reports or leading questions. Johnson *et al.* (1993) observe that certain factors facilitate source monitoring errors such as the degree to which the post-event information is fundamental rather than peripheral to the sequence of events, the level to which subjects are stressed or focused during the encoding of the misinformation or during the test and the extent to which subjects imagine pictorial or audio features as they encode verbal post event information. Lindsay and Johnson, (1989) posit that memory error caused by post-event information can result from the non-existence of the original information in the memory because at the perception stage it was not encoded, or it was encoded but has decayed and, it could also happen as a result of reliance on familiarity with the reminder rather than with the source of information.

Rac-Lubashevsky and Kessler, (2016) argue that an old information is automatically overwritten and disappears as soon as new information which is contrary to the old information is encoded, leading to a memory update. However, McClelland *et al.,* (2020) contend that the presentation of new information does not cause an automatic memory update, but that the old memory remains untouched while a new memory trace emerges which may contain some of the previous information. Memory distortion which occurs at retrieval of memory for original event is not as a result of post-event information

but due to lack of the critical features which were present during acquisition of the original event memory and due to the regular problems associated with retrieving old memories. Post-event information would be retrieved when the retrieval environment has the critical thematic information that were present during the acquisition of the post-event information rather than that of the original event (Bekerian and Bowers, 1983) probably due to source monitoring error or retroactive interference.

McCloskey and Zaragoza (1985) contend that there is no clear basis to claim that the capability to recall an event witnessed is impaired by post-event information, and that the proposition was based on the application of inappropriate logical procedures and methodology in conducting their assessments. However, they stated that under some circumstances the effect of post-event information cannot be determined. Stockbridge and Newman, (2019) argue that the recall of an event is not affected by the parametric variations in evaluated severity of verbs contained within questions about an event and such influences do not also differentially affect the short- and longterm illustrations in memory.

Although most of eyewitness research lack ecological validity since they are founded primarily on laboratory and simulation studies, many of them remain valid (Wagstaff *et al.,* 2003). However, field and archival methods can increase the accuracy and reliability of eyewitness research because of its characteristics which include greater emphasis on behavioural dependent variables, relatively high levels of participant variety, comparative lack of control over peripheral

variables, less area for researcher degrees of freedom, and minor probability of publication bias (Maner, 2016).

Findings

The study found that researches on the mechanisms of human memory show that eyewitness accounts are frequently defective, and that nonetheless, there is palpable need to make eyewitness testimony reliable in the courtroom. Finally, the study found that eyewitness testimony can be made reliable in the courtroom and that this can be accomplished by improving the system variables.

This study found that although, studies of the mechanisms of human memory have indicated that due to several factors, eyewitness accounts are frequently defective (Overbeck, 2005). Nonetheless, the criminal justice system relies most of the time on eyewitness accounts as the only evidence available for the resolution of criminal cases; therefore, it is critical in crime investigation and prosecution (Wells and Olson, 2003). From the perspective of judges and jurors, eyewitness testimony is one of the most important and persuasive forms of evidence in the courtroom (Overbeck, 2005), because many crime scenes, such as murder, robberies, drive-by shooting etc. (Wells *et al.*, 2000) are without DNA-trace evidence which could provide clues to police investigators or prosecutors. Consequently, the police, prosecutors, judges and jurors will continue to rely on eyewitness testimony (Areh and Umek, 2004). In addition, abolishing eyewitness testimony in the courtroom is to place several innocent defendants in very perilous condition because it will mean that they cannot present any alibi they have which might help their case as that would amount to eyewitness testimony

(Wells, 1978). Some of the reasons for inaccurate eye witness testimony include passage of time, poor perception, post event information etc.

> *Therefore, shorter exposure time of the original event, longer retention intervals between the original and misinformation phases, and warnings about potential is information prior to the misinformation phase all reduced the misinformation effect, consistent with the notion of discrepancy detection (Loftus, 2005).*

"Storage produces a long term memory trace; further storage adds to and changes that trace, and later retrievals of a trace changes the trace yet again" (Atkinson, and Shijfrin, 2016.).

Recommendations

Based on the findings, this study proffers the following recommendations which will address some system variables which cast doubts over eyewitness testimony.

1. There is a natural human propensity to change perceptions of an event witnessed as more time between the event and the retrieval of the memory of the event passes. Therefore, this study recommends avoiding long memory retention intervals in criminal matters by giving such matters speedy trial (Loftus, 2005).

2. Eyewitnesses should be warned ahead of time of the impact of post event information prior to the misinformation phase (Sheaffer *et al.,* 2021).

3. The use of cognitive interview/interrogation method by police investigators and attorneys should be encouraged. The application of this method can partially eliminate the problem of unreliability of eyewitness

testimony because it facilitates eyewitness memory enhancement, helps police investigators to obtain accurate and detailed information from eyewitnesses and is a legally accepted procedure (Pavlicek, 2019).

4. With regard to improving the accuracy of eyewitness performance during identification parade, the following steps should be applied by criminal justice practitioners especially the police. (a) Double-blind procedure should be used during identification parades wherein; neither the administrator nor the eyewitness knows who the suspect is (Steblay, 2018). (b)Eyewitnesses should be made to know that the suspect may not be present in the line-up, consequently, they are not under compulsion to pick when they are not sure and should not look at the line-up administrator for feedback during the identification procedure (Wells *et al.,* 2020). (c) In selecting photographs or lineup members the administrators should adopt a blended approach in selecting fillers wherein; there is a resemblance between the fillers, the description provided by the eyewitness and the police suspect, in order not to bring unreasonable attention to the suspect (Gupta and Agrawal, 2021). (d) Eye witnesses should provide a statement, in their own words, indicating the level of confidence they have in the identification they have made (Smalarz et. al., 2021).(e)The line-up procedure should be electronically recorded and where that is not practicable, an audio recording or written record should otherwise be adopted (Morton, 2000).

Conclusion

The episodic memory of a scene or other events witnessed by an individual which requires a conscious remembrance of the experiences including place, time

and faces of the major actors who appeared at the scene is referred to as eyewitness testimony and it is one of the sources of miscarriage of justice and wrongful convictions in the courtroom. Memory process consists of three stages: the acquisition stage, the retention stage and retrieval stage, and these three stages are important because failure at any stage can lead to errors in memory.

Researches conducted to determine the reasons for inaccurate eyewitness testimony by psychologists have found several factors, and they fall into two broad categories which are estimator variables and system variables. One of the estimator variables identified is known as weapon focus effect phenomenon and refers to the memory impairment caused by the presence of a weapon such as gun, at crime scenes. This phenomenon is explained by the arousal/threat approach, the attentional focus approach and the unusual item approach. While one of the system variables identified is known as post-event information phenomenon, which refers to memory impairment caused by the exposure of a witness to post-event information such as reading news reports, discussing with co-witnesses or being asked questions especially leading questions by attorneys or the police etc. This phenomenon is explained using the source monitoring approach and the retroactive interference theory.

The inevitability of eyewitness testimony is anchored on the fact that many cases of crime are without DNA-rich biological traces, therefore the investigators, prosecutors and courts would always rely on eyewitness as the main source of evidence available for the resolution of several criminal cases. However, the criminal justice system should effect changes within the system variables, in line

with research findings, in order to make eyewitness testimony more reliable in the courtroom. These changes include using cognitive interview methods, reducing the time between the event and the retrieval of the memory of the event, warning eyewitnesses about potential misinformation prior to the misinformation phase, applying double-blind procedure, a blended approach in selecting fillers for line-up /identification parade, electronically recording the process of identification parade and making eyewitnesses to provide a statement, in their own words, indicating the level of confidence they have in the identification

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