



The Reliability of Eyewitness Testimony Across the Lifespan: A Review with Implications for the Indian Legal System

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Abstract

Eyewitness accounts of crimes are a mainstay of the criminal justice system worldwide. Courts of law usually regard the accounts of eyewitnesses to be among the most credible forms of evidence presented in a court of law. However, psychological research over several decades has revealed that eyewitness testimonies are among the most fragile forms of evidence. The vulnerability of eyewitness testimony is rooted in memory theories such as Bartlett's theory of reconstructive memory, Information Processing Theory, and the Source Monitoring Framework. The vulnerability of eyewitness testimony has been demonstrated through the study of various characteristics of the perpetrators of the crimes, such as the effect of the race of the perpetrator upon the eyewitness's ability to recognise him or her, and the effect of the presence of a weapon upon the eyewitness's ability to focus upon the perpetrator. Other factors that have been shown to affect the credibility of eyewitness accounts include forgetting and retaining information over time, the emotions felt as a result of the witnessed crime, and the misinformation effect. Furthermore, the credibility of eyewitness accounts also differs according to the age of the eyewitnesses. Finally, cases such as Ronald Cotton demonstrate the consequences of these vulnerabilities. Despite the amount of research on eyewitness testimony in the Western world, research on these topics in India remains limited, even though eyewitness testimony carries significant weight in Indian courts of law. Therefore, a review of psychological research on eyewitness testimony can help reveal the need for eyewitness protocols in India's courts of law, as well as indicate areas for future research.

Keywords: *Eyewitness Testimony; Reconstructive Memory; Misinformation Effect; Cross-Race Effect; Weapon Focus Effect; Source Monitoring; Wrongful Convictions; Indian Criminal Justice System*

1. Introduction

1.1 Background

In most instances around the world, the cornerstone of the criminal justice system is the requirement of the testimony of an individual that has directly witnessed the crime that is being investigated. Eyewitness testimony is the testimony provided by an individual that directly witnessed a criminal event. In the courtroom, the testimony of an eyewitness is often considered to be the most reliable form of testimony presented by any of the parties within the case (Wells & Olson, 2003). An eyewitness is any individual that directly witnessed the criminal event. Thus, eyewitnesses can be the victim of the crime, an individual that witnessed the crime but was present at the scene of the crime, or an individual that was both present at the scene of the crime and that witnessed the crime without any knowledge of the crimes that would be committed. As eyewitnesses typically directly describe the perpetrator of the crime, the crime itself, and the elements of that crime, the reliability of eyewitnesses can be impacted by various variables of either that eyewitness or the witnessing of the crime itself (variables referred to as "estimator" variables, as opposed to those variables of the criminal justice system itself) (Wells, 1978). These variables of the eyewitness will be discussed in this paper.

Despite the consideration of eyewitnesses within the criminal justice system, scientific research into the reliability of those eyewitnesses indicates that the testimony of eyewitnesses is often poor reliability. Instead of being able to provide

accurate descriptions of the crimes that they witnessed, human memory often introduces details into the memories of those eyewitnesses of crimes that were not witnessed by those eyewitnesses (Bartlett, 1932; Loftus & Palmer, 1974).

Furthermore, the errors of eyewitnesses can often lead to innocent individuals being sentenced to prisons for the crimes that they did not commit. The Innocence Project, an organization in the United States whose goal is to release individuals that have been sentenced to prison for crimes that they did not commit, has determined that eyewitness identifications are the leading cause of wrongful convictions in the United States prisons. Furthermore, the organization reports that eyewitness misidentification was a contributing factor in approximately 69% of DNA-based exoneration cases in the United States (Innocence Project, n.d.). Additionally, while there is no database of individuals in India that have been sentenced to prisons for crimes that they did not commit, there are still a number of documented cases of eyewitness errors leading to innocent individuals being imprisoned for crimes that they did not commit, or for the failures of the criminal justice system to imprison individuals that performed those crimes (iPleaders, 2022; Legal Service India, 2022). These outcomes of the criminal justice system indicate the reliance of that system upon eyewitnesses of the crimes, as well as the lack of knowledge (or avoidance of the knowledge of) of the weaknesses of eyewitness testimonies.

Consequently, the topic of the reliability of eyewitnesses has been explored in numerous scientific studies. In these studies, the focus of the investigations into reliability has been upon the eyewitness itself, rather than the perpetrator of those crimes and the criminal justice system that handles those crimes. Thus, the focus of this review will be upon the eyewitness and their reliability, the perpetrator of the crimes and their characteristics will be discussed in general, and the criminal justice system and its management of the testimonies of eyewitnesses will be avoided.

This review draws upon Bartlett's (1932) theory of reconstructive memory as its primary theoretical framework, which proposes that human memory is an active and reconstructive process rather than a faithful recording of events. It further draws upon Information Processing Theory (Atkinson & Shiffrin, 1968), which describes memory as a sequential system of encoding, storage, and retrieval, and the Source Monitoring Framework (Johnson, Hashtroudi, & Lindsay, 1993), which explains how individuals misattribute the origins of their memories. A central gap this review addresses is the limited integration of this body of psychological research into legal practice in India, where eyewitness testimony carries substantial evidential weight yet no standardised protocols govern how such testimony is obtained or evaluated.

1.2 Perpetrator

The perpetrator is the individual who committed the crime witnessed by the eyewitness. The characteristics of the perpetrator can impact the reliability of the eyewitness of the perpetrator. Two characteristics of the perpetrator that have been shown to impact eyewitness reliability are the distinctiveness of the perpetrator from the eyewitness and the characteristics of the perpetrator with relation to the use of a weapon by the perpetrator during the crime. Eyewitnesses often experience what has been documented as the "cross-age" and "cross-race" effect; eyewitnesses are typically able to recognize individuals of their own race, age, and physical characteristics more accurately than individuals that are of another race, age, or physical characteristics (Chance & Goldstein, 1984). Furthermore, the eyewitness's attention to the perpetrator that was using a weapon during the crime will cause the eyewitness's memories to focus upon those details related to the perpetrator that was using the weapon, rather than upon the perpetrator that did not have the weapon during the crime. Other characteristics of the perpetrator that may be considered in eyewitness reliability are characteristics related to the background of the offender or to the family of the offender.

1.3 The Architecture of Memory

In order to understand in which stages of the memory of the eyewitnesses that eyewitness errors occur, it is first necessary to understand the architecture of the memory of those eyewitnesses. According to Information Processing Theory (Atkinson & Shiffrin, 1968), memory has the potential to fail in each of three stages: encoding, storage, and retrieval. During the encoding stage of memory, the eyewitness perceives the crime that occurred and stores it in their mind. During this initial stage, the memory of the eyewitness can be considered selective; the eyewitness may not be able to focus their attention upon all elements of the crime. During the storage stage of memory, the eyewitness remembers the crime that occurred and stores it in their mind over time. During this stage, eyewitnesses may learn other information about the crime that can alter their memory of the crime. Finally, during the retrieval stage of memory, the eyewitness recalls the crime in their mind. The memory that is retrieved during this stage likely differs from that of the eyewitness's memory during the encoding of the crime; during the retrieval of the crime, the eyewitness fills in the gaps of their memory for the crime (Bartlett, 1932). Thus, the eyewitness's memory is the result of each of these three stages of memory.

1.4 Forgetting and the Retention Interval

Another factor that can impact eyewitness reliability is the phenomenon of forgetting. The process whereby eyewitnesses' memories fade over time is referred to as "forgetting." Hermann Ebbinghaus was the first to chart the "forgetting curve" in 1885. Ebbinghaus discovered that the retention interval between the learning of information by eyewitnesses and their retention of those learned details was steepest during the initial hours following their learning of the information, but evened out over time; eyewitnesses' memories of crimes learned the previous day were stronger than those of eyewitnesses who learned of the crimes after a fortnight (14 days). Two theories have been proposed as explanations for the fading memories of eyewitnesses. The decay theory suggests that eyewitnesses' memories fade biologically over time; memory is formed within the brains of eyewitnesses, and those memories fade over time. The other theory that has been proposed is the interference theory, which states that eyewitnesses' memories fade as a result of the introduction of other memories into the brains of those eyewitnesses (McGeoch, 1932). Thus, the longer eyewitnesses' retention interval between witnessing the crime and reporting it to the criminal justice system, the more likely that eyewitnesses' memories of those crimes will fade.

1.5 The Nature and Emotional Intensity of the Event

Eyewitnesses do not have the same memories of each event that they witness. Memory of events that contain elements of emotion, threat, excitement, or surprise is often remembered with ease by eyewitnesses after the occurrence of the event. This is thought to be due to the role that emotions play in the consolidation of eyewitnesses' memories of those events. Yet, eyewitnesses do not experience similar memories of all events that contain elements of emotion. The Yerkes-Dodson principle states that eyewitnesses that experience moderate levels of stress will exhibit higher performance in the recall of those events than eyewitnesses that experience either high or low levels of stress. Furthermore, a meta-analysis of numerous studies that assessed eyewitness memories of the crimes that they observed performed by Deffenbacher et al. (2004) indicated that eyewitnesses that experienced high levels of stress at the time of the witnessing of those crimes exhibited memories of the crimes that had less accuracy in their descriptions of the details of those crimes. Additionally, eyewitnesses often have a natural fading of their memories of the peripheral aspects of crimes that they have witnessed. This phenomenon is related to the concept of the "weapon focus effect" described below in relation to eyewitnesses' focus upon crimes that include the perpetrators using weapons to perform those crimes. Finally, eyewitnesses may also exhibit fading memories of aspects of crimes that are similar to the type of crime that is performed.

1.6 The Misinformation Effect

Another major effect upon the memories of eyewitnesses is the phenomenon of the "misinformation effect." The misinformation effect is the phenomenon wherein eyewitnesses' memories of the event that they have witnessed are altered by information gained from other sources following the witnessing of the crime. Loftus and Palmer (1974) have performed one of the most well-known studies of the misinformation effect; eyewitnesses who were asked questions about the speed of two vehicles that crashed into each other estimated the speed of those vehicles as higher than eyewitnesses who were questioned about the speed of vehicles that only exhibited a collision between those vehicles. Furthermore, a week after performing the initial questions of eyewitnesses about the vehicles that collided, eyewitnesses who were previously questioned about the vehicles that crashed into each other (as opposed to those that only collided) also reported that they witnessed broken glass created by the collision of the vehicles. This misinformation effect was replicated in numerous other studies with the same success (Loftus, 2005). Thus, misinformation that is introduced to eyewitnesses after they have witnessed the event can come from other eyewitnesses, media reports of those eyewitnesses, or even the repeated questioning of those eyewitnesses regarding the witnessed event. Furthermore, eyewitnesses do not simply forget the misinformation that was introduced to them; they remember the misinformation with the same level of confidence as their memory of the witnessed event. Thus, misinformation introduced to eyewitnesses after the witnessing of the event can impact the testimonies of eyewitnesses; those testimonies could be led by leading questions of eyewitnesses, testimonies of other eyewitnesses, or even the publicity that surrounds the crime prior to the trial of the eyewitnesses for the event.

1.7 Suggestibility

Similar to the misinformation effect, suggestibility is related to the susceptibility of the eyewitness to the suggestion of the other eyewitnesses or those of their own social groups. Ceci and Bruck (1993) explain that suggestibility is the susceptibility of an eyewitness to the suggestion that is placed before them by the interviewer or another member of their social group. This concept is especially true of children. The susceptibility of children to suggestion has been specifically

studied by Ceci and Bruck (1993), who have found that younger children are more susceptible to suggestion from the interviewer than adolescents or adults. Additionally, the children are also more susceptible to suggestion from those of high social status relative to themselves. Thus, susceptibility to suggestion is one of the factors that can impact eyewitness reports.

1.8 Age-Related Differences in Reliability and Malleability

The susceptibility of eyewitnesses to make errors in their memory of the witnessed event are different according to the age of the eyewitness. Both young children and the elderly are susceptible to eyewitness errors. Young children have not yet developed the cognitive skills necessary to accurately provide reports of eyewitnesses of events that they witnessed. These skills continue to develop throughout adolescence, reaching full maturation in the mid-twenties (Steinberg, 2008). Additionally, adolescents have been found in numerous eyewitness studies to be less likely than adults to accurately describe the features of the criminal that committed the witnessed crime (Pozzulo & Lindsay, 1998). Furthermore, as with children of young ages, adolescents and young children are also more likely to be influenced by the suggestion of eyewitness interviews of them.

The elderly are also susceptible to eyewitness errors. Memory studies of eyewitness reports of the elderly have discovered that the elderly are more susceptible to the misinformation effect than younger adults. Thus, the elderly eyewitnesses are more likely to form false memories of the witnessed event, or to not be able to correctly remember the source of those false memories (Roediger & Geraci, 2007). Studies of eyewitness reports of the elderly have also discovered that, in some cases, the eyewitness reports of the elderly are also no different from those of adults of any age group. These findings relate to the source-monitoring skills of the eyewitnesses. The ability of humans to correctly remember the origin of their memories is crucial to the accuracy of eyewitness reports of the witnessed event.

1.9 Key Cognitive Factors

There are several cognitive abilities that have been recognized as those that can impact the reliability of eyewitness reports of witnessed events. One of these factors is the attentional capacity of the eyewitness. The eyewitness' attentional capacity is limited to their focus; any information that is not noted or focused upon at the time of the witnessing of the event will not be able to be accurately retrieved from their memory. Additionally, any factors that impact the eyewitness' attentional capacity will also have an impact upon the reliability of the eyewitness reports. Such factors can include the stress upon the eyewitness, the exposure of the eyewitness to the witnessed event, and whether there was a weapon used in the crime. Another of the recognized cognitive abilities of eyewitnesses is the susceptibility of the eyewitness to suggestions of their reports. The suggestion of eyewitness reports can impact the eyewitness' memory of the witnessed event. Factors that impact the susceptibility of eyewitness reports to suggestion can include the age of the eyewitness, the social status of those interrogating the eyewitness, and whether bribery is used. The third of the recognized cognitive abilities is the source-monitoring ability of the eyewitness, as described by the Source Monitoring Framework (Johnson, Hashtroudi, & Lindsay, 1993). The eyewitness' capacity to remember from which source any memory of the witnessed event originated is crucial to the reliability of the eyewitness reports. An eyewitness' memory may contain false information that originated from some other source than the witnessed event; if the eyewitness cannot remember from which source that false memory originated, then the eyewitness may report that memory as if it were the memory of the witnessed event (as in the misinformation effect), or the eyewitness' reports may inaccurately state the witnessed event and its details but those details originated from some source other than the witnessed event.

1.10 The Weapon Focus Effect

One of the examples of how eyewitness' attentional capacity can impact eyewitness reports is in relation to what is known as the weapon focus effect (Loftus et al., 1987). In studying eyewitnesses who observed crimes in which a weapon was used, researchers discovered that eyewitnesses are susceptible to the weapon focus effect; when they focus their attention upon the weapon that was used in the witnessed crime, their ability to focus upon other elements of the crime decreases. Thus, their accuracy in identifying the perpetrator of the crime is significantly lower. The focus of the eyewitness' attention upon the weapon is due to the attentional capacity of the eyewitnesses. The eyewitnesses' attention focuses upon the weapon due to the high level of arousal that they feel following the witnessing of the crime. Furthermore, because weapons are used in many types of crimes, such as violent crimes, the weapon focus effect can have an impact upon the justice system and upon the eyewitness reports of those types of crimes.

Beyond the general effects upon eyewitness reports of the eyewitness' attentional capacity, susceptibility to suggestion, and source-monitoring abilities, there are additional effects upon eyewitness reports of specific groups of eyewitnesses. Beyond the focus upon eyewitness reports based upon the different age groups of eyewitnesses, there are additional factors related to eyewitness reports that can be examined in relation to each of the four stages of human development.

1.11 Childhood Years (4-12 Years)

The memory system of children between the ages of four and twelve years is different from that of adults. For instance, the brains of children have not yet developed the areas responsible for episodic memory between the hippocampus and the prefrontal cortex; these areas continue to develop into adulthood (Steinberg, 2008). Additionally, children in these age groups have less developed working memory capabilities than adults; they also exhibit deficiencies in their executive functions. Children also require the aid of adults to effectively form and retrieve episodic memories; they are less successful in performing these tasks than adults themselves. Children between the ages of four and twelve years are also less likely to be able to remember the details of an event that they witnessed, but only remember the gist (general idea) of the event; they also have to rely upon the adults to recall these events. The lack of developing episodic memory capabilities of children between these ages makes them vulnerable to misinformation provided to them during the retrieval of these memories.

The source-monitoring abilities of children between the ages of four and twelve years are underdeveloped. Source-monitoring is the ability of the human mind to remember from which source a memory was encoded. For children of these ages, the qualitative aspect of memories and the prefrontal cortex that monitors those memories are underdeveloped. Thus, children of these ages are less likely to correctly remember from which source their memory originated. For instance, Lindsay, Johnson, and Kwon (1991) have determined that younger children are more likely to become confused regarding the source of their memories than children of similar ages to those young children. Thus, a young child who is provided with a story after the event is more likely to remember that story as if they had witnessed the event themselves.

Children are also susceptible to leading questions from those adults in their lives. Ceci and Bruck (1993, 1995) have performed research over several decades in the area of child eyewitnesses to determine the susceptibility of children to leading questions. Their findings are that children under the age of eight, particularly preschool-age children, are more susceptible to leading questions than adults. The reasons for this susceptibility of children include their underdeveloped episodic memory capabilities discussed above. Additionally, children are taught from a young age to please those of authority over themselves, such as their parents, teachers, or police officers. Thus, they will provide answers to these leading questions provided by these adults rather than their own memories of the event.

Furthermore, research also proves that children are more susceptible to the effects of leading questions than adults. These types of questions include suggestions of the answer to the child. These answers are more likely to become altered by the questions posed to the children who provide these eye witness reports (Ceci & Bruck, 1993). Additionally, children are also susceptible to developing false memories of the events that occurred. When children are questioned about the events in several different interviews, these children often develop false memories of those events that are provided to them during the interviews. Thus, the children's false memories are resistant to being corrected in additional interviews (Ceci & Bruck, 1995). Furthermore, numerous research studies have proven that children will form false memories at higher rates than adults when presented with suggestions regarding the events that they experienced (Ceci & Bruck, 1993).

Despite the deficits in the memory of children, children can be reliable eyewitnesses; however, there is no protocol to follow when questioning child eyewitnesses in India. Thus, the reliability of eyewitness reports of children in India will depend upon the individual investigator of the events in question.

1.11 Adolescence (13-19 Years)

The memory of adolescents is also slightly different from that of adults, but with a lesser susceptibility to errors than young children. For instance, adolescents have not yet developed the same areas of the brain as adults regarding episodic memory; the prefrontal cortex of adolescents is developing between the ages of 12 and 18 years of age (Steinberg, 2008). Thus, adolescents have less developed working memory capabilities than adults. Additionally, adolescents between the ages of 13 and 19 have not yet developed the executive functions that are required to effectively control their attention; those functions are developed with age.

Adolescents have been found to have the same memories of witnessed events as adults. Pozzulo and Lindsay (1998) performed a study of the eyewitness reports of children between the ages of five years of age and adolescents to determine if young children and adolescents have the same memory capabilities as adults. In their study, they discovered that children and adolescents as young as five years of age are able to recognize the perpetrator of the crime in a line up of eyewitnesses as accurately as adults. However, adolescents and children of these ages have difficulty in correctly identifying individuals who are not the perpetrator of the crime that was witnessed by those children and adolescents.

Additionally, adolescents have been found to have similar abilities in the number of descriptions of the perpetrator of the crime that are provided to the police. While adolescents provide fewer descriptions of the perpetrator of the crime than adults, those descriptions are just as accurate. Additionally, adolescents have been found to be less likely to be susceptible to leading questions than adults when being interrogated. This is due to the developing prefrontal cortex of adolescents; adolescents of ages under 18 years of age have not yet developed the executive functions to provide correct answers to questions of the police that may be suggested by those adults (Steinberg, 2008). Thus, adolescents are less likely to be influenced by those leading questions. Finally, the ability of adolescents to provide accurate eye witness testimonies are also gradual in their development. An adolescent of ages between 13 and 15 years of age are less likely to have accurate memories of the events that they witnessed compared to adolescents of ages between 19 and 25 years of age.

While there are some studies regarding adolescents and the accuracy of their eye witness testimonies, there are fewer studies of adolescents than there are of children. Most studies of individuals of different ages include adolescents in the age group of researchers, rather than studying adolescents of specific age groups themselves. Thus, there are research gaps regarding adolescents' eyewitness reports that warrant additional studies.

1.12 Young to Middle Adulthood (20-55 Years)

The cognitive abilities of individuals between the ages of 20 and 55 years of age have been the most extensively studied in relation to eye witness testimonies. Within this age group, eyewitness reports are the most reliable. Individuals between these ages have fully developed prefrontal cortexes in the brain. Thus, individuals in these age groups have the cognitive abilities to have accurate eye witness reports; they have developed working memories, executive functions, and susceptibility to leading questions from others.

Despite the reliability of young and middle age adults in providing eye witness reports of witnessed crimes, there are still factors in these age groups that can impact the accuracy of those eye witness testimonials. One factor is the stress upon those eye witnesses. Adults who are subjected to high levels of stress during the witnessing of the crime can have inaccurate eye witness testimonials provided to law enforcement officials. For instance, a recent meta-analysis of the accuracy of eyewitness testimonies provided under conditions of stress found that adults who were experiencing high levels of stress during the witnessing of the crime had less accurate eye witness testimonies (Deffenbacher et al., 2004). These eyewitnesses have less accurate testimonies for a variety of reasons. For instance, the stress upon the eyewitnesses leads to the focus of their attention upon the details of the weapon that was used in the witnessed crime (Loftus et al., 1987). Thus, their eyewitness reports of that perpetrator were formed with the consideration of those details of the weapon, which can lead to the eyewitnesses' focus upon that weapon while they are providing their eye witness report.

Another factor for the inaccuracies of the eyewitness reports of adults is referred to as the cross-race effect. Adults have been found to be significantly more accurate in eye witness reports of individuals of their own race than those of another race (Chance & Goldstein, 1984). This has been seen in various different cultures around the world. The reason for this effect is due to the different methods of focusing upon the features of individuals of their own race versus those of another race.

In India, a culturally and ethnically diverse nation, the cross-race effect may be less prominent in many within-community encounters; however, empirical research on the cross-race effect specific to the Indian context remains limited, and this represents an important gap for future investigation. Additionally, one of the findings in the area of study of eyewitness reports of adults is that adults who are more confident in their eyewitness testimonies will have more accurate eyewitness reports than those who are less confident in their ability to accurately remember the eye witness reports of the witnessed crimes. However, only if the adults are confident and provided those eyewitness reports quickly and with high levels of initial confidence will there be a significant relationship between the confidence of the eyewitness reports and the accuracy of those eyewitness reports of the perpetrator of the crime (Sporer, Penrod, Read, & Cutler, 1995).

The confidence of the adults in the identification of the perpetrator of the crime after the crime has been witnessed and after the suggestions of the identification of that perpetrator by the police are significantly less indicative of the accuracy of their eyewitness reports of the crime than the confidence that they exhibit when they first provide those eyewitness reports of the perpetrator of the crime.

1.13 Older Adulthood (60 Years and Above)

Of all of the memory systems that have been studied regarding the age-related decline in memory capabilities, episodic memory is the most prominent system within which the memory capabilities of adults of different age ranges decline with age. Studies of adults of the age of sixty years or beyond indicate that the episodic memories of those adults are significantly weaker than those adults of the same age who have the younger ages within the ranges of middle and adulthood (Fitzgerald & Price, 2015). An adult of the age of sixty years or beyond, therefore, has significantly more difficulty in remembering the details of a past event compared to adults of the same age who are of the younger age ranges within the middle and adult stages of those adults' lives.

Beyond the decline in the episodic memory of adults of those ages, the executive functions of adults of those ages also decline with age. One executive function that declines with age is the inhibitory control of the minds of those adults. Inhibitory control is the ability of adults to ignore information and memories that are irrelevant to the eyewitness testimony that is provided by those adults. Thus, adults of the age of sixty years or beyond are more susceptible to having false information encoded into their episodic memories after the occurrence of the event that they are attempting to remember (Roediger & Geraci, 2007). Additionally, the executive functions of adults of those ages also decline with age. For instance, the ability of those adults to utilize their source-monitoring skills to discount false information in their eyewitness testimonies weakens with age (Cohen & Faulkner, 1989). Thus, those adults are more likely to be misled by false information after they have witnessed the crime. Furthermore, those adults of the age of sixty years or beyond are also more likely to believe that the misinformation after the event has occurred. They are also more confident in providing false and incorrect eyewitness testimonies than those of the young or middle-adult age groups.

Furthermore, the weaknesses in the episodic memory of adults of those ages also apply to the ability of those adults to form false memories. Adults of the age of sixty years or beyond are more likely to form false memories of events than either young or middle-adult adults (Martschuk & Sporer, 2019). Furthermore, those adults are almost as confident as those young or middle-adult adults in the accuracy of those false memories. Thus, adults of those age groups have a significantly less accurate episodic memory than the younger adults of society.

Beyond these memory-related factors that contribute to the inability of adults of those ages to accurately provide eyewitness testimonies, other conditions that are common amongst adults of those ages can impact their episodic memory. For instance, adults of those ages may suffer from conditions like mild cognitive impairment or dementia. These conditions are characterized by the inability of those adults to perform processes like encoding, consolidating, and retrieving episodic memories – the same processes whose capabilities decline with age (World Health Organization, n.d.). Thus, even if those conditions are not officially diagnosed in adults of the age range of sixty years and beyond, their presence as an issue for the adult population is still detrimental to their ability to form accurate eyewitness testimonies. Therefore, the eyewitness testimonies of this population are amongst the least reliable of all age groups of adults. Thus, their eyewitness testimonies are ignored within the justice systems of India.

1.14 Documented Cases of Eyewitness Error

Some cases have been documented in which eyewitness testimonies have led to the convictions of innocent individuals who were later exonerated through additional means, such as DNA analysis. One such case is that of Ronald Cotton. In 1984, Cotton was identified by Jennifer Thompson as the individual that committed the sexual assault of Thompson. Based upon this eyewitness testimony, Cotton was convicted of the crime. Years later, however, Cotton was exonerated upon the disclosure of DNA evidence indicating that another man, Bobby Poole, was the actual perpetrator of the crime (Thompson-Cannino et al., 2009). Thompson's mistaken identification arose from identifications made through a photo array and a live line-up conducted shortly after the assault — a sequence of events that illustrates how the mechanisms of memory distortion reviewed in this paper, including stress, attentional narrowing, and post-event suggestion, can combine to produce a sincerely held but entirely erroneous eyewitness identification. Similar cases like that of Cotton are the reason for the findings of the Innocence Project in regard to the number of innocent individuals that have been convicted of crimes based upon eyewitness identification (Innocence Project, n.d.).

2. Theoretical Framework: Reconstructive Memory

The eyewitness testimonies discussed in relation to each of these different age groups can be consolidated under a single theoretical understanding of the reasons for the weaknesses in those eyewitness testimonies of adults of those ages. One theory that explains why individuals form false memories and exhibit the weaknesses in their ability to form accurate and reliable eyewitness testimonies is the theory of reconstructive memory. This theory, proposed by Bartlett (1932), states that the memories that are stored within the minds of the individuals are not stored in the same manner as media recordings of those minds. When individuals recall a memory of a past event, their brains reconstruct that memory. During the encoding and retrieval of a memory of an event, the minds of those individuals apply the knowledge that they have of the event to fill in the blanks of their memory regarding that event. This knowledge that is applied during the formation of a memory is stored within the brain as that memory itself, and is later retrieved by those individuals when they speak of the memory of that past event. This theory is the thread that relates to each of the phenomena discussed within this research review.

3. Legal Context: The Indian Scenario

Though the topic of eyewitness testimonies and the psychological characteristics of those who provide those testimonies relates to the psychological makeup of individuals, there are also implications to the legal system in which those individuals are often called to the stand to tell their stories of the crimes that they witnessed. In India, as in the majority of the remainder of the world's countries, the testimony of eyewitnesses to a crime is one of the most important types of evidence that is presented in the courts to prove that an individual has committed that crime. The testimony of a single eyewitness, for instance, is often enough to secure the conviction of the individual who is suspected of having committed the crime. Despite the importance of such testimonies in the legal system of India, however, there are a variety of legal procedures within India that work against the reliability of those eye witness testimonies. For instance, many eyewitness testimonies in India are established through dock identifications of those eyewitnesses to the judge or jury for the first time. Furthermore, there is no protocol for the recording of eyewitness testimonies within India. Finally, there is often a delay between the commission of the crime and the eyewitness statement of that eyewitness of the crime. Each of these legal procedures within India work against the reliability of eyewitness testimonies in that country, and, thus, indicate the need for a review of the reliability of eyewitness testimonies within the Indian legal system.

4. Discussion

In reviewing the eyewitness testimonies of individuals of different age groups, it becomes evident that eyewitness testimonies are one of the most fragile forms of evidence within the legal system. These findings, however, relate to the cognitive factors that govern the reliability of those witnesses. The information on eyewitness testimonies related to the Information Processing Theory (Atkinson & Shiffrin, 1968), theory of reconstructive memory, and the Source Monitoring Framework (Johnson, Hashtroudi, & Lindsay, 1993) all relate to the ways in which the brains of eyewitnesses may create false memories or misidentify the perpetrators of the crimes that they observed. Additionally, the misinformation effect, the suggestibility of individuals, the weapon focus effect, the effect of stress on eyewitness testimonies, and the effect of misdirection on eyewitness testimonies work to explain the reasons for the inaccuracies of those eyewitnesses. Finally, each of the different age groups also have different weaknesses in their eyewitness testimonies – children are among the most vulnerable to the misinformation effect, adolescents appear to be the least studied group, but have characteristics of both children and adults, young and middle-aged adults are the most reliable, but not without error, and the eyewitness testimonies of those of the age of sixty years or beyond are among the least reliable of any age group. These findings can be applied to the legal system of India, in which eyewitness testimonies are among the most important within the legal system, yet which also have a variety of legal procedures that work against their reliability.

5. Significance of this Topic

The reliability of eyewitness testimonies is of interest to the legal system of India due to the way in which the testimonies of individuals who witnessed a crime are among the most critical types of evidence within the legal system of the country. In numerous instances, the testimonial of a single eyewitness of a crime is enough to lead to the conviction

of the individual that is suspected of having performed that crime. Furthermore, the possibility of the eyewitness testimonies of India to lead to the conviction of innocent individuals is also of concern. The Innocence Project, for instance, reports that mistaken eyewitness identifications are the leading cause of innocent individuals in the United States to be convicted of crimes that they did not commit (Innocence Project, n.d.). Though similar investigations have yet to occur in India, the potential for such convictions of innocent individuals through the testimonies of eyewitnesses to the crimes is still present. Thus, the investigation of the reliability of eyewitnesses could lead to the adjustment of India's legal system to increase the accuracy of the legal system and to ensure that the convictions of individuals for crimes are based upon accurate information.

6. Implication of Findings

Based upon the findings of this review of the eyewitness testimonies of individuals of different age groups, a variety of legal changes can be made to the legal system of India. For instance, the vulnerability of children to false eyewitness testimonies suggests the need to implement the use of specific interview protocols for children within India. Furthermore, the finding that individuals of the age of sixty years or beyond are susceptible to false eyewitness identifications suggest the need to implement the screening of those eyewitnesses for conditions like dementia or other forms of cognitive impairment prior to presenting their testimonies in the legal system of India. Additionally, the findings regarding the effect of stress on eyewitnesses, eyewitness testimonies, and eyewitness identifications suggests the need for changes to the legal system of India that ensure that the testimonies of eyewitnesses are obtained in manners that do not induce stress of those individuals.

Future Recommendations

In addition to the changes to the legal system of India that can be made as a result of the findings of this research review, there are also suggestions for future research that could be performed within the topic of eyewitness testimonies. For instance, research can be performed into the eyewitness testimonies of adolescents of India, as most research on eyewitnesses has been performed with participants of other age groups. Furthermore, research on eyewitness testimonies of Indian populations specifically, rather than those of other populations of the world, would help to fill an existing gap in the knowledge of the reliability of eyewitnesses. Finally, further research into the legal system of India as it relates to eyewitness testimonies will help to make recommendations regarding the changes to that legal system.

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