

Eyewitness Memory: Factors affecting the formation of false memories

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Abstract

Research has largely demonstrated the malleable nature of memory and the possibility of recalling events – or part of them – never experienced. These memory errors are well-known as false memories and have been largely investigated by researchers due to strong implications for the legal context. Studies on false memories formation have demonstrated a series of circumstances and factors that can lead to this phenomenon. False memories might occur because of internal processes as well as external influences, leading to spontaneous and suggestion-induced false memories, respectively. In addition, some individual differences – like cognitive resources and personality traits – can inform on individuals' likelihood of reporting false memories. Still, emotions experienced during the event as well as the emotional content of the experience itself can affect false memories formation. The present work aims to provide an overview of the literature on false memories in the legal context, addressing how scientific evidence can be useful for forensic psychologists, specifically those working in the Italian system.

Keywords: False memories, Individual Differences, Emotions, Forensic Practice.

Credit author statement

Fabiana Battista and Antonietta Curci conceived the article. FB wrote the manuscript. Antonietta Curci and Ivan Mangiulli critically revised the manuscript. All authors contributed to the article and approved the submitted version.

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Eyewitness Memory: Factors affecting the formation of false memories

The reliability of eyewitness memory is an important subject in the legal system due to the fact that eyewitnesses' recollection, namely one's testimony, constitutes one of the main proofs for law enforcements to reconstruct the crime. As a matter of fact, testimonies are a crucial source of information for legal and forensic professionals, such as judges, when making determinations of guilt or innocence for a suspect (Nash et al., 2016). Nevertheless, due to the constructive and reconstructive nature of memory (Curci, 2022), the accuracy and reliability of a witness's account can be uncertain. Indeed, it is so far consolidated the idea that memory does not work as a video camera and, thus, during the recollection of an event, people may remember details of it that are partially incorrect or even details that never actually occurred (Arnold & Lindsay, 2002; Frenda et al., 2011; Howe et al., 2017; Loftus & Pickrell, 1995; Nash et al., 2015; Nash & Wade, 2008; Roediger & McDermott, 1995). Consequently, it is common for a person to provide a testimony that includes distorted or entirely fictional information as well as the omission of relevant details about the event (Leding, 2012). These errors are known as memory distortions, more specifically commission errors when people recall false or distorted information, and omission errors, when they are unable to remember some information (e.g., Schacter, 2012). Among commission errors, it is possible to identify the widely known false memories.

False memories present a significant challenge for forensic experts and judges who must rely on individuals' memory-based statements. The importance of this concern is underscored by research that demonstrates how false memories in witnesses' accounts are a leading factor contributing to wrongful convictions (e.g., Saks & Koehler, 2005; Smeets et al., 2004; Wells & Quinlivan, 2009). An example of the deleterious consequences of false memories in court is evidence from public organizations of different countries (e.g., USA, Italy, Belgium) working on re-evaluating cases of people erroneously accused and convicted for a crime, like for instance the Innocence Projects (e.g., USA: www.innocenceproject.org; Italy: <https://italyinnocenceproject.org/>). The root of these miscarriages of justice lies in the difficulty of establishing the complete and accurate truth of a criminal experience (i.e., the "ground truth"). Hence, understanding factors that make people prone to develop false memories can help in reducing errors made by forensic professionals. The present paper, therefore, will provide an overview¹ of the main results of research on the possible factors (e.g., age, cognitive and personality traits, etc.) affecting individuals' proneness to report false memories. We will first present

the main paradigms adopted to experimentally test false memories. Then, we will focus on some factors (i.e., demographic, cognitive and personality traits, emotions) affecting false memories creation. Finally, we will discuss evidence in light of their possible consideration for Italian forensic psychologists².

What Do We Know about False Memories?

A significant number of experiments have been conducted to investigate the formation of false memories. These studies have shown that individuals can report two different types of false memories, namely spontaneous false memories and suggestion-induced false memories (Brainerd et al., 2008; Loftus, 2005; Otgaar et al., 2023; Mazzoni et al., 1999). The first type of false memories occurs because of internal mechanisms (e.g., spreading activation), thus without external pressure (Brainerd et al., 1995). By contrast, suggestion-induced false memories originate from external pressure like in the case people listening others' memories of the same event (Otgaar et al., 2018). Experiments, so far, have studied false memories by adopting different paradigms, depending on the type of false memories they intended to reproduce in the lab.

With regard to spontaneous false memories, the most acknowledged and used paradigm is the Deese/Roediger-McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1998). The procedure of this paradigm can be split into two phases. In the first phase, the encoding, participants are presented with lists of words conceptually associated with each other (e.g., bed, rest, awake, tired, dream, wake, etc). These words are also related to a word called critical lure (i.e., sleep) that is not presented during the encoding phase. In the second phase, participants' memory is tested, hence participants perform either a

1. Note that we do not intend to provide a systematic review of the literature so far published on false memories and factors affecting their formation. Hence, we did not carry out an extensive research on articles platforms (e.g., Scopus, WoS). Instead, we tried to summarize the state of the art by considering relevant articles on the matter.
2. Despite the common distinction between legal (e.g., expert who work on people's ability to testify) and forensic (e.g., expert who work people's capacity to stand a trial) psychologists, typical in some European countries (e.g., the Netherlands, United Kingdom), in our manuscript we use the Italian connotation forensic psychologists to refer to experts doing a psychological evaluation of witness' ability to testify.

recall or recognition task which also includes the critical lure. Typically, several participants remember to have seen the critical lure during the encoding phase, thus resulting in a false memory for the critical lure (e.g., Gallo, 2010). Different variants of the DRM were developed, some of which included pictures and videos. Also by using those variations, a non-trivial number of people reported false memories for the critical event (e.g., Miller & Gazzaniga, 1998; Peters et al., 2013; Otgaar et al., 2014).

Another paradigm used to study spontaneous false memories was developed by Mirandola and collaborators (Mirandola et al., 2014). This paradigm enabled an investigation of spontaneous emotional memories through a within-subject manipulation. It consists of a pool of pictures presenting different life episodes (e.g., dating a person) which may end positively (e.g., the two guys kiss each other), negatively (e.g., the boy is aggressive towards the girl) or neutrally (e.g., the guys meet for exchanging a book). Specifically, participants are shown 9 episodes consisting, in turn, of 16 pictures. However, of those, 12 pictures correspond with material presented during the encoding phase and 3 are shown only during the recognition phase -among which the ending picture of the episode. Hence, participants first watch the 9 episodes and during the retrieval are presented with 3 positive, 3 negative, and 3 neutral ending scenes. The typical finding is that people produce more false memories for negative emotional episodes than for positive and neutral ones.

Concerning suggestion-induced false memories, one of the most famous paradigms is the misinformation paradigm (Loftus, 2005). This paradigm was adopted in pioneer work on eyewitness testimonies and false memories (Loftus et al., 1978). It is composed of three stages: The study phase when participants are provided with some pictures or a video (e.g., video of a bank robbery), a second phase during which participants receive misinformation in the form of suggestive questions (i.e., falsely claiming that the robber had a gun while it actually was a knife) or suggestive narrative. Finally, in a third phase, participants complete a memory test. Many participants claim to remember the misleading information as a part of the original pictures or video, the so-called misinformation effect (Loftus et al., 1978).

Subsequently, other studies have additionally demonstrated that people can develop suggestion-induced false memories even for entire false events (e.g., Loftus & Pickrell, 1995; Scoboria et al., 2017). These studies adopted the so-called implantation method. Researchers contact children's parents to understand whether their children experienced a specific event (i.e., experimental event: being lost in a mall). If not, researchers interview the children asking whether they experienced a pool of events one of which was the experimental event. Hence, researchers suggest the children that they have experienced the experimental event, and they know this information because their parents told them. Usually, studies have found that around 30% of participants report to have

experienced the never experienced event during their childhood (e.g., Scoboria et al., 2017). This finding was largely replicated in several studies adopting also different types of events (e.g., not plausible events such as UFO abduction) or types of stimuli (e.g., pictures) or different samples (e.g., adults).

Another mechanism leading to suggestion-induced false memories production is the memory conformity effect (e.g., Gabbert et al., 2003; Wright et al., 2000). Scholars have proven that discussing with other people of an experience can also alter memories for such an experience. The paradigm adopted to show this evidence has three variants. In the first one, pairs of participants are engaged in studying some pictures and in a subsequent phase are asked to recognize which elements were present in the pictures by alternating their responses. In the second variant, groups of participants are involved in the stimuli presentation and a consequent discussion. However, among these participants, some are confederates of the researcher and suggest false information about the stimuli. Finally, in the third variant, each participant receives information told by other participants, such as being told that a high number of participants believe there is a specific – and false – detail in the original stimulus. Irrespective of the variant used to investigate the effect, all studies adopting the memory conformity paradigm display that a relevant number of people integrate into their memory the suggestive information heard or discussed by other participants, thus forming suggestive false memories for the original stimulus (Gabbert et al., 2006; Bodner et al., 2009).

Other experimental paradigms have also shown that either hearing rumours about an experienced event, or being said that their own memory was false, or imagining having experienced an event can lead to the formation of false memories (e.g., Principe et al., 2006). These paradigms are respectively called rumour mongering (Principe et al., 2006), false feedback (Bernstein & Loftus, 2009), and imagination inflation (Garry et al., 1996) paradigms.

Mechanisms Underpinning False Memory Formation

Different theories have been proposed to explain the formation of spontaneous and suggestion-based false memories. The Fuzzy Trace Theory (FTT; Brainerd et al., 2008) is one of the principal theories supporting spontaneous false memory production. FTT stipulates that two memory traces are stored during the experience of an event. Gist traces correspond to the essential meaning or semantics of an experience (e.g., remembering to have seen a robbery), while verbatim traces reflect item-specific details of an event (e.g., remembering the colour of robber's shirt). According to FTT, verbatim traces fade faster over time than gist traces. This means that when people have to remember a past experience and verbatim traces are no longer available, they rely on gist traces of

such an experience meaning that people generally recall the general meaning and information of the experience. The retrieval of gist traces foments the formation of spontaneous false memories.

Alternatively, according to the Associative Activation Theory (AAT; Howe et al., 2009), the formation of false memories depends on spreading activation. That is, experiencing an event (e.g., going to the market) activates a network of related nodes (i.e., related concepts and memories). When people activate a node (i.e., because they experience an event), they also activate other nodes that are related to the event but not necessarily experienced (e.g., going to the market and meeting a friend) causing the formation of false memories (e.g., meeting the friend).

Finally, the Source Monitoring Framework (SMF; Johnson et al., 1993) postulates that, during retrieval, people evaluate various sources of information by judging the memory characteristics (e.g., perceptual, contextual, affective) of these sources. Moreover, the framework holds that memories for an experienced event contain more perceptual, contextual, and affective characteristics than memories for non-experienced events (i.e., suggested or imagined). However, when a mental representation shares similar memory characteristics with memories for an experienced event, people have more difficulty to distinguish between the true and false sources of information. This difficulty makes them more likely to report source monitoring errors, which correspond to false memories.

Factors Affecting the Formation of False Memories

Demographic Factors

Several studies have taken into consideration whether individuals' age can determine the proneness to false memories. These studies have highlighted that people, in general, might report false memories regardless of their age although age differences have been shown in children and adults both for spontaneous and suggestive false memories. As a matter of fact, overall, it has been demonstrated that children are more likely than adults to develop suggestive false memories, while it seems that a contrary direction exists for spontaneous ones (for a review, see Rosendaul et al., 2023). To illustrate, studies on the misinformation effect have found that children are more susceptible than adults to accept misleading information both when verbal stimuli (e.g., Sutherland & Hayne, 2001) and actions (e.g., Otgaar et al., 2010) were administered. In addition, other studies underlined that this effect also occurs for children of different ages, such that younger children (4 years old) generally report more suggestion-based false memories than older children (9 years old) (e.g., Otgaar et al., 2010). By contrast, research on spontaneous false memories has suggested a developmental reversal effect. That is, by using the DRM paradigm, scholars have demonstrated that spontaneous

false memories are more frequent in adults than in children (Brainerd et al., 2008; Otgaar et al., 2016). The Associative-Activation Theory (AAT; Howe et al., 2009) explains this effect: Spontaneous false memories increase with age because adults have more knowledge available than children. In other words, the AAT postulates that once we retrieve information (e.g., an experience), spontaneous false memories may occur because of an automatic activation of related-information concepts, even when these concepts were not experienced. However, this spreading of activation depends on the maturity of the person's brain and knowledge base. In other words, children are less inclined to make automatic associations which lead to spontaneous false memories.

Another line of research has focused on the possible differences between women and men. Overall, most of these experiments, conducted by adopting DRM word lists eliciting gender stereotypes, have shown no specific differences due to participants' gender (Bauste & Ferraro, 2004; DeMayo & Diliberto, 2003). An example is the study by DeMayo and Diliberto (2003). The authors found a tendency to form more false memories for stereotypical female activities than for male ones, but without significant differences between women and men. Only a few studies have found significant differences between women and men. To illustrate, Sha'bani and colleagues (2019) investigated false memories in women and men by using DRM word lists differing in their emotional content (i.e., negative vs neutral) and gender stereotypes (i.e., female-stereotypes vs male-stereotypes) and found that there was a congruent-gender effect in false memories formation as well as an interaction of the gender stereotypes by the emotional content, such that women reported false memories especially for negative gender-congruent words. Surprisingly, to the best of our knowledge, research on suggestion-induced false memories seems to have not taken into account possible differences between women and men.

Cognitive Factors

Several studies have shown that individual differences in terms of cognitive resources can influence people's tendency to report false memories (e.g., Battista et al., 2020b; Battista et al., 2021a; Gerrie & Garry, 2007; Leding, 2012; Peters et al., 2007). To illustrate, scholars have identified that individuals' ability of Working Memory (WM) (i.e., the system implicated in the active maintenance and manipulation of information, Baddeley & Hitch, 1974; Engle & Kane, 2000) predicts individuals' false memories formation. More specifically, people with a high availability of WM resources are less likely to develop false memories (e.g., Bixter & Daniel, 2013; Peters et al., 2007; Watson et al., 2005), and this finding has been found for both spontaneous and suggestive false memories (e.g., Bixter & Daniel, 2013; Jaschinski & Wentura, 2002; Peters et al., 2007; Watson et al., 2005; Zhu et al., 2010). For instance, Peters and

colleagues (2007) adopted the DRM paradigm and tested individuals' WM resources by using the Digit Span task. Based on the results on this task, they split the sample into people with high vs low WM resources, and analysed data on spontaneous false memories by observing that low WM people were more inclined to form spontaneous false memories than those with high WM. The same pattern of results was found by Zhu and collaborators (2010a) in a study investigating how cognitive differences impact the formation of suggestive false memories. In particular, the authors adopted the misinformation paradigm and a pool of different cognitive tasks to assess people's WM resources. In line with studies on spontaneous false memories, the authors detected a negative and strong correlation between individuals' availability of WM resources and false memories scores, suggesting that the higher the WM resources available the lower the proneness to report false memories. More recently, Battista and colleagues (2020) tried to disentangle the specific components of WM involved in this negative relationship by adopting a more ecological stimulus (i.e., video). They tested specifically the individuals' availability of the three components of Updating, Shifting, and Inhibition and found evidence that all these WM components are involved in the formation of false memories thus supporting the influence of cognitive factors on memory illusions.

Recently, researchers have highlighted that another cognitive factor that can lead to false memories is lying (for a review see Battista & Otgaar, 2022). Lying is considered a cognitive process because the act of lying is more cognitively demanding than simply telling the truth as it requires to suppress the truth and tell an alternative account of the original event (e.g., Vrji, 2008). Studies suggest that when an individual intentionally falsifies their account of an experienced event, this deceitful act can affect their initial recollection of the event even when they eventually reveal the truth (for a review see Otgaar et al., 2018). This influence results in reporting memory errors for the lied event (Battista et al., 2020a; Battista et al., 2021b,c; Battista et al., 2024; Buecken et al., 2022; Buecken et al., 2023; Dianiska & Meissner, 2023; Mangiulli et al., 2018; Mangiulli et al., 2019; Riesthuis, 2022; Li & Liu, 2022). Additionally, an increasing number of studies have demonstrated that the memory errors caused by lying depend on the type of lies chosen. That is, less demanding strategies (i.e., false denial) might result in omitting experienced details of the event while more demanding strategies (i.e., feigning amnesia and fabrication) might lead to false memories³. Furthermore, Mangiulli and collaborators (2019) asked participants to simulate a memory for a crime and then they tested their

memory by asking participants to give up their role of simulators. They found that simulators reported more false memories for the event than those who did not feign amnesia. Similarly, Riesthuis and colleagues (2022) tested whether fabricating a false alibi would make people report false memories concerning the fabricated event. Also in this study, researchers found a higher tendency of those who lied to report false memories than those who did not lie.

Personality Factors

The formation of false memories has been also associated with personality traits. Beyond research work investigating the link between false memories and personality disorders (e.g., schizophrenia, dissociative disorder) (e.g., Brebion et al., 2000; Bremner et al., 2000; Clancy et al., 2000; Sajjadi et al., 2023; Shilling et al., 2003), a few studies have shown that individual personality dispositions – non clinically relevant – such as extroversion, psychopathy, alexithymia, openness – relate with false memories susceptibility (e.g., Battista et al., 2021d; Battista et al., 2023; Mirandola et al., 2023; Frost et al., 2006).

For instance, in 2000, Porter and colleagues tested whether extroversion traits can be informative of false memories creation and found that people with low extroversion traits were indeed more likely to report false memories, specifically for their childhood. Subsequently, this evidence was confirmed by Frost and collaborators (2006) who tested the link between false memories and the four domains of introversion-extroversion, sensation-intuition, thinking-feeling, and judging-perceiving. They found that traits of extroversion are associated with false memories, although the strongest relationship was found for both the traits of thinking and feeling (i.e., feeling traits: Making decisions based on their own and others' emotions; thinking traits: Making decisions based on logic, principles, and reasons). This study, however, was criticized because of the low validity and reliability questionnaire used to measure personality domains (i.e., the Myers-Briggs Type Indicator; MBTI). Thus, other studies (e.g., Sanford & Fisk, 2009; Sigurosson, 2003) further explored the relationship between personality traits and false memories by using the NEO Five-Factor Inventory (NEO-FFI), a measure of personality characteristics based on the big five approach to personality (i.e., neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness). By adopting this questionnaire, Sigurosson (2003) found that people high on conscientiousness and high on openness were more vulnerable than other people high on other personality traits to report false memories. Sanford and Fisk (2009) found that people high in extroversion reported a higher number of false memories than those with low extraversion, and, in turn, people high in introversion were less likely to report false memories than people with low introversion.

3. False denials consist in denying the occurrence of the experienced event, feigning amnesia in reporting to not remember such an event, and fabrication is providing a completely false account of it (Otgaar & Baker, 2018)

Recent studies have also tried to understand whether traits of psychopathy would make people more or less susceptible to false memories. To illustrate, Mirandola and colleagues (2023) adopted an emotional (negative vs positive vs neutral) false memory paradigm, tested participants' psychopathic traits with the Psychopathic Personality Inventory-Revised (PPI-R), and found that psychopathic traits were involved in the formation of false memories. Specifically, they displayed that, when participants had high traits for PPI-R fearless dominance, they also reported fewer false memories for negative events. These results were in line with a prior study by Thjissen et al. (2013) aiming to verify the link between the precursor of psychopathy, i.e., callous-unemotional traits, in children and false memories for negative vs neutral information. These authors indeed showed that children having high callous-unemotional traits were less prone to report false memories for negative information than those with such a low trait. Another recent study focused the attention on the link between alexithymia and false memories (Battista et al., 2021). In this study, the authors adopted an emotional video, and assessed alexithymia through the Toronto Alexithymia Scale-20 (TAS-20): They discovered that individuals with a high level of alexithymia reported more false memories and forgetting for the original event than those with low alexithymia.

All the above-mentioned studies support for a link between personality traits and spontaneous false memories. However, there are also studies showing that personality traits can influence the proneness to suggestion-induced false memories (e.g., Liebman et al., 2002; Zhu et al., 2010). For instance, Liebman et al. (2002) found that false memories induced through the misinformation paradigm were positively associated with three subscales of the NEO Personality Inventory, specifically the openness dimension, and modesty and altruism of the agreeableness dimension. Similarly, Zhu and collaborators (2010) tested whether the personality traits of harm avoidance, self-directedness, novelty seeking, persistence, negative coping, reward dependence, and cooperativeness were associated with the incorporation of misleading information in the misinformation paradigm. The authors demonstrated that people with low traits of harm avoidance, novelty seeking, and negative coping were more likely to form suggestive false memories, while people high in cooperativeness, reward dependence, and self-directedness traits were less likely to form false memories due to misinformation.

Emotions

Emotions can affect false memories creation in a twofold way. On the one hand, people's mood when experiencing an event can influence false memories. On the other hand, the valence of the event itself is another relevant factor determining false memories formation.

Regarding mood effects on false memories, Storbeck

and Clore (2005) used the DRM paradigm and tested the assumption that a positive mood (i.e., being happy) leads to more false memories than a negative mood (i.e., being sad) or a neutral one. Nevertheless, scholars have also underlined that the effect of mood on false memories formation depends on the type of emotional states taken into consideration (Cordon & Verrier, 2007; Corson, 2006; Semmler & Brewer, 2002). In other words, even when moods have the same valence at encoding and retrieval (i.e., mood congruency: e.g., sadness and anger: negative valence), they influence false memories in a different way because of a secondary component of emotion, namely the arousal (Semmler & Brewer, 2002). Indeed, Corson (2006) created different situations of positive and negative valence in terms of high and low arousal and found that a high level of arousal made participants -both in the negative and positive moods- report fewer false memories than those in a low level of arousal. In a subsequent study, Cordon and Verrier (2007) further tested how moods valence and arousal explain false memories. In a similar vein, they found that high arousal irrespective of the valence (i.e., negative vs positive vs neutral) led to fewer false memories than low arousal.

Additional interesting findings come from research unveiling possible differences in false memories based on the valence of the event. Emotions make events experienced in a more detailed and vivid manner than common neutral events and boost memory accuracy such that people better remember emotional events as compared to neutral ones (e.g., Kensinger, 2008; Laney et al., 2004; Levine & Edelstein 2010; for a review, see Kensinger & Schacter, 2008). This memory enhancement for emotional - especially negative and highly arousing - information leads to reduced false memories and this has been observed in studies using different stimuli and procedure (e.g., Mirandola et al., 2014; 2017; Otgaar et al., 2012). For instance, Mirandola and colleagues (2014, 2017), by adopting a specific paradigm using emotional pictures, found that emotional events were generally associated with fewer spontaneous false memories than neutral events in young adults, both in the case of negative and positive events.

However, other studies have pointed out that the valence of an event can boost rather than reduce false memories formation (e.g., Otgaar et al., 2019; Otgaar et al., 2019b; for a review, see Bookbinder & Brainerd, 2016). For example, Brueckner & Moritz (2009) by presenting emotional -as opposed to non-emotional - contents found more false memories for negative than for neutral material in adults (but see also Gallo et al., 2009). This pattern of findings is also supported by studies investigating how valence affect suggestive false memories (e.g., Hess et al., 2012; Monds et al., 2016; Porter et al., 2003; Zhang et al., 2021). Porter and colleagues (2003) asked participants to watch a positive, or neutral, or negative event; then, half of participants were exposed to misleading questions while the second half were in the control condition. The authors found that, in general,

people recalled the misleading information as part of the original event, and this was particularly frequent in those who watched the negative event. Indeed, people in the negative condition reported more suggestion-induced false memories than those in the positive and neutral conditions. Similarly, van Damme et al. (2014) replicated this pattern, by showing participants different pictures (i.e., positive vs negative vs neutral) and then providing misinformation to half of the sample. Findings demonstrated that false memories due to misinformation were higher for negative events than for positive and neutral (van Damme et al., 2014).

However, also for suggestion-induced false memories, there are a few studies showing that the valence of the event decreases false memories production (e.g., English & Nielson, 2010; Brown & Schaefer, 2010; Doss et al., 2020; Kesinger et al., 2016; Schmidt et al., 2013). For instance, Schimdt et al. (2013) tested participants memories for negative and neutral events by adopting the misinformation paradigm and found that people were less prone to report suggestive false memories for negative events than for neutral ones. Doss and colleagues (2020) extended this result by taking into consideration also positive pictures and demonstrated that people report fewer false memories for negative memories as compared to both positive and neutral pictures. In addition, Kensinger et al. (2016), in two experiments using a social conformity paradigm and pictures, found that people are likely to report fewer false memories for negative and positive pictures than neutral ones. In this study, participants were presented with positive, negative, or neutral events and, after a delay of 48 hours, engaged in a discussion with other people where wrong information was introduced by a confederate (another researcher participating along with actual participants). Those who watched the emotional events (i.e., both positive and negative) reported fewer false memories than those in the neutral condition as a consequence of the discussion.

The Implications for Italian Forensic Psychologists

In contrast to what occurs in other European countries (e.g., the Netherlands, Belgium) where forensic psychologists are oftentimes asked to evaluate the reliability of statements, the Italian jurisdiction does not allow psychology experts to express their opinion concerning the accuracy of a statement. Indeed, forensic psychologists called to work in the courtroom can only provide an evaluation of the person's (children, people with mental disabilities, etc.) ability to provide a testimony when required by the judge. Importantly, this evaluation needs to be done based on the scientific literature, in line with the Daubert standard and as underlined in the Cozzini ruling (Cass. Pen., Sez. IV, n. 43786/2010): "*Experts should be called upon not only to express their personal, albeit qualified, judgment but also to outline the scenario of studies and provide elements that allow*

the judge to understand whether, considering the different scientific representations of the problem, it is possible to arrive at a 'metatheory' capable of reliably supporting the reconstruction. The judge is ultimately called upon to give an account of this complex investigation in the reasoning, explicating the available scientific information and providing a rational explanation, in a complete and understandable manner for all, of the assessment carried out."

The article 196 of the Italian Penal Code, while underlying that each person can provide a testimony, leaves the judge the possibility to require an assessment of the person's physical and mental eligibility to testifying on certain occasions. For instance, this might occur when the person has a mental disability or for elderly people. This psychological evaluation implies a) the verification of the person's ability to understand questions and answer accordingly, along with b) sufficient memory regarding the facts to be testified about, and c) a full consciousness to report them truthfully and completely (Cass. Pen., Sez. III - 14/03/2023, n. 24365).

Another case in which Italian forensic psychologists might be required to evaluate the person's eligibility to testify is when the witnesses are children, as their natural immaturity raises doubts on the mental abilities needed to testify. For these special cases, the Italian community of researchers and forensic professionals has set up some *ad hoc* experts' Guidelines called "Carta di Noto"⁴, aiming to clarify which type of assessment can be operated: "*The ability to testify on which the expert is called to express an opinion includes generic and specific skills. The former concern cognitive functions such as memory, attention, comprehension, linguistic expression skills, the ability to identify the source of information, the ability to discriminate between reality and fantasy, the plausible from the implausible, etc., as well as the level of suggestibility and psycho-affective maturity. Specific skills concern the minor's ability to organize and report the memory in relation to the experiential complexity of what is supposed to have happened and the possible presence of suggestive influences, internal or external (resulting from interaction with adults or peers) that may have interfered with the account.*" (Carta di Noto 4, dated October 14, 2017, see also Cass. Pen., III Sez. n. 37147/2007)⁵. These Guidelines provide a methodological pathway to be followed by experts in order to avoid the production of witnesses' false memories, and, although specifically intended to children's assessment, contain important hints also applicable to adult witnesses (e.g., on the general functioning of autobiographical memory, the adoption of evidence-based approaches and procedures, etc.). To illustrate, following the recommendations of Carta di Noto, and in accordance

4. The "Carta di Noto" serves as a comprehensive document offering guidelines to professionals regarding the assessment of children's testimonial capacity, particularly in cases where they are alleged victims of sexual abuse.

5. Note that this is a literal translation from Italian to English.

with the literature review provided in the previous pages, Italian experts are advised to make use of scientific findings pertaining to the role of individual factors (e.g., demographic information, cognitive and personality traits) on the witness' ability to generally recall information (i.e., generic ability to testify). On the other hand, the evaluation of external factors (i.e., social pressure, discussions with other people, lying) and their impact upon the individual's memory functioning are informative on the abilities of the witness to report peculiar information concerning the events under investigation (i.e., specific ability to testify).

In addition, apart from situations in which forensic psychologists are directly called by the judge to help them in their final evaluation (i.e., *peritus*), they can engage in various collaborative activities with lawyers both before and outside of legal proceedings (i.e., trial consultation; Scardigno, Curci & Mininni, 2017). These activities may include crime reconstruction, assistance for legal defence investigation, and preparing for cross-examination. Trial consultation represents a valuable opportunity for the involved parties, such as the defence and prosecution, to acquire pertinent information for effective lawsuit management. In these circumstances, for instance, psychologists might offer their expertise in determining which witnesses to propose during the trial proceedings and how to interview them (Caso & Palena, 2018), by relying on findings on individual differences in the formation of false memories.

Finally, as suggested by Conway (2012) and Curci and colleagues (2020), forensic psychologists with a solid scientific preparation, have the potential to provide valuable guidelines and criteria, derived from the examined scientific evidence, for practitioners working in the Courtroom. Indeed, experts' advice might be determinant to facilitate the task of judges and jurors of determining the credibility of witnesses (Bianco & Curci, 2016), and would also contribute to reduce miscarriage of justice, oftentimes still based on naïf criteria instead of scientific evidence.

Conclusions

The current work aimed to present the main findings concerning individuals' proneness to report false memories by focusing on the main factors influencing this proneness. In particular, we highlighted the different influence of age, gender, individuals' cognitive and personality traits and emotions (i.e., mood and emotional valence) on false memories. We did stress that different factors can affect false memories formation (i.e., age, cognitive and personality traits, moods, emotional valence of the event), even though, in some cases, studies do not always present the same pattern of results (e.g., the emotional valence of the event). Therefore, research on false memories is still necessary. In addition, these findings should carefully be considered by forensic psychologists

while working in the courtroom by taking firm that an evidence-based evaluation of each case is always recommended for justice purposes.

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