Discuss How Social or Cultural Factors Affect One Cognitive Process *(for example, education, carpentered-world hypothesis, effect of video games on attention)*.

Is memory a fixed trait, or can it be altered by social and cultural experience?

Cognitive psychologists believe that the core processes of memory are universal. There is no reason to doubt that all humans, no matter of social and cultural background have basic memory processes, such as working memory, long term memory and schematic processing. Cultural and social factors may however modify the capacity and content of these memory processes. Some influencing social factors include socioeconomic status and education.

Research shows that poverty can have an affect on memory processes. Children who are raised in poor families have poorer working memory in young adulthood than other children. Evans & Schamberg (2009) conducted a long term study of cognitive development in 195 American lower and middle class students. Participants were measured on their levels of stress, such as amount of stress hormones in the blood and their blood pressure between ages of 9 to 13. Later, at the age of 17, the researchers measured the participants’ working memory. Participants were asked to remember a sequence of items. The teenagers who had grown up in poverty averaged about 8.5 items compared to middle class students who averaged about 9.44 items. The researchers controlled birth weight, maternal education, and parenting styles.

The major factor for the reduced memory performance in lower class students could be because of higher stress levels. The chronic stress that comes from poverty can also have a negative effect on brain development. Goulds’ research on laboratory monkeys has for instance shown that stress during pregnancy can lead to a smaller hippocampus, an area important for working memory, in the offspring. The stress of mothers from economic problems may therefore have a negative effect on their children’s development.

There may of course also be other influences on children’s biological processes from poverty. Compared to children from rich families, poor children in America often attend schools with less economic and educational resources. Poor children may also eat food that is low in nutrition, another factor that may inhibit memory development.

One problem with Evans & Schamberg’s study is that though it was able to identify a relationship between stress symptoms and poorer working memory in adolescence, it was not able to demonstrate how exactly stress affected the brain, nor did it identify the life events before adolescence that could have led to higher stress levels. Research on animals do suggest that stress has a negative effect on memory development, but those findings may not be fully generalisable to human subjects. Further on, Evans & Schamberg’s study has not yet been replicated. The study was however well controlled and used a large sample, increasing its’ external validity. Even though some details still are unclear, it has furthered our understanding of the connections between poverty, stress and memory processes.

Another social factor that can influence memory is formal education. Hall studied the relationship between formal education and progress of dementia of 117 American subjects by the use of a memory test. The results showed that participants with higher formal education had a delayed memory decline than participants with a lower formal education.

Even though the Hall study suggests that education can improve memory faculties, it does not explain exactly why this is the case. It is possible that the differences may be due to dispositional differences. People who pursue an academic degree may have a better semantic memory than others. It is also possible that people who pursue academic careers have certain skills that give them a better ability to do well on memory tests.

The effect of schooling on memory techniques was demonstrated in a study by Cole & Scribner (1974). Cole & Scribner tested the memory ability of Liberian school aged children. The children were expected to remember items on word lists that were organized into different categories. The test was reiterated with the children several times. The children were asked to recall the items freely. If the children used the categories to aid their recall they were expected to recall more words. Children with formal schooling in America and Liberia used this mnemonic which improved their memory of the items. Children without formal schooling however, did not use the categories to aid their recall and subsequently did not remember as much as children who had attended school.

This study suggests that people without formal schooling may lack vital mnemonic skills. It is also a possibility that some of the phenomena observed in many experimental studies on memory are affected by formal education. One such phenomenon is the primacy effect, the tendency to be more likely to remember the first item in a list. The reason for this tendency may plainly be because participants used to memorize information will repeat the presented information silently for themselves compared to participants who is not used to memorize information.

It is possible that children without formal schooling lack knowledge of memory strategies, but it does not mean that they have poorer memory. Instead it may be that they are not used at learning material with different methods. One way that some cultures learn information, such as geographic locations, is through story telling. When Cole & Scribner varied the story and presented the items in a meaningful way as part of a story, the children without schooling remembered the items as well as the children with schooling. This can be because of the traditions of a certain culture. For instance, Ross and Milson (1970) discovered that college students in Ghana were better at remembering themes of stories better than college students from the United States. This may be because Ghana has a rich oral tradition.

Current findings suggest that although many basic memory processes are universal, poverty may indirectly have an effect on memory processes because it can lead to stress, poor nutrition and lower education levels. Formal education is an important factor, because it encourages children to develop memory strategies to remember information. Social and cultural factors affect how we remember, what we remember and how well we remember.

To What Extent do Cognitive and Biological Factors Interact in Emotion?

How psychologists define emotion depend on what perspective they have. A biologically oriented psychologist defines emotion as physiological behavior; body arousal, hormones, brain activity and facial expressions are considered to be associated with pleasant or unpleasant mental states of the mind. Conversely, cognitive psychologists focus on the mental aspects of emotions and how the unconscious and conscious mental processes influence emotional experiences and actions. This essay will discuss the biological and cognitive views, their interaction and mutual influence on emotion.

Biological psychologists view emotion as a primarily somatic process. Those somatic processes may be facial expressions, physiological changes, such as arousal of the autonomic nervous system and the endocrine system, brain activity and neurochemical processes. One example of a researcher with a biological view on emotion is Le Doux. Basing his research on animals, he investigated the brain’s emotional circuit. Le Doux discovered that for fear responses, there are two neurological pathways. The short route, that goes from the sensory store in the thalamus to the amygdala, and the long route, which traverses the neocortex and the hippocampus before it results in a fear response. Le Doux argues that there is an evolutionary advantage of having two separate pathways for fear responses. During danger, the short route is effective, as it will lead to a quick, but often inaccurate response. The long route, however, is slower, but will allow for a more thorough evaluation of a situation, and a more appropriate response.

There is a large body of evidence to support the view of biological influences on behavior. Many body chemicals are related to certain emotional states, such as oxytocin and vasopressin for feelings of love in women and men, adrenaline for stress sensations, and serotonin for depressive moods. Certain areas in the brain, such as the prefrontal lobe and the amygdala, are also related to emotional processing. One should however be cautious in drawing too far reaching conclusions, as the research suffers from methodological weaknesses. Biological research on emotion is mainly experimental and findings are often based on non-human animals, questioning its applicability to humans in real life situations. Further on, it cannot be ascertained that all types of emotions are influenced to the same extent and in the same way by biological processes. Le Doux’s findings may only be valid for fear, but not for more positive or elevated emotions, such as admiration or gratitude. In favor of this argument is the fact that research has identified a multitude of interacting brain regions for emotions, and there is suggestive evidence that separate brain regions process different emotions. Notwithstanding, this research has still supports the theory that biological factors affect emotion.

In contrast, cognitive psychologists assume that conscious and unconscious mental processes can influence our emotions. This principle guides cognitive and rational emotive therapies, which assume that cognitions and emotions are interrelated, and that negative cognitions will lead to negative emotions. Those negative emotions may come out of people’s faulty interpretations of experiences, and that it is by raising awareness of, challenging and changing those beliefs that we may alter our mood. Though this therapeutic model does not explain the interactions of cognitions and emotions in great detail, it has a proven effectiveness in treatment of patients with mood disorders. (e.g. Lyon & Woods, 1991). Some neuroimaging studies have even found brain changes in the cortex and limbic system after cognitive therapy, the primary brain regions for emotional processing.

Which cognitive process is it then that cognitive psychologists believe is essential for emotion? Cognitive researchers on emotion usually emphasize the importance of cognitive appraisal. Appraisals are interpretations of situations and how they will affect one’s well being. Those appraisals, that are both conscious and unconscious, contribute to the quality and intensity of an emotion. Lazarus, Averill, and Opton have identified two components of appraisal. The first type is the primary appraisal, where the organism assesses the significance or meaning of the event and the second type is the secondary appraisal, when the organism appraises the consequence of the event and decides on how to act.

The influence of appraisal on emotional experience can be illustrated with a study by Speisman and colleagues. Participants were shown a film about an initiation ceremony. The ceremony involved unpleasant genital surgery. Speisman and colleagues manipulated the appraisal of the surgery by showing the film with three different soundtracks. One soundtrack emphasized the pain and mutilation; another presented the participants as happy and deliberate. The third soundtrack emphasized an intellectual or detached interpretation of the ceremony. Observations and self reports showed that participants reacted more emotionally to the soundtrack that was more traumatic. There are some methodological problems with the study. It is possible that participants’ reactions were primarily affected by the music, not that the music affected the appraisal of the situation. That aside, if we choose to interpret the findings according to appraisal theory, it can be hypothesized that the music affected the appraisal of the situation, which in turn affected the emotional reaction to it. Above all, the study strongly supports the view that situational factors can affect emotional responses.

So how then do biological and cognitive factors interact in emotion? In order to answer this question, one must be aware of how biological and cognitive factors are considered to be related. Both biological and cognitive psychologists believe that mental processes are related to body and brain processes especially, and that the mind cannot exist independent from those processes. The predominant view on the mind and body relationship is one of interdependence; the mental structure and processes are similar to and have biological correlates. This isomorphic view explains the interaction of biology and cognition in the following manner; they are just different aspects of the same phenomenon. Where appraisal processes and biological processes interact for fear responses may be through Le Doux’s long route, whose brain regions are thought to be related to memory, perception and higher order thinking.

Assessing the evidence, biological and cognitive factors can be assumed to contribute to emotion. If we accept the information processing view of the brain, cognitive and biological factors interact in those brain regions where cognitive and perceptual processing is thought to be occurring, such as the thalamus, the hippocampus, the amygdala and the prefrontal lobe.

Evaluate One Theory of How Emotion may Affect One Cognitive Process

A flashbulb memory is a detailed, vivid and photograph-like remembrance of a moment in time and the context in which you experienced this episode. The term was first coined by Brown & Kulik in 1977, and has been under debate ever since.

Brown & Kulik argued that there is a special biological memory mechanism which is triggered when an event exceeded threshold levels of surprise and had perceived serious consequences for the individual. This would create a permanent flashbulb memory of the immediate experiences surrounding the trauma. Brown & Kulik’s hypothesis also holds that flashbulb memories have unique features distinguishing them from other memories. Representations formed by the special flashbulb memory mechanism were believed to be detailed, accurate, picture like and impossible to forget. This is in contrast to normal memories, which by most researchers are believed to be selective, unreliable, and malleable. Even though flashbulb memories have unique features, they are considered to be a type of autobiographical memories, which are memories related to everyday life events. Some studies have even indicated that childhood memories with high emotional content, such as high school graduation can be as vivid and clear as flashbulb memories of less personal importance, such as national events. (e.g. Rubin & Kuzin, 1984)

Brown and Kulik also developed a model to describe the processes involved in Flashbulb memories. This photographic model suggests that accounts of flashbulb memories depend on three consecutive steps. First, for a flashbulb memory to occur there must be a high degree of surprise the first time an individual experiences or learns about the event. The degree of surprise may vary due to individual differences. Second, is the degree of consequentiality, with which means the consequences or significance of the event may have on the individual’s life, or how things could have been if the event had not occurred. Last, the degree of consequentiality determines the level of emotional arousal, which will also contribute to the account of the flashbulb memory. Frequent rehearsal, either by often thinking or talking about the event, acts as a mediating process in the development of flashbulb accounts, as it creates stronger memory associations and more elaborated accounts.

Brown & Kulik’s special-mechanism hypothesis, that there is a special biological memory mechanism that is triggered when an event exceeds certain threshold levels of surprise and has serious perceived consequences for the individual, has been supported by brain research. Investigations have shown that the brain’s emotional centre, the amygdala, is regulating the encoding, storage and retrieval of autobiographical memories. The underlying processes for this interaction are still largely unknown. What is known is that memories that were encoded during high emotional arousal or Amygdala activity are more likely to be recalled than other memories.

Studies support the view that emotional arousal can lead to a better recall of an event, but there is also a question as to how accurate memories of highly emotional events are. Eyewitness testimonies (e.g. Clifford & Scott, 1979; Clifford & Hollin, 1981; Kramer, Buckhout, & Eugenio, 1989) usually demonstrate that eyewitness testimonies of highly arousing events, for instance violence, are unreliable. It has therefore been conjectured that arousal only benefits memory up to a certain point. If the level of arousal passes this optimal point, memory retrieval tends to decline.

The original research that supported Brown’s and Kulik’s special-mechanism hypothesis and photographic model has been criticized for having methodological flaws. It is based on a survey in which participants were asked about the Kennedy assassination, other assassinations, remarkable events, and personally important events. Participants reported flashbulb memories for highly surprising, significant and exciting events, which provided some support for Brown’s & Kulik’s assertions. Even though the study has some credibility, as it was based on first hand reports, the study has been criticized for not testing the accuracy of the memories. It might well be that flashbulb memories are not especially accurate, only that they are experienced with great vividness and confidence. Flashbulb accounts may also be reinforced by mass media and may therefore be less likely to occur in societies less exposed to television images.

Other studies do suggest that flashbulb memories are not completely accurate. McCloskey, Wible, & Cohen, N. J. (1988) sampled groups on a date close to the Challenger Space Shuttle disaster and then asked the participants of their memories 9 months later. The results showed that 89 % of the subjects could accurately recall the location, what they were doing, where they found about the event and their reaction upon learning of the explosion. The study also controlled for highly the participants rated the importance of the event. This study shows that, although flashbulb memories are very accurate, they are not perfect, which provides a challenge to Brown & Kulik’s original hypothesis, which stated that flashbulb memories were unable to erode. Because the study only investigated the recall 9 months after the disaster, it is also very likely that the memory will be even more distorted over time.

Most modern research support Brown’s & Kulik’s suggestions that the importance of an event and the perceived consequentiality are determinants of flashbulb memories. This may be because more personally important events may be rehearsed and talked about more often (e.g. Neisser et al., 1996). However, in contrast to their model, some studies suggest that the initial emotional reaction is more important than the perceived consequentiality is more important for the formation of flashbulb memories. Many other factors than the ones proposed by Brown & Kulik have also been found to influence the accuracy of a flashbulb memory. One factor is proximity; the closer you are to an event the more likely you are to recall it. This was for instance the pattern found in the earthquake victims of Marmara. The more personally involved you are with the event, the more likely you are to recall it in detail. A third factor influencing the accuracy of memory is distinctive or unique. Uniqueness of an event has shown to be the best overall predictor of how well it will be recalled later on. (e.g. see Brower, 1988)

Many of the influencing factors on flashbulb memories proposed by Brown & Kulik have empirical support. Although much of the original model has been rejected, it still does provide insight and has generated an abundance of research on the processes of traumatic memories.

Evaluate Schema Theory

In psychology, the concept of schemas, also called script, frame or template, was first introduced by the child psychologist Jean Piaget in 1926. Piaget defined a schema as the mental representation of an associated set of perceptions, ideas, or actions.

Even though he did not use the term schema, Bartlett is often acknowledged as the first psychologist who linked schema theory to memory. Doing research on reconstructive memory, Bartlett was able to show that our long term memories are not permanent, but is constantly changed and adjusted with experience. In a famous investigation, participants read the Native American folk tale “War of the ghosts”, and were then to recall it several times up to a year later. Bartlett discovered that participants transformed the details of the story in such a way that it reflected their cultural norms and expectations. Bartlett identified several characteristics of this process. These were omission; when participants left out information they considered to be irrelevant, transformation; when participants changed details, order of events or choose to emphasize certain aspects of the story, rationalization; when participants left out details or changed the story in order to make it more comprehensible, and cultural shift, when the content and style of the story was altered in order to fit the cultural background of the participant. Bartlett was one of the first to test the schema theory empirically, but his research has been criticized for having methodological problems, especially in regards to lack of controls and comparison groups. Even so, Bartlett’s contribution to the theory has been essential.

Loosely, a schema can be defined as a mental structure that represents some aspect of the world. Its’ ideas or information pieces are organized and linked in some way. Schemas are considered to contain generic knowledge that can be applied in a large variety of situations. This is because our mental space is limited and it therefore would be impossible to have a schema for every singular event or object in the world. It would also be difficult for us to deal with novel events. Schemas do not require effortful processing and are therefore often unconscious and automatic. This speeds up information processing and makes it easier for us to do skills that are well trained, but also makes us prone for errors. Because schemas organize our knowledge, they help us understand the world and people, to form expectations of and predict situations, and guide our behavior. Examples of schemas include stereotypes, beliefs or world views, concepts of self, procedures for certain skills etcetera. Consequently, they affect many human behaviors, such as reading comprehension, decision making, memory, and prejudice.

One example of a behavior that schemas can influence is memory encoding and retrieval. In an experiment by Anderson & Pichert (1978), college undergraduates read a story about two boys who skipped school from the perspective of either a burglar or a house buyer. After the participants recalled the story once, they were asked to shift their perspective and to recall the story again. Participants mainly remembered information related to their own perspective (e.g. a leaking tap if they were house buyers, or valuables if they were burglars), but also that they remembered more of the story related to their changed perspective. The data suggests that retrieval processes are independent from encoding processes, that participants encoded more information than they could retrieve, and that the retrieved information depend on the schema they apply at the time of retrieval.

Schema theory has substantial empirical support. It is important to emphasize that it is only a construct to explain the inner functions of the mind, and that research therefore cannot observe schemas directly. The existence of schematic processing can however be inferred from observable behavior. From research, it is reasonable to believe that schematic processing, or something similar to schematic processing influences cognition. Schema theory can explain a various number of phenomena, as well as be applied in a variety of situations, such as therapy, eyewitness testimony and education. Schema theory’s impact on education is essential, for instance by the use of mind maps and rubrics.

One criticism of schema theory is its’ reductionist or mechanistic view on mental processes. Are we really just information processors that passively receive information from the environment, process it by the use of schemas and then produce an output in the form of a behavior? It is therefore important to point out that schema theory does not challenge our notion of free will. There are still many choices that seem to be conscious and deliberate. Schematic processes should instead be seen as assistants to our daily choices, interpretations and perceptions. Even though they have a significant influence on our behaviors, and we cannot claim that we are completely free in our mental processes, we do also seem to have a great deal of choice to choose what to think of, and how to create the links between schemas through our imagination. We may also choose to challenge our beliefs. Thus, we are not mindless drones. This is the reason why many modern theories of cognition, such as Baddeley’s working memory model, usually include a voluntary, non-automatic executive function or control processor.

As schema theory has philosophical roots, its’ link to brain research has traditionally been vague. Modern cognitive research attempt to corroborate schematic processing with brain processes by the use of neuroimaging technology, but the relationship is still unclear. Newer models of information processing, such as connectionism, may therefore turn out to be more useful than schema theory, and are likely to replace it. Even so, schema theory has contributed largely to our understanding of mental processes.

Evaluate One Model or Theory of One Cognitive Process

There are several models of memory. One fairly recent model is the working memory model. The working memory model was developed by in 1974 by Baddeley and Hitch, in an attempt to unite structural and process approaches to memory. Structural models of memory emphasize separate storage mechanisms whereas process based approaches argue for a unitary memory that is manipulated by cognitive processes, such as schemas.

The working memory model was developed through a series of experiment. The results suggested that our working memory consists of three or more separate subsystems, the visuospatial sketchpad, the phonological loop and the episodic buffer. These subsystems are controlled by a third subsystem called the central executive. Attention to these subsystems, as well as transfer of information between them or to long term memory has to go through the central executive, thus the visuospatial sketchpad, the phonological loop and episodic buffer are called slave systems to the central executive.

The central executive is believed to be involved in a variety of functions. Its primary functions are regulatory. It coordinates activity within the working memory and controls interactions with other parts of the cognitive system. The central executive is also theorized to have other functions, such as selective attention, mental counting, recollection of events, logical reasoning and recognition. Baddeley has indicated that the model of his central executive may be similar to Norman’s & Shallice’s supervisory attentional system. If this is so, it may be hypothesized that some of the processes in the central executive can be taken care of with certain schemas or templates from long term memory.

The two most important slave systems are the phonological loop and the visuospatial sketchpad. The phonological loop consists of two subsystems, the phonological store and the subvocal rehearsal process. The phonological store processes meaning of speech input whereas the subvocal rehearsal process processes other noise. The subvocal rehearsal process can revive memory traces by subvocal articulation. The phonological loop has several functions. It may temporary store and rehearse phonological information for about two seconds. The visuospatial sketchpad is theorized to have subsystems similar to the phonological store. It is a visual store or cache, but also part of your visual imagination.

Baddeley has also recently added a third slave system, which he calls the episodic buffer. This component links information across domains to form integrated units of visual, spatial and verbal information with time sequencing or chronological ordering such as the memory of a story or a movie scene. The reason for the introduction of this component was the observation of patients with anterograde amnesia who lack the ability to encode new information in long term memory, nevertheless can have good short term retention of stories and recall much more information than is possible in the phonological loop.

The working memory model has some empirical support, both from case studies of patients with brain damage that has impaired their memory processes. The model is also backed up by experimental research. The research that most persuasively supports the working memory model comes from experiments that require participants to simultaneously use two separate perceptual domains, such as the visual and auditory domains. Findings show that simultaneous use of visual and auditory domains is nearly as effective as effective as performance of the tasks individually. Conversely, if the participants carry out two tasks involving the same perceptual domain, performance is less efficient than when doing the tasks separately. Another effect shown in experimental studies that support the working memory model is the phonological similarity effect. Word lists that are phonologically similar create proactive interference compared to word lists that are phonological dissimilar. In line with the working memory model, the rehearsal process of the phonological loop is impaired because of the phonological similarity of the two word lists. The phonological loop has a limited processing capacity and is therefore conjectured to not be able to account for both lists. In addition, a number of brain scan studies that have found that different brain regions are activated when participants carry out different tasks involving different components of working memory. Other research by Paivio demonstrates that memory is enhanced for information that is processed both visually and verbally. This is further support for the view that visual and verbal stimuli are processed separately and therefore can have an additive effect on encoding.

There is however some criticism to the working memory model. The central executive is the function that had been most criticized. There is hardly any empirical support for its’ existence and much of its’ functioning is unclear. The existence of a phonological subsystem has also been questioned. Jones, Macken, & Nichols (2004) has in experiments shown that memory of spoken language can be diminished if participants repeatedly hear a redundant word spoken in the same voice as the words they are to remember. This implies that the storage is rather acoustic than phonological. Their findings also show that experiments that use an articulatory suppression task, which is a task where participants reproduce a certain speech output while listening to the words to remember, still have a significant recency effect. The articulatory suppression task should have diminished the recency effect due to the importance of the subvocal rehearsal process in reviving memories, but this is not the case.

The working memory model also has problems explaining many phenomena related to the irrelevant sound effect. For instance, in an experiment by Buchner & Bell (2006), recall performance of visual stimuli was reduced by irrelevant sound, especially if the sound source came from the same direction as the visual stimuli. This phenomenon cannot be accounted for by the working memory model. If there are two separate storage mechanisms of visual and phonetic stimuli, irrelevant sounds should not impair recall of visual stimuli. Instead the findings are in support of an attention mechanism for memory, rather than a rehearsal mechanism. In the working memory model, information from the environment enters the visual and phonetic buffers, and may then enter long term memory through rehearsal. The central executive acts as a mediating factor for this process. The Buchner & Bell findings, however, suggest that retention in short term memory is also dependent on attention, which is not accounted for by the working memory model.

Although there are some problems with the working memory model, the empirical support for it is fairly solid. Only the future can tell whether it has to be modified or rejected. At the moment, it is a useful model to understand memory.

With Reference to Relevant Research Studies, to What Extent is One Cognitive Process Reliable?

Once memories in our long term memory, how reliable are they? Are they malleable and open to change, or are they permanent and unable to corrupt?

First of all, it is important to be aware of that there are individual differences in memory reliability. There are a few rare cases of people with a certain brain trauma who has developed exceptional photographic memory. One known example is Kim Peek, who could remember almost everything he read and heard. Other people use better memory techniques. Many people with photographic memories may depend on such mnmenonics. In one study by Maguire et al. 10 participants with superior memory was compared with 10 controls. She found that participants in the control group and the experimental group did not differ in cognitive abilities. Neither was there a difference in brain structure between the experimental group and control group. There was however, a difference in brain processing during encoding. Participants with superior memory had higher activity in the right cerebellum, left media superior parietal gyrus, bilateral retrosplenial cortex, the right superior hippocampus and frontal sulcus than the controls. As these areas spatial memory, it was suggested that people with superior memory abilities use spatial strategies for encoding information. The sample in the study was limited, however, which questions the generalisability of the study.

There are some memories that by many researchers are considered as more accurate than others because of the emotion involved during encoding and the significance of the memory to the individual. These memories are called flashbulb memories; detailed, vivid and photograph like remembrances of a moment in time, and the context in which you experienced the episode. Flashbulb memories depend on several factors. One factor is the involvement of emotion during encoding. Studies support the view that emotional arousal can lead to a better recall of an event, but there is also a question as to how accurate memories of these highly emotional events are. Studies on eyewitness testimony (e.g. Clifford & Scott, 1979; Clifford & Hollin, 1981; Kramer, Buckhout, & Eugenio, 1989) usually demonstrate that eyewitness testimonies of highly arousing events, for instance violence, are unreliable. It has therefore been suggested that arousal only benefits memory up to a certain point. If the level of arousal passes this optimal point, memory retrieval tends to decline. This is the in the line with the Yerkes-Dodson law that has been empirically verified a number of times (e.g. Broadhurst, 1959; Duffy, 1962; Anderson, 1988). Likewise, the Yerkes-Dodson law states that if the level of arousal is too low, memory is also negatively affected.

Even memories encoded under the most ideal circumstances are malleable and open to change over time. This is because memories are believed to be stored in a schematic form. A schema is a mental representation of some aspect of the world. Its’ ideas or information pieces are organized and linked in some way. The information in the schemas is prone to change. This process is called reconstructive memory. It is even possible to develop false memories. The reason for the reconstructive process may be because the imaginary processes are closely related to memory. There are cases of individuals who suffer from Korsakov’s syndrome, a type of brain damage where the patient is unable to form new memories, and must approach every single moment in their life as it happens for the first time. To compensate for their lack of memory of every new situation, these patients tend to confabulate to themselves, meaning that they constantly are making up new stories to explain where and why they are at a certain place in time.

Many studies have supported the view that memory is reconstructive. The researcher who is often acknowledged for having discovered this phenomenon is Bartlett. In a famous investigation, participants read the Native American folk tale “War of the ghosts”, and were then to recall it several times up to a year later. Bartlett discovered that participants transformed the details of the story in such a way that it reflected their cultural norms and expectations. Bartlett identified several characteristics of this process. These were omission; when participants left out information they considered to be irrelevant, transformation; when participants changed details, order of events or choose to emphasize certain aspects of the story, rationalization; when participants left out details or changed the story in order to make it more comprehensible, and cultural shift, when the content and style of the story was altered in order to fit the cultural background of the participant. Bartlett was one of the first to investigate the concept of reconstructive memory empirically, but his research has been criticized for having methodological problems, especially in regards to lack of controls and comparison groups. Even so, Bartlett’s contribution to this type of research has been essential.

A key researcher in the modern study of reconstructive memory is Elisabeth Loftus. In several studies Loftus and her colleagues have provided evidence for the reconstructive process of memory. In one study, participants read four short narratives that was claimed to come from family members and describing childhood events of participants. Three of the childhood events had actually happened. One of the narratives was a false, but plausible childhood event of being lost in the mall when the subject was about 5 or 6. The participants were asked to write a story about each narrative and were then interviewed one to two weeks later. They were told that one of the narratives were false and asked to guess which one it was. 25 % were unable to guess that the false childhood event was false. In another known experiment, Loftus & Palmer had participants watch clips of car accidents and were then asked how fast the cars were going, asking the question with different verbs for different conditions. If the participants were asked how fast the cars were going when they collided into each other, participants tended to attribute a faster speed compared to if they were asked how fast the cars were going when they contacted each other. Loftus’ et al. studies were well controlled and have been replicated many times. Even though one cannot claim that all our memories are false, and some are more accurate than others, it seems plausible to assume that they are malleable.

The reliability of memory depends on individual differences, the use of mnemonics, the level of arousal during encoding, how much the memory has been rehearsed, the significance of the memory, how old it is, and so forth. But even if the encoding processes are ideal, memory will not be necessarily perfect. This is due to the reconstructive nature of memory.