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An Experiment to Investigate the Combined Effects of Short-Term Memory and Eye Closure on Memory Performance

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ABSTRACT

The term memory refers to the various networks and processes concerned with the storage and retrieval of information (Davis et al, 2010). Memory plays huge role in our lives and is an essential part our existence and who we are (Burgess, 2000). Without access to memories we would find it almost impossible to function, plan for the future and learn within our present lives (Siegel et al, 2009; Shohamy and Adcock 2010; Postma et al, 2012). Therefore, the accuracy and fullness of our memory is highly vital (Vredeveldt et al, 2012; Guo et al, 2014). From this perspective, several techniques have been developed to improve memory in everyday life; one of these techniques involves the cognitive interview (this is dealt with briefly below). Another technique involves the use of eye closure. Previous research has shown that merely closing one's eyes can improve memory and have beneficial effects on a range of cognitive tasks (Wagstaff et al, 2004; Perfect et al, 2008; Vredeveldt et al, 2014). The primary aim of the current study was to assess whether eye closure would influence the number of words freely recalled by participants, as well as investigate how much the level of recall would be affected by short-term memory capacity.

KEY WORDS:	**EYE CLOSURE**	**MEMORY RETRIEVAL**	**DIGIT SPAN**	**WORKING MEMORY**	**MEMORY PERFORMANCE**

Introduction

Techniques for Improving Memory – The Cognitive Interview

The field of psychology has made many useful and positive contributions to various Police and forensic practices across the world. Among those has been Fisher and Geiselman's (1992) cognitive interview technique. This integrates fundamental aspects of cognitive psychology as related to procedures that are known to influence memory. These include mental reinstatement and repeated questioning (Paulo et al, 2013). Cognitive interviewing also incorporates the social psychological principles of building rapport and skills in conversation management (Coral et al, 2009). Positively, cognitive interviewing has been shown to significantly increase the amount of correct details reported by witnesses (Akehurst et al, 2003; Holliday & Albon, 2004; Dando et al 2009).

However, a weakness of cognitive interviewing is the complexity of the procedure (Vredeveldt et al, 2011). In order to be utilized it requires a significant amount of time and effort to learn as well as conduct, as a result not all police officers undergo this training (perfect et al, 2008). Furthermore, due to its complex nature, trained officers tend to stray from the specific training procedures laid out (Dando et al, 2009). In a survey by Wright and Holliday (2005), it was found that only 62 percent of detectives with an average service length of 10.8 years were perceived to be using cognitive interviewing with older adults. In another study, Dando et al (2008) surveyed 221 police officers with an average of 22.6 months service on their perceived interview practices. The findings reveled that police officers applied some components of the cognitive interview procedures such as uninterrupted free recall, rapport building and report everything. However, none of the police officers reported applying the cognitive interview in its entirety. Additionally, in an evaluation of 75 interviews Clarke and Milne (2001) found that the overall components of the cognitive interview were rarely applied to witnesses, with no evidence of use found in 83 percent of the interviews evaluated.

Therefore, the ideal interviewing procedure would need to be one that is simple enough to require little training, as well as be applicable to the majority of witnesses. Such an intervention would be eye closure.

Techniques for Improving Memory – Eye Closure

When confronted with a task that is challenging or ambiguous, we often respond instinctively by closing our eyes or averting our gaze (Doherty- Sneddon & Phelps, 2005). Numerous findings have suggested that the simple act of closing one's eyes, can improve memory (perfect et al, 2008; Markson & peterson, 2009; Wais et al, 2010; Vredeveldt & Penrod, 2012) and have beneficial effects on performance during a wide range of cognitive tasks (Markson & Paterson, 2009). Additionally, eye closure has also been shown to enhance the recall of videotaped and past public events such as Wagstaff et al's (2004) study on the funeral of Princess Diana. However, Wagstaff et al's (2004) study could be criticized as the funeral of Princess Diana was widely displayed across various forms of media, attracting both national and international attention. It could therefore, be argued that if eye closure is only effective for such commonly familiar stimuli then perhaps eye closure might not be as beneficial for more ordinary events such as those witnesses may be asked about during police interviews (Perfect et al, 2008).

However Perfect et al (2008) went on to broaden their research to that of live everyday events, which lead to the conclusion that eye closure can have beneficial effects on intentionally studied video events as-well as live incidentally encoded interactions. Additionally, a study on the memory of eyewitness testimonies also illustrated how eye closure enhanced the memory of a violent event (Vredeveldt et al, 2011).

Verdeveldt et al's (2011) study utilized a sample of 80 university students who were randomly assigned to one of four interview conditions (eyes closed, blank screen, visual distraction and auditory distraction). The participants were asked to watch a violent video clip then participate in an interview containing 20 questions relating to the witnessed video clip. The findings revealed that the participants who had their eyes closed had 32 percent more 'finegrain' responses compared to the participants in other interview conditions. Furthermore, those within the eyes closed condition also experienced a 43 percent reduction in incorrect recall. Illustrating the usefulness and real world implications of psychological research into eye closure and its benefits on memory.

A number of explanatory theories aimed at understanding eye closure have been developed within previous literature. Among those, includes Glenberg's (1997) Cognitive Load Hypothesis which states that memory retrieval occurs simultaneously with the task of environmental monitoring, resulting in an increased demand for cognitive resources. The hypothesis therefore argues that eye closure produces beneficial effects on memory performance as it reduces environmental distractions by releasing cognitive resources, which are then reassigned to retrieval tasks (Glenberg et al, 1998). This hypothesis was further supported by a more recent study by Perfect et al (2008), in which participants were instructed to either close their eyes or where not given any instruction to do so during the recollection of both auditory and visual details of events witnessed. The finding showed that eye closure resulted in greater accuracy of details and fewer errors during recollection. These finding where also consistent across all of the five experiments, which used both free and cued recall for live interactions and videotaped events. This supports the cognitive load idea, as the participants who were instructed to close their eyes were better able to focus on the recollection of details as well as effectively block out any visual distractions from the environment (Vredeveldt, 2012). Such as periphery movement from visual fields as well as the social and cognitive distraction of facing the experimenter, which Wagstaff et al (2008) showed to cause significant impairment to eyewitness memory. The process of eye closure eliminated the need of environmental monitoring, which in turn decreased the demand for cognitive resources resulting in greater accuracy of details and fewer recall errors.

It was therefore concluded, that eye closure transforms an interview situation from one that is dual-task, to one that is single task orientated, consequently improving memory performance (Perfect et al, 2008). Arguably, what remains unclear are the precise mechanisms involved within these effects, as some studies have reported changes in accurate rate of recall whereas some have only reported changes in rate of error (Perfect et al, 2012).

An alternative explanation to the cognitive load hypothesis is the modality-Specific explanation, established on the modality specific effect of interference and the framework of short-term memory. This explanation suggests that eye closure is more beneficial when recalling visual, rather than auditory information (Vredeveldt et al, 2012). In a study relating to general tests of modality specific competition, Baddeley and Andrade (2000) set out to investigate the cognitive mechanisms involved in the retrieval of long-term memories**.** The findings revealed that a simultaneous visual-spatial task had a greater hindrance on the clarity of visual imagery than a simultaneous auditory-verbal task, which was a greater hindrance to auditory clarity rather than visual imagery.

However, in relation to eye closure effect Perfect et al (2011) concluded that eye closure was not modality specific. In their study, they combined eye-closure with the presence of an auditory distraction (bursts of white noise). They found that neither eye closure nor white noise had a significant impact on the correct recall of auditory or visual information. Because eye closure was able to help participants overcome impairment in cross-modal memory created by the auditory distraction, it was concluded that eye closure was not modality specific.

Despite conclusions from perfect et al’s (2011) study, Verdeveldt et al (2011) found evidence to show that auditory and visual distractions within an interview environment caused a combination of both modality specific and general interference(base on the cognitive load hypothesis). They found that auditory or visual distractions that were meaningless disrupted the recall of both auditory and visual information when compared to conditions were the participants closed their eyes or looked at a blank screen. However, the recall of visual information was more disrupted when the distraction was visual, whereas the recall of auditory information was more impacted when the distraction was auditory. Providing evidence for both the cognitive load hypothesis as well-as the modality specific effect of interference.

Short-Term Memory

Short-term memory, which makes up a component of working memory (Engle et al, 1999), refers to our ability to retain information for a brief period (generally, a few seconds with concurrent rehearsal) within our consciousness (Potagas, 2011). Working memory can be understood as a temporary processing system with a limited amount of capacity (Zheng, 2009).The role of working memory involves the simultaneous preservation and processing of new or old information (Unsworth and Engle, 2007). Within working memory is a central executive system, which serves to control two main components. These are (i) the visuospatial sketchpad, concerned with visual information and (ii) the phonological loop involved with the encoding of audio information (Baddeley, 2000).

The central executive itself, functions as a supervisor in determining which information receives attention or is neglected (Fang, 2016). Measurements of working memory and short-term memory test the ability to manage controlled processing and information relevant to a particular task (Zheng, 2009). Of these, the forward and backward digit span are of particular importance. Miller (1956) suggested that the capacity of immediate memory span was limited between 7 ± 2 items. Forward and backward digit span tasks, require individuals to verbally recall a sequence of digits immediately after being read aloud to them. For digits forward, participants are required to recall a sequence of three to nine digits and for digits backward, they are required to recall two to eight digits. The number of digits within each sequence are gradually increased (by one digit) until the participant is unable to recall two consecutive sequence attempts (Laures-Gore et al, 2011). The highest number of digits recalled then becomes the calculated digit span.

It is believed that in adults, digits backward span is generally shorter than digits forward span as the demand on working memory skills is higher (Wilde and Strauss, 2002). Digits forward is believed to measure the maintenance and storage components of working memory by placing less emphasis on material manipulation. Whereas, Digits backward is believed to be more complex than digits forward. This is because, backward digit span tasks have a greater reliance on working memory processing as they require some form of manipulation as well as rehearsal (Kail and Hall, 2001; Oberauer, 2003; Cornoldi and Mammarella, 2008).Information is simultaneously stored while processing tasks, vital for mentally reordering information are performed (Oberauer et al, 2004).

The current Research

The current research was therefore, concerned with the impact of short-term memory capacity and eye closure on memory performance. In this context, short-term memory capacity was assessed prior to the experimental phase using a forward and backward digit span test. During the experimental phase, word recall was assessed within an eyes-open or eyes- closed condition. The participants were divided into low, or high short-term memory capacity groups based on a median split. The experimental phase consisted of participants being exposed to lists of words which they subsequently recalled with their eyes open or closed.

Research Hypotheses

Much of the research within this area has focused primarily on assessing the correlation between cognitive task performance alone and working memory span (Baddeley, 2003). Far less research however, has explored the contribution other factors such as eye-closure. The following research will there investigate the combined effects of eye-closure and more specifically short-term memory on performance. In doing so, adding to literature within this field and potentially leading to greater understanding of the various mechanisms involved within short-term memory performance.

There are a number of hypothesis, and these are as follows:

Hypothesis one:

It is predicted that individuals with a high short-term memory capacity will recall more words than individuals with a low short-term memory capacity.

Hypothesis two:

It is predicted that eye-closure will enhance memory recall.

Hypothesis Three:

It is predicted that there will be an interaction between short-term memory capacity and eye-closure. Within this, it is expected that eye-closure will have a larger effect on individuals with low short-term memory capacity.

Method

Design

The current quantitative study was analyzed using a 2 by 2 mixed factorial ANOVA. The first independent variable was short-term memory (measured using a forward and backward digit span test) and was between-subjects. The second independent variable was eye closure (eyes open verses eyes closed during recall) and was within-subjects. The dependent variables include: (i) the total score on the forward and backward digit span test, (ii) the correlation between short-term memory capacity and (iii) level of recall during eyes open or closed task, finally the primary dependent variable was (iv) the number of words recalled during the eyes open or closed condition.

Participants

The participants consisted of a sample 60 university students (both male and female) aged 18 years or over. The participants were recruited through the Manchester Metropolitan University psychology research participation pool and via opportunity sampling. The exclusion criteria was participants with existing memory problems.

Materials

The research utilized the following materials and equipment. The digit span test, taken from the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1997), as a measure of forward and backwards digit span. A set of 50 random words for the experiment, a laptop computer to present the word lists to each participant. The research also utilized Audacity Laptop an audio recording software, to record each of the participants recalled answers. Finally, a timer was used for the timed procedures.

Procedure

Once recruited, the participants were invited to the Manchester Metropolitan university experimental labs, where they were tested individually after being welcomed by the experimenter. The participants were told about the study and informed consent was obtained via the consent form (appendix 4) which was offered prior to participation. The participants were also told that the experiment would progress in a number of phases.

Phase one – Digit Span

During the forward-digit span test the experimenter read out a string of digits (e.g., 4, 2, 7 etc.) and the participant were asked to immediately repeat the string after it had been read by the experimenter. The experimenter read all the digits using a monotone voice without and inflections, furthermore the experimenter conducting the tests remained consistent for all the participants. This was done in order to reduce the effects of variations in accent, pitch or tone of voice, variables known to influence memory. All the digits were said at the rate of one digit per second and were not repeated once the digit string had been fully read to the participant. If the participant incorrectly recalled the digit string over two successive strings, the test ended and the last correct recall was the participant's forward span. However if the participant was successful, the next digit string increased in length by one digit. The same procedure was followed for the backward-digit span test, however the participant was required to repeat the string of digits in the reverse order read to them by the experimenter (e.g. If the experimenter said 4,2,7, and the participant would say 7,2,4).

Phase two – Experiment (Eyes Open or Eyes Closed)

During the experiment, each word was presented for one second with a one-second (white blank screen) interval between each word. This continued until the full set of 25 words had been presented. The participants were then asked to count backwards form 30 until they reached zero. Following this, the participants were then asked to verbally free-recall (in no particular order) the list of 25 words memorized with their eyes open or closed. The procedure was then repeated with a different set of 25 words for counter balancing. The recall phase was recorded using audacity (an audio recording software).

Phase three – Debrief

Once the experiment was complete, the participants were thanked for their participation and given the opportunity to ask any questions. A debrief sheet (see appendix 5) containing all the relevant information, including counselling services, the data withdrawal deadline and experimenter contact details were made available for the participants to take with them.

Results

General overview of results

The data was screened for any unusual scores or outliers, the total score for forward and backward digit span was then calculated based on this. The median score was determined, than those falling below or above the median were classified as low or high memory span. The total number of words recalled and non-studied words falsely recalled were determined, and these scores entered into the primary analysis. The primary analysis consisted of a series of two (short-term memory span; high vs low) between–subjects by two (Eye condition; open vs closed) within subjects mixed ANOVA. Any interaction was assessed by the use of simple main effects; this consisted of either between or within subjects T-test.

The overall descriptive statistics for forward digit span can be found in Table 1.

Table 1: Forward Digit Span Results

Mean (SD) number of studied items recalled and false recall as a function of eye condition, response type and memory span.

	Eye Condition	
Response type & Span	Open	Closed
Correct Recall Overall		
Low	4.64 (1.73)	6.77 (3.17)
High	6.24 (1.71)	8.24 (2.04)
Correct Recall Remember		
Low	4.30 (1.53)	6.70 (3.11)
High	6.17 (1.65)	8.05 (1.96)
Correct Recall Know		
Low	0.09 (0.29)	0.18 (0.50)
High	0.05 (0.22)	0.18 (0.51)
Incorrect Recall Overall		
Low	0.45 (0.74)	0.68 (0.89)
High	0.58 (1.06)	0.60 (1.17)
Incorrect Recall Remember		
Low	0.32 (0.57)	0.32 (0.57)
High	0.37 (0.67)	0.45 (0.89)
Incorrect Recall Know		
Low	0.14 (0.35)	0.32 (0.65)
High	0.13 (0.41)	0.08 (0.27)

Forward digit span for correct recall

The main effect of eyes closed was significant, F (1, 58) = 41.82, p < .001. Overall this indicates that memory recall was higher under the eyes closed condition. The main effect for forward digit span was also significant, F (1, 58) = 10.16, p = .002.This indicates that those with a higher forward digit span recalled more words. Finally the interaction between the eyes closed condition and forward digit span was not significant, F (1, 58) = 0.04, p = .83.

Remember Responses

For the remember responses the main effect of the eyes closed condition was significant, F (1, 53) = 42.38, p < .001. This indicates that the remember responses were higher under the eyes closed condition. The main effect for forward digit span was also significant, F (1, 53) = 11.45, p = .001.This indicates that the number of remember responses were higher in the eyes closed condition. Finally the interaction was not significant, F (1, 53) = 0.61, p = .44.

Know Responses

For the know responses the main effect of the eyes closed condition approached significance, F (1, 58) = 3.29, p = .07.This means that the know responses for the eyes closed condition were marginally higher than those for the eyes open condition. The main effect for memory span was not significant, F (1, 58) = 0.04, p = .84. Finally the interaction was not significant, F (1, 58) = 0.11, p = .74.

Guess Responses

The number of guess responses were at floor levels and consequently were not subject to any analysis.

Overall

In general, eye closure increases memory recall and short-term memory capacity increases memory but they do not interact.

Forward digit span for incorrect memory recall

The main effect of eyes closed was not significant, F (1, 58) = 0.76, p= *0. 39*. Overall this indicates that memory recall was not higher under the eyes closed condition. The main effect for forward digit span was also not significant, F (1, 58) = 0.01, p = .918.This indicates that those with a higher forward digit span did not recall more words. Finally the interaction between the eyes closed condition and forward digit span was not significant, F (1, 58) = 0.47, p = .49.

Remember Responses

For the remember responses the main effect of the eye condition was not significant, F (1, 58) = 0.13, p= .72. This indicates that the remember responses were not higher under the eyes closed condition. The main effect for forward digit span was also not significant, F (1, 58) = 0.32, p = .573.This indicates that the number of remember responses were not higher in the eyes closed condition. Finally the interaction was not significant, F (1, 58) = 0.13, p = .72.

Know Responses

For the remember responses the main effect of the eye condition was not significant, F (1, 58) = 0.58, p = .45. This indicates that the know responses for the eyes closed condition were not higher than those for the eyes open condition. The main effect for memory span was not significant, F (1, 58) = 2.71, p = .11. Finally the interaction was not significant, F (1, 58) = 1.92, p = .17.

Guess

The number of guess responses were at floor levels and consequently were not subject to any analysis.

Overall

In general, eye closure increases memory recall and short-term memory capacity increases memory but they do not interact.

Backward digit span results

The overall descriptive statistics for backward digit span can be found in Table 2.

Table 2: Backward Digit Span Results

Mean (SD) number of studied items recalled and false recall as a function of eye condition, response type and memory span.

	Eye Condition	
Response type & Span	Open	Closed
Correct Recall Overall		
Low	4.61 (1.28)	6.85 (2.63)
High	7.00 (1.67)	8.81 (2.12)
Correct Recall Remember		
Low	4.41 (1.48)	6.44 (2.98)
High	6.27 (2.41)	8.50 (1.98)
Correct Recall Know		
Low	0.03 (0.17)	0.29 (0.17)
High	0.12 (0.33)	0.27 (0.60)
Incorrect Recall Overall		
Low	0.56 (0.93)	0.88 (1.27)
High	0.50 (0.99)	0.31 (0.62)
Incorrect Recall Remember		
Low	0.41 (0.66)	0.40 (0.78)
High	0.27 (0.60)	0.23 (0.59)
Incorrect Recall Know		
Low	0.15 (0.44)	0.24 (0.55)
High	0.12 (0.33)	0.77 (0.27)

Backward digit span for correct recall

The main effect of eyes closed was significant, F (1, 58) = 42.57, $p < .001$. Overall this indicates that memory recall was higher under the eyes closed condition. The main effect for backward digit span was also significant, F (1, 58) = 26.77, $p < .001$. This indicates that those with a higher backward digit span recalled more words. Finally the interaction between the eyes closed condition and backward digit span was not significant, F (1, 58) = 0.48, $p = .49$.

Remember Responses

For the remember responses the main effect of the eye condition was significant, F (1, 58) = 29.96, $p < .001$. This indicates that the remember responses were higher under the eyes closed condition. The main effect for backward digit span was also significant, F (1, 58) = 18.75, $p = .001$.This indicates that the number of remember responses were higher in the eyes closed condition. Finally the interaction was not significant, F (1, 58) = 0.67, $p = .80$.

Know Responses

For the know responses the main effect of the eye condition approached significance, F (1, 58) = 4.13, $p = .05$. This means the know responses for the eyes closed condition were marginally higher than those for the eyes open condition. The main effect for memory span was not significant, F (1, 58) = 1.98, $p = .17$. Finally the interaction was not significant, F (1, 58) = 0.30, $p = .58$.

Guess

The number of guess responses were at floor levels and consequently were not subject to any analysis.

Overall

In general, eye closure increases memory recall and short-term memory capacity increases memory but they do not interact.

Backward digit span for incorrect recall

The main effect of eyes closed was not significant, F (1, 58) = 0.23, p=.64. Overall this indicates that memory was not higher under the eyes closed condition. The main effect for backward digit span was also not significant, F (1, 58) = 2.06, p=.16. This indicates that those with a higher backward digit span did not recall more words. Finally the interaction between the eyes closed condition and backward digit span was not significant, F (1, 58) = 3.47, p = .07.

Remember Responses

For the remember responses the main effect of the eye condition was not significant, F (1, 58) = 0.14, p= .71. This indicates that the remember responses were not higher under the eyes closed condition. The main effect for forward digit span was also not significant, F (1, 58) = 2.12, p = .15.This indicates that the number of remember responses were not higher in the eyes closed condition. Finally the interaction between the eyes closed condition and remember responses was not significant, F (1, 58) = 0.54, p = .47.

Know Responses

For the know responses the main effect of the eye condition was not significant, F (1, 58) = 0.09, p = .77. This means the know responses for the eyes closed condition were not higher than those for the eyes open condition. The main effect for memory span was not significant, F (1, 58) = 1.71, p = .20. Finally the interaction was not significant, F (1, 58) = 0.58, p = .45.

Guess

The number of guess responses were at floor levels and consequently were not subject to any analysis.

Overall

In general, the findings reveal main effects of eye closure and of both forward and backward memory span. Essentially, closing one's eyes increases memory recall and higher memory span is associated with enhanced recall. However, these two variables do not interact and the reason(s) for this are considered in the discussion below.

Discussion

General aspects of the current findings

The results of the current study demonstrate that eye closure improves long-term memory recall irrespective of whether an individual's short-term memory span is high or low, this was found throughout all the results. These findings are consistent with the majority of existing literature, which has shown that eye closure has beneficial effects on memory recall (Wagstaff et al, 2004; Perfect et al, 2008; Vredeveldt et al, 2014). The present study therefore contributes to literature in showing that eye closure has a significant effect on long-term memory recall. This was demonstrated by the higher levels of word recall during the eyes closed, rather than the eyes open test condition. The most important finding was that eye-closure and short- term memory both increase memory recall, but they do so independently as no significant interaction was found within the study.

The above dealt with memory responses overall, however, consideration needs to be given to both 'Remember' and 'Know' responses as these might reveal different findings. For the 'remember' responses, word recall was higher during the eyes open condition for both forward and backward digit span however, a significant interaction was not found. For the 'know' responses, forward digits span approached significance, while the correct 'know' responses for backward digits span were marginally higher than those for the eyes open condition. Previous literature supports the expectation that the correct 'know' responses for eyes closed would be consistently significant for both forward and backward digit span, as-well as higher within the eyes closed condition (Perfect et al, 2008; Markson & Peterson, 2009; Wais et al, 2010; Vredeveldt and Penrod, 2012). However, the differences shown within the current study may have been due to the relatively low number of 'know' responses form participants. Therefore, the current research could have benefited from having a larger sample size.

Potential limitations and future implications

It is important to interpret the findings of this study in light of its potential limitations. These limitations pertain to a number of factors including (i), the nature of the participant sample, (ii) and the nature of the stimuli. Thus, in relation to the first point, it should be noted that the participant sample used within this study were university students. As a whole, university students are often overrepresented within psychological research because of their availability. Though this can be advantageous for research, it is important to recognize that with this comes the risk of obtaining an unrepresentative sample, making it more difficult to apply generalizations to the wider population. In general, when compared to younger adults, older adults have been shown to perform more poorly on memory retrieval tasks (Spaniol, 2006). This is because older adults have been shown to have specific age deficits in cognitive processes such as recollection and self-initiated processing (Naveh- Benjamin, 2000). However, the aim of the current study was to investigate the effect eye-closure on memory recall, as well as assess the interaction between the level of word recall and short-term memory capacity. Therefore, age related factors such as poor recollection and self-initiated processing would not have had a significant impact upon the validity of the findings as well as the generalizability of the current study.

In relation to the second point, a potential area of criticism would also be the recall stimuli of 50 words, there has been research to show that word characteristics such as frequency, emotional tone and length can have an impact on recall performance. The current study controlled for such factors by utilizing 50 neutral valence words. However, a factor that was not controlled for was the meaningfulness of the words used. Meaningfulness along with the factors such as frequency, emotional tone and length has also been shown to influence recall and internalization. These factors could have been controlled for by using word stimuli in a language not known to the participants. As a result, decreasing the chance of present and previous meaning assignment, further adding to the accuracy of the current study.

Practical and applied implications

Despite the potential limitations highlighted above, the present study still has real practical applications. Having knowledge about memory enhancing techniques such as eye closure has the potential to lead to greater improvements in a wide range of areas. It is widely recognized that the accuracy of eyewitness testimony can be reduced by a range internal as-well as factors (Vredeveldt et al, 2011).Therefore the application of techniques such as eye closure has the potential to lead to further improvements in eyewitness testimony and training procedures, leading to greater improvements within the criminal justice system. Furthermore, the application of eye closure to the study techniques used by students has the potential to lead to improvements in recall accuracy during tests as well as exams. Finally, having general knowledge and understanding of the beneficial effects of eye closure can also enhance everyday recall for situations such as the remembrance of names and addresses.

Summary & Conclusions

In conclusion, the findings of the current study have shown that eye closure has beneficial effects on memory recall, irrespective of a high or low short-term memory capacity. However further research is required to investigate the mechanisms behind why eye closure and short-term memory, where found to show no interaction when it came to memory performance.

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