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What effect does the relationship between the encoding-retrieval match and cue overload have on memory performance? Is confidence-accuracy correlation affected by the diagnostic value of a cue? An assessment of memory functions.

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Abstract

The encoding-retrieval match has been established as a means to improve memory performance. It has recently been proposed that memory performance is not only explained by the encoding-retrieval match and that the cue overload effect needs to be taken into account when predicting memory performance. In the present study, participants were tested using a cued recall methodology. During a study phase, participants viewed word-pairs with pictures in the background. During the test phase the participants identified whether intact or recombined word-pairs were presented while again having pictures in the background. The pictures contributed as retrieval cues during the test phase. The participants also rated their confidence about their decision on a 1-5 scale. By using the pictures in the background as the manipulation, memory performance in a Baseline condition, a Diagnostic Cue condition (with a unique picture) and a Non-Diagnostic Cue condition (with a re-used picture) was statistically analyzed to explore the relationship between the encoding-retrieval match and the cue overload effect. The analysis showed that during the Diagnostic Cue condition, participants' performance was enhanced relative to the Baseline condition. The cue overload effect undermined the positive effect that the encoding-retrieval match had on memory performance during the Non-Diagnostic Cue condition. Confidence ratings significantly and positively correlated with accuracy. No significant difference between the CA-correlations of the different conditions was discovered. This study's results suggests that a cues diagnostic value has great importance for whether a person may benefit or not from the encoding-retrieval match during cued recall.

Keywords: *encoding-retrieval match, cue overload, confidence, optimality hypothesis*

What effect does the interaction between the encoding-retrieval match and cue overload have on memory performance? Is confidence-accuracy correlation affected by the diagnostic value of a cue? An assessment of memory functions.

A most important part of the human memory system is the *episodic memory* (Herrmann & McLaughlin, 1973). Episodic memory allows us to recall earlier events and base our decisions on previously learned knowledge. In order to access our episodic memories that are stored in long-term memory, retrieval is needed (Tulving & Pearlstone, 1966). One of the theories declaring how we can better access our episodic memories during retrieval is the *encoding-retrieval match*. The encoding-retrieval match theory claims that when a cue is present during both encoding and retrieval, the encoding-retrieval match will lead to an enhanced performance on a memory test (Godden & Baddeley, 1975; Fisher & Craik, 1977). The encoding-retrieval match has become a standard viewpoint on how memory functions.

There is a need for research that challenges the encoding-retrieval match dogma and evaluates which aspects of a cue that will increase memory performance and also what types of conditions that will interfere with recall, such as *cue overload* (Nairne, 2002). When the same cue is presented across several different occasions a cue overload effect will occur. The cue overload is suggested to increase the risk of a person not being able to access the correct information during retrieval, thus leading to a decrease in memory performance.

To demonstrate the cue overload effect, this present study used a cued recall methodology. Cued recall has been used in many memory experiments though mostly ones in which the encoding-retrieval match has been discovered and renowned for its positive effects on

recall (Tulving & Pearlstone, 1966). It has been shown in previous research that cued recall with an encoding-retrieval match enhances the recall performance and indeed is crucial for an accessible episodic memory (Fisher & Craik, 1977).

This study has set out to question whether the effects on memory performance can be attributed solely to the encoding-retrieval match or if other factors need to be included, such as cue overload. The goal was to via better understanding of how memory functions be able to predict performance on memory tasks. The encoding-retrieval match was questioned from a *memory-as-discrimination standpoint* (Goh & Lu, 2011; Poirier et al., 2012).

The memory-as-discrimination standpoint states that to predict the memory recall outcome, both the encoding-retrieval match and cue overload needs to be considered (Poirier et al., 2012). There is a relationship between the encoding-retrieval match and cue overload illustrated by a principle: if the cue overload is increased, the encoding-retrieval match will produce a decreased outcome on recall. Inversely, if the cue overload is decreased the encoding retrieval match will have an enhanced effect on memory resulting in increased recall outcome (Nairne, 2002; Poirier et al., 2012).

As well as suggesting a memory-as-discrimination viewpoint, Nairne (2002) also suggested that instead of further exploring all the positive effects encoding-retrieval match has on memory recall, focus should be switched to specific properties of the stimulus being encoded, namely its *diagnostic value* (Nairne, 2002).

Nairne's (2002) description of the diagnostic value of a cue can be linked to the theory of *encoding specificity*. The encoding specificity theory states that memory recall can be facilitated by returning to a certain context (Tulving & Thomson, 1973). A cue consists of, or imitates, aspects of the encoding context. A context has many specific features which can trigger recall.

Similarly, a cue will need to have specific features, or be diagnostic, in order to trigger recall, according to this study's memory-as-discrimination viewpoint (Poirier et al., 2012).

The memory-as-discrimination viewpoint also links together Nairne's (2002) theory of the diagnostic value of a cue and the *levels-of-processing theory* (Nairne, 2002; Poirier et al., 2012). The levels-of-processing theory states that deeper encoding leads to facilitated recall (Craik & Lockhart, 1972). The definition of deep encoding is dependent on memory performance. This results in a problem of circularity whenever deep encoding is used to explain memory performance. Because of this problem, the deep encoding term has little explanatory value. This problem can be solved if the term deep encoding is remodeled and defined by what Nairne (2002) describes as a diagnostic cue: a diagnostic cue's unique features will trigger the recall of the correct memory to select at retrieval (Poirier et al., 2012).

The *transfer-appropriate processing theory* adds to explaining the diagnostic value of a cue by referring to examples of what the cue being diagnostic involves (Goh & Lu, 2011). That the cue is diagnostic means that it is the appropriate source for triggering memory recall. The diagnostic value of a cue can involve meaning, rhyming or supposedly other features connected to the memory source (Goldstein, 2011). What describes a cue as having diagnostic value is its uniqueness compared to other cues.

Elaborating on the memory-as-discrimination proposition to include the theory of transfer-appropriate processing can give a clearer picture and a more complete definition of the diagnostic value of a cue. The transfer-appropriate processing theory also fills in the blanks from what the levels-of-processing theory doesn't explain about the memory-as-discrimination view (Goh & Lu, 2011).

By having all these propositions in mind, a complete picture of Nairne's (2002) memory-as-discrimination theory can be presented and elaborated upon. By testing Nairne's (2002) theory empirically, the relationship between the encoding-retrieval match and cue overload can be described scientifically and the myth of the encoding-retrieval match can be replaced with an explanation of the functions of the intricate human brain and memory (Poirier et al., 2012).

Proposing that the diagnostic value of a cue has significant meaning for the potential outcome of an encoding-retrieval match has implications regarding areas of memory function other than memory performance on tests. One of these areas concern false memories. Previous research has generated theories as to why false memories occur (Straube, 2012).

One theory suggests that false memories can be induced by matching the conditions of encoding and retrieval with a cue. If the cue generates access to several different memories at the retrieval stage, the correct source can be confused with an incorrect memory source, so that the person misattributes the content of one memory to the situation of another memory (Straube, 2012).

Loftus and Pickrell (1995) described the process of post-event information that alters the recall process of the event itself, as used in experiments, in three steps: first the actual witnessing of the event in question. Then false information is introduced. This false information is then adopted as if it was their actual memory. From a diagnostic- vs non-diagnostic cue perspective, these events can be interpreted as the actual memory and the misinformation both matching the retrieval cue. The cue can consist of the context in the sense that the actual question is specific. For instance: if a witness observes a yellow car during the event, but later is provided with misinformation involving a blue car, these two memories (the observation and the

misinformation) both match the contextual cue (asking about a car involved) that is incorporated in the question ("What color was the car that was involved in the event?").

If non-diagnostic cued retrieval can cause false memories, how does *confidence*, i.e. how certain an individual feels about his or her statement, relate to diagnostic and non-diagnostic cues? To the authors' knowledge, this area has not been explored previously.

It is a rather well-established belief in cognitive psychology that confidence is only vaguely related to accuracy (Kassin, Tubb, Hosch & Memon, 2001). The relationship between confidence and accuracy has interested psychologists for over a century (Dallenbach, 1913).

Indeed, there is ample evidence for a low correlation between confidence and accuracy (CA-correlation). For instance, Clifford & Scott (1978) found no correlation between confidence scores and accuracy in their experiment involving recall of events that had been shown to the subjects on film. Although Loftus, Miller & Burnes (1978) detected a positive CA-correlation to some extent, they draw the conclusion that the effect is miniscule and easily overshadowed by other factors.

In an overview, Gary L. Wells and Donna M. Murray (1984) summarized the results from 31 independent studies, in which only 13 reported a significant correlation between confidence and accuracy. They found an average correlation of those that do show a significant correlation of (r = .33). However, when they included all studies they estimated the correlation to a mere (r = .08).

There appears to be a well-established consensus of confidence as a bad predictor of accuracy. Kassin, Tubb, Hosch & Memon (2001) conducted a survey study, essentially reproducing an earlier study (Kassin, Ellsworth & Smith, 1989), giving questionnaires to 64 eyewitness psychology experts who had conducted eyewitness research or published articles,

chapters or books thereof within ten years. Most respondents believed that the research supported the statement “An eyewitness's confidence is not a good predictor of his or her identification accuracy.” Only a minority (8 %) of the respondents believed the evidence to be inconclusive, not supportive of or contradictory to this statement. One respondent answered that he or she didn’t know. 87 % responded that the phenomenon (that confidence is not a good predictor to accuracy) was reliable enough for psychologists to present in courtroom testimony. 95 % responded that the evidence was contradictory to “common sense”. No significant change in belief regarding low CA-correlation since 1989 was found.

While it is commonly accepted among psychology scholars that the CA-correlation is low, in practice a high CA-correlation is assumed in legal contexts and police work, if perhaps implicitly. Wells et al., (1998) show in their overview that there seems to be a firmly rooted belief in confidence as a predictor of accuracy among practicing lawyers and even more so among prosecutors as well as in test subjects. Of particular interest are the results from studies where no CA-correlation and strong effect of belief in such in observers were found in the same experiment.

Wells et al., (1998) also make evident that jurors rely on witness confidence when attempting to assess the accuracy of witness testimony by taking witnessing conditions less in account when a witness appears confident. The authors conclude that “There is consistent evidence to indicate that the confidence that an eyewitness expresses in his or her identification during testimony is the most powerful single determinant of whether or not observers of that testimony will believe that the eyewitness made an accurate identification.” (p. 240).

There is, however, also conflicting evidence that puts the dogma of low CA-correlation into question. Luna and Martín-Luengo (2012) measured a CA-correlation of $r = .64$. Kenneth A. Deffenbacher (1980) reports that his meta-study "[...] reveals a great deal of more apparent conflict in research findings regarding the accuracy/confidence relation than have the previous reviews." (p. 620). He goes on to mention correlation coefficients ranging up to ($r = .95$).

An attempted solution to these apparent contradictions was put forth by Deffenbacher (1980). His suggestion, named the *Optimality Hypothesis*, states that the level of CA-correlation is dependent on favourable conditions during encoding. If the conditions during encoding are such that memories are encoded in a manner in which they can easily be retrieved, i.e. high *optimality*, then the CA-correlation will be higher, Deffenbacher predicts. Retrieval cues are one of the ways of increasing optimality that Deffenbacher mentions in his article.

Bothwell, Deffenbacher & Brigham (1987) found support for the Optimality Hypothesis in their meta-analysis of 35 staged-event studies. The result showed that longer target exposure times provided a significant increase in the CA-correlation. Another example of a factor improving memory encoding conditions and also enhancing CA-correlation was found in a study by McKelvie (1993), in which inverted and non-inverted images of bespectacled or non-bespectacled faces were shown to the participants. They performed better with both the non-inverted images, and the non-bespectacled faces, as expected, and also rated their confidence higher under these conditions, although a (lower) CA-correlation was found even under the less favorable conditions.

First, we aim to determine whether the Optimality Hypothesis holds true in this context, i.e. not a witness-identification experiment, but rather a more stripped down experimental design for investigating episodic memory. We thus predict a higher CA-correlation in the Diagnostic

Cue condition than in the Baseline condition. Secondly, we wish to examine whether the Optimality Hypothesis still holds water in the case of cue overload, i.e. with a non-diagnostic retrieval cue.

The overall objective of this study was to critically examine the influence that cues can have on memory performance from a memory-as-discrimination viewpoint. By undertaking the memory-as-discrimination viewpoint, the effect that the cue overload combined with encoding-retrieval match has on memory performance was assessed.

Method

Participants

The participants that took part in the study consisted of women and men who were native Swedish speakers. A total of 42 participants were initially selected for the study, though four of them were later excluded for analysis due to misinterpretation of the task. Out of the 38 participants remaining in the analysis, 20 were women and 18 were men. The mean age was 27.63 years old with a standard deviation of 9.76 years. The age span ranged from 19 years old to 65 years old. The participants were selected from the authors' contacts: family, friends and others. This selection of participants resulted in a convenience sample.

Stimulus materials

To test the participants' recall accuracy this study used words combined into word-pairs. The word-pairs were either intact across the study and test phase or recombined during the test phase.

Detailed pictures of various scenes and items were presented in the background as a manipulation during the participants' main focus in the study.

Design

The manipulation in the test consisted of pictures being presented in the background of the word-pairs. Each word-pair always had a picture in the background, both during the study phase and during the test phase. The three relevant outputs from the test for testing the encoding-retrieval match hypothesis are Baseline, Diagnostic Cue and Non-Diagnostic Cue. In the Baseline condition the pictures did not match across the study phase and the test phase for each word-pair. In the Diagnostic Cue condition, each word-pair was matched with the same picture across the study phase and the test phase, thereby matching conditions of encoding and retrieval. During the Diagnostic Cue condition the word-pair always had a picture in the background that was unique for the word-pair. In the Non-Diagnostic Cue condition the picture in the background matched with the word-pair across the study and test phase, but the same picture occurred several times with other word-pairs, thereby creating a cue-overload effect (Nairne, 2002).

Procedure

Prior to participating in the study, each participant signed an informed consent form. Via the informed consent form and verbally the participants were informed that they had the right to terminate their participation at any time without consequences. Data for the study was collected via portable computers. Participants took part in the study via an E-Run program file programmed to contain a memory test, which consisted of five blocks. All blocks included a

study phase, a distractor task and a test phase. Before the experiment started, the participants were verbally instructed to remember as many correct word-pairs as possible. Additionally, an information screen with instructions was shown before each phase during the experiment.

Each block started with a study phase in which 30 word-pairs were presented to the participants with an exposure time of four seconds per each word-pair. The study phase was followed by the distractor task, which was a calculation exercise. The participants were instructed to count down from a random number shown on the screen, seven digits at the time until the screen showed a stop-sign, and then write down which number they landed on. The purpose of this exercise was to clear the participants' working memory and inhibit the recency effect for remembering (Glanzer & Cunitz, 1966).

Next came the test phase, where the participants were instructed to identify whether the word-pair was intact (a correct word-pair) or if it was a recombined word-pair (an incorrect word-pair). The correct word-pairs were intact across the learning and testing phases and the incorrect word-pairs were recombined in the test phases. The participants were instructed to press the k-key when the word-pair presented was correct, and the f-key when the word-pair presented was incorrect. By recombining the word-pairs during the test phase, the participants couldn't identify the correct word-pairs via familiarity since the words themselves all had occurred during the study phase. The recombination of word-pairs was thereby utilized in order to test the participants' episodic memory. Each word-pair was followed by a confidence rating from 1 to 5, where 1 indicated guessing and 5 indicated being absolutely certain.

Each block tested the participants on 10 word-pairs for each of the three conditions, a total of 30 word-pairs per block. The left word was a cue and the right word was a target. The

testing session thereby utilized the cued recall method. The five blocks contained a total of 150 word-pairs, 50 for each condition.

Analysis

Each participant's ratio of correct recognitions to number of opportunities (25) for each of the three conditions (Baseline, Diagnostic Cue and Non-Diagnostic Cue) served as raw data for the study's statistical analysis. The accuracy measurement for this part of the analysis, the PR-value, was derived by subtracting the ratio of false alarms (incorrect recognitions) from the ratio of hits (correct recognitions). These were then compared across the three conditions by a repeated measures analysis of variance (ANOVA). The statistical analysis was conducted using IBM Statistical Package for the Social Sciences. Significant effects were followed up by pairwise comparisons.

In addition to the PR-values used in the ANOVA, a measure of accuracy rate was also calculated for each individual and condition, as well as a mean confidence rating for each individual and condition. This generated three confidence rating means and three accuracy rates per individual, one rating per condition.

To measure CA-correlation a Pearson correlation analysis was conducted between accuracy rate and mean confidence rating for all three conditions, thus essentially replicating the method used by Luna & Martín-Luengo (2012). The resulting *r*-values were then compared pairwise using Fisher's *r*-to-*Z* method to conduct a *Z*-test.

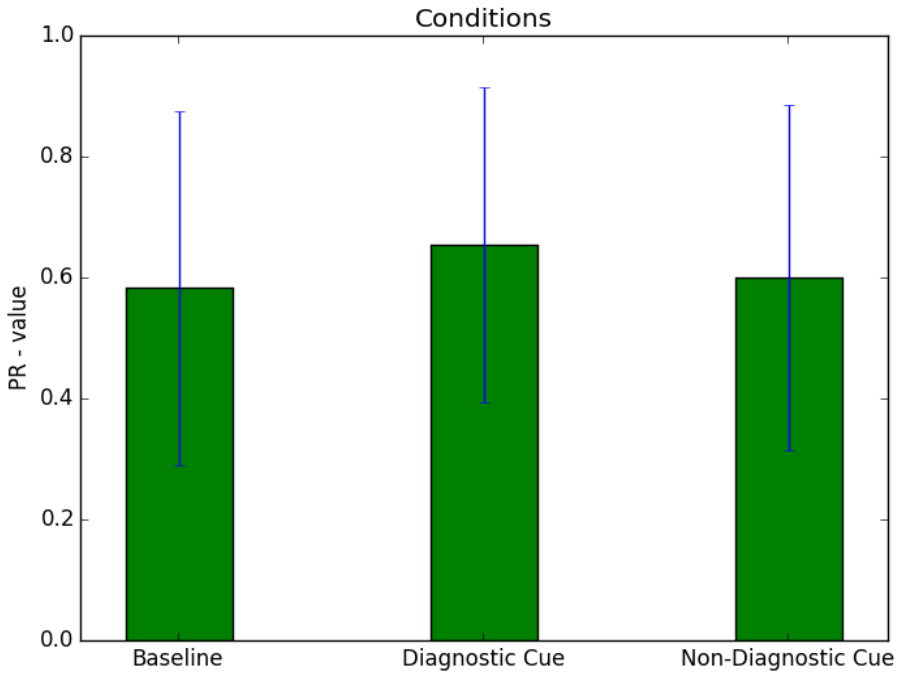
Results

Table 1

Condition	PR *M*	PR *SD*	Accuracy *M*	Accuracy *SD*	Confidence *M*	Confidence *SD*	CA-correlation
Baseline	.58	.29	.80	.15	3.95	.54	0.82**
Diagnostic cue	.65	.26	.84	.14	4.05	.53	0.79**
Non-Diagnostic cue	.60	.29	.81	.15	3.96	.57	0.85**

Note. Summary of means and standard deviation outputs from PR-values, accuracy measures, and confidence. Additionally, a summary of the correlations between confidence and accuracy. ** $p < .01$.

Bar chart 1



Note. Bar chart over means and standard-deviations of PR-values from the Baseline, Diagnostic Cue and Non-Diagnostic Cue conditions.

The repeated measures ANOVA for the Baseline condition, Diagnostic Cue condition and Non-Diagnostic Cue condition indicated a significant main effect [$F(2,36) = 7.42$, $p = .002$, $\eta^2 = .29$]. A pairwise comparison between the Baseline condition and the Diagnostic Cue condition showed a significant result [$t(37) = 3.35$, $p = .002$] which indicated a higher PR-value for the Diagnostic Cue condition compared to the significantly lower PR-value from the Baseline condition. The pairwise comparison between the Diagnostic Cue condition and the Non-Diagnostic Cue condition also showed a significant difference [$t(37) = 3.30$, $p = .002$] where the Diagnostic Cue condition indicated a significantly higher PR-value than the Non-Diagnostic Cue condition. There was no significant difference between the PR-values for the Baseline condition and the Non-Diagnostic Cue condition [$t(37) = .86$, $p = .40$] although the PR-value for the Non-Diagnostic Cue condition was slightly higher than the PR-value for the Baseline condition.

The initial comparison of confidence ratings for each situation over different conditions (Baseline condition, non-target, wrong answer with Diagnostic Cue condition, non-target, wrong answer etc.) generated no significant differences. The correlation analysis between accuracy and confidence means resulted in strong, positive CA-correlations for Baseline [$r = .82$, $n = 38$, $p < .01$], Diagnostic cue [$r = .79$, $n = 38$, $p < .01$] and Non-Diagnostic cue [$r = .85$, $n = 38$, $p < .01$]. The Fisher-comparisons did not show any significant differences between the three different CA-correlations.

Discussion

This study evaluated what effect the cue overload can have on the encoding-retrieval match's enhancing qualities on memory performance. A Baseline condition, a Diagnostic Cue condition and a Non-Diagnostic Cue condition was statistically analyzed to determine this effect.

The study's results convey that there is a relationship between the encoding-retrieval match and cue overload when predicting memory performance similar to the one described by Nairne (2002). The participants' performance is significantly enhanced during the Diagnostic Cue condition compared to the Baseline condition. However, the participants' performance did not increase during the Non-Diagnostic Cue condition relative to the Baseline condition despite a perfect encoding-retrieval match. There was also a significant difference between the participants' performance in the Diagnostic Cue condition and the Non-Diagnostic Cue condition. These results indicate that the cue overload effect can undermine an increase in memory performance and generates a state where the encoding-retrieval match has no positive effect on memory performance (Goh & Lu, 2011).

With respect to these findings we draw the conclusion that there is indeed a relationsip between the encoding-retrieval match and cue overload (Poirier et al., 2012). The interaction expressed in our study indicates that the encoding-retrieval match can have a positive effect on memory performance if the cue provided has a high diagnostic value. If the cue overload is increased and the cue loses its diagnostic value, the encoding-retrieval match has no positive effect on memory performance.

We suggest that Nairne's theory needs to be specified in a simple way. Instead of declaring that cue overload has a negative effect on memory performance, cue overload can undermine the positive effect from the encoding-retrieval match on memory performance. This conclusion is strengthened by similar results regarding memory performance in Goh and Lu's (2011) study.

Detailed pictures were used as cues in our experiment. This study's three conditions were created by manipulating the screening of these pictures in the background of the word-pairs at

both the study phase and the test phase. During the Diagnostic Cue condition, the picture served as a cue with great diagnostic value since we used both detailed and unique pictures relative to one another. The diagnostic value lies within that each word-pair was presented with a unique background picture. During the Non-Diagnostic Cue condition, however, the picture served as a strong source of cue overload. The cue overload effect arose because the same picture was presented in the background of many different word-pairs.

By using detailed pictures, the cue created a context, both visual and situational. It can therefore be argued that the implications the pictures have had on memory performance can be attributed to the ability of a picture to convey a source. This can be illustrated by the fact that when looking through a photo-album, lots of memories that were unattainable can resurface. Such memories often cause a case of nostalgia or some other internal sensation. We mean that memories can be rekindled in a similar way by using pictures as cues. Because a picture conveys a certain context, this creates an opportunity for a person to have thoughts and feelings regarding this context. Since a picture can create an internal change that a person can relate to a memory, the picture should therefore be able to function as a process of appropriate transfer of a memory. Thereby our experiment draws upon the transfer-appropriate processing theory.

Because of its many details, a contextual picture can also be more deeply encoded than, for example, a picture of a color. The levels-of-processing theory can therefore play a part in explaining how we by using pictures gained significant results and play a role in further insights regarding episodic memory.

As previously stated, our results provide a basis for declaring a relationship between cue overload and the encoding-retrieval match. Since the encoding-retrieval match has been used in order to help eyewitnesses recall events by letting them revisit its location, the implications the

diagnostic value of a cue can have is critical since if the cue is not diagnostic a cue can supposedly induce false memories. We did not find evidence of any difference in confidence between the Baseline- and the Diagnostic Cue condition. In other words, the potentially false, non-diagnostic memories may very well induce as much confidence in the individual as diagnostic ones do.

Deffenbacher's (1980) Optimality Hypothesis predicts a higher CA-correlation whenever the encoding and recall conditions are more favorable. We found no evidence to support this hypothesis. We did, however, find rather high CA-correlations for all three conditions. Although the results may be considered remarkably high, they are somewhat comparable to the results that Luna and Martín-Luengo (2012) measured for CA-correlation for general knowledge questions (r = .64).

Nonetheless, our CA-correlations are undoubtedly high compared to most of the studies of CA-correlation that we encountered during our work with this project. A few possible explanations to this phenomenon spring to mind: first, it could be that eyewitness memory experiments generally generate lower CA-correlations than other tests, such as possibly ours. The fact that Luna and Martín-Luengo (2012), while measuring a strong CA-correlation (r = .64) for general knowledge questions and a weaker one (r = .33) for the questions concerning eyewitness memory would suggest that this may indeed be the case.

Secondly, there seems to be some controversy to which exact method for measuring CA-correlation is to be preferred. Nelson (1984) argues that the different methods being used produce different results, and don't actually measure the same thing. The fact that we and Luna and Martín-Luengo (2012) both used the same method and got relatively high CA-correlation results suggests this as a possibility.

Even though we found no support for Deffenbacher's (1980) optimality hypothesis, our high CA-correlations are nonetheless interesting in themselves, since they further put the dogma of negligible CA-correlation into question. We suggest that this field of research is explored further in the future.

There are some notable limitations to this study, despite the convincing results. The study rests on the assumption that the studied effects are common for practically all humans, hence the non-random sample. This may not necessarily be the case. Confidence in particular may vary from one individual to another.

Several participants spontaneously reported usage of mnemonic devices. Such techniques could undermine the effect of the manipulation by decreasing the difference in performance over the three conditions. Our sample included disproportionally many individuals with, or undergoing higher education. For instance, three participants had a Ph.D. (although not in social sciences). It's possible that people with higher education are more likely to use mnemonic devices.

In future studies the sample would need to be random in order to increase validity for the findings and enable the findings to be generalized to the population. Great care should be taken not to draw too strong conclusions about real life events from this study alone. The reason is of course the low ecological validity caused by the very artificial nature of the experiment situation. Future studies ought to apply designs that more closely mimic real life events, such as staged-crime designs.

The overall findings from our study supports Nairne's (2002) theory and further challenges the common conception that the encoding-retrieval match always improves memory performance. Instead, the nature of the cues, i.e. whether they are diagnostic or not, ought to

receive more attention from cognitive psychologists. Our findings also suggest that confidence may not always be as poor a predictor as is commonly believed amongst psychologists. We didn't, however, find any support for the Optimality Hypothesis as a determinant for when confidence predicts accuracy and not, at least not in regard to diagnostic vs. non- diagnostic cues.

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