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# RETRIVAL EXPERIENCE AS AN ACCURATE INDICATOR OF PERSON IDENTIFICATION IN LINE-UPS

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**Abstract**

Responses in eyewitness identification of a person in a line-up may be based on two types of recovery experiences, remember and know experiences. Remember responses involve eyewitness identification of the target person as an episodic memory task, because it implies retrieving information about the target person in the place and at the time of the event. Know responses, in contrast, engage recognition based on familiarity or perceptual facilitation, that is, as a semantic memory task. To explore the relation between retrieval experiences and recognition accuracy, 86 participants took part in a recognition task with two conditions: one with an interpolated target absent line-up and the other only with the target present line-up. Accuracy of recognition and retrieval experience was measured. The results showed that, having previously participated in a target-absent line-up, increased omissions, while the number of hits decreased. Furthermore, participants' know responses were associated to false recognition, whilst remember responses were associated to hits in recognition. Thus, asking eyewitnesses to inform about the kind of retrieval experience in which they based their recognition responses, may serve as a reliable indicator of accuracy in recognition. Future studies are needed to investigate whether this is also the case in natural settings.

**Keywords:** Remember-know experience, Eyewitness, Identification, Testimony, Line-ups, Person recognition.

**Resumen**

La identificación de una persona en una rueda de reconocimiento puede llevarse a cabo mediante dos tipos diferentes de experiencia de recuperación: recuerdo y conocimiento. Las respuestas basadas en el recuerdo suponen la identificación de una persona como una tarea de memoria episódica, dado que implican recuperar información sobre la persona objetivo y el contexto espacio-temporal en que se produjo en suceso. Las respuestas basadas en el conocimiento, por el contrario, implican un reconocimiento basado en la familiaridad o respuestas de facilitación, como una tarea de memoria semántica. Para explorar la relación entre las experiencias de respuesta y la exactitud de los reconocimientos, 86 participantes tomaron parte en una tarea de reconocimiento de personas con dos condiciones: una con una rueda interpolada de objetivo ausente y la otra sólo con una rueda de objetivo presente. Se midió la exactitud de las identificaciones y las experiencias de recuperación. Los resultados mostraron que la participación en una rueda previa con el objetivo ausente incrementaba las omisiones y disminuía los aciertos en la rueda con el objetivo presente. Además, las respuestas de saber estaban asociadas a errores en las identificaciones y las respuestas basadas en el recuerdo a aciertos. En consecuencia, solicitar a los testigos que informen de las experiencias de recuperación en las que basan sus reconocimientos podría ser un buen indicador de exactitud. Son necesarios nuevos estudios para evaluar si estos resultados se mantienen en contextos naturales.

**Palabras clave:** Juicios de recordar/saber, Testigo visual, Identificación, Testimonio, Experiencia de recuperación, Ruedas de identificación, Reconocimiento de personas.

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## Introduction

Mandler (1980) defines recognition as a decision-making process based on the previous occurrence of an event. This process can be achieved using two different kinds of procedures: a) by evaluating familiarity or b) by identification as a result of memory recovery. According to Mandler (1980), the first procedure is direct and does not require conscious processing, while identification is indirect and requires a conscious process of elaboration.

Similarly, Jacoby and Dallas (1981) proposed that a recognition task can be accomplished through either judgements about perceptive fluidity or by decision-making processes involving the recovery of the context in which the information was first coded. Perceptive recognition takes place only through the assessment of perceptual fluency, while for recognition by identification it is essential to recover the context in which the information was first acquired. Jacoby and Dallas (1981) suggest that perceptive fluidity processes are automatic and usually involve guessing while the processes that take place when participants need to recover the acquisition context to respond in an analytic manner (decision-making process) are conscious and controlled.

Jacoby and Dallas (1981) liken their distinction to that proposed by Tulving (1972) who distinguishes between episodic and semantic memory. Recognition by identification would be the result of an episodic memory, because it relies on having previously formed an episodic trace, while perceptive recognition would be a semantic task that relies only on the activation of semantic information of the target item. This explains why variables such as level of processing of material relate to identification processes and not to perceptive recognition processes, since the level of processing affects the likelihood of forming an episodic trace (Jacoby & Dallas, 1981). Jacoby (1982) notes that the poor performance of patients with amnesia in recognition tasks may be due to an inability to elaborate information during the study and thus the reliance on perceptive recognition.

In semantic information retrieval the person is not aware of the context in which they acquired that knowledge. However, one of the main features of episodic memory is precisely that the person is conscious of recalling a previous experience (Tulving, 1983). In the first case we talk about a *know* experience and in the second case of a *remember* experience. Thus, perceptive recognition (semantic memory task) does not

require the person to be aware of what s/he is recovering. Regarding the role of consciousness in recognition processes, Jacoby and Dallas (1981) propose that when recognition is based on perceptive fluidity, the person is not aware of retrieving information, whereas when recognition is based on elaboration processes there is conscious awareness.

Thus, the kind of experience that leads to each of the recovery experiences vary. Rajaram (1993) has proposed a continuum from controlled responses to automatic responses, where it is possible to distinguish between three types of responses: remember, know and implicit responses. When recovery is controlled a *remember* response is produced (Gardiner, 1988; Rajaram, 1993; Tulving, 1985). In these responses participants are aware that the information recovered is a memory trace and therefore the information was experienced in a specific context of her/his life with specific time and spatial characteristics (autonoetic consciousness).

In automatic recovery there are two types of response (i.e., Gardiner, 1988; Gardiner & Java, 1990; Rajaram, 1993). On the one hand, *know* responses, that is, responses in which the participant is not aware that the information has been experienced in the past, but is aware of having the knowledge. This is, what Tulving (1985) called noetic consciousness where there is awareness of the knowledge but not of the context in which this knowledge was acquired. On the other hand, there would be an even more automatic response in which the participant is not even aware that s/he has, or is using, this knowledge, these are *implicit responses* (Rajaram, 1993). These are responses in which there is no awareness of knowledge or the context in which it was acquired (anoetic consciousness).

Most of the investigations that aim to study recovery experiences in recognition tasks are based on a paradigm developed by Tulving (1985) that examines participants' judgements about know and remember experiences.

**Remember/Know paradigm**

Tulving (1985) developed an experimental paradigm that allows the study of recovery experiences through participants' judgements of their own experiences, showing that it is possible for participants to discriminate between responses from an actual memory (remember responses), and responses based on knowledge (know responses) and that these responses are sensitive to variables such as retention interval and level of processing. Gardiner (1988) for instance, using the same paradigm, found

that the level of processing (generating a word vs. reading a word) affected the ease with which words were recognised but only when words had been judged to be remembered. Generated words were more easily recognised than read words when participants identified the words as being consciously remembered (remember), whereas no differences were found for words that had been identified as familiar (know) but had not been consciously remembered.

From these experiments it can be concluded that explicitly asking participants to make this judgement does not pose difficulties, and that they can reliably discriminate between remembered and known items. These data provide information about the phenomenological characteristics of memories and, in turn, these provide valuable information about what is recovered in order to perform a task.

An open question however is the extent to which accuracy of person recognition is conditioned by recovery experience. It could be argued that *know* experiences should lead to worse performance in recognition tasks, given that familiarity judgements do not discriminate between two people that look similar, while recognition based on *remember* responses would place one specific person as seen previously in a given context, even if the two people look alike. The results from a study by Rajaram (1993, Experiment 3) investigating memory for word lists provide indirect support for this prediction as the results showed that false alarms were associated with experiences of knowing.

The potential relationship between recovery experience and accuracy could be however be influenced by other factors (Horry, Wright, & Tredoux, 2010; Meissner, Tredoux, Parker, & Maclin, 2005). It could be argued that insofar as memory traces deteriorate as the result of the effect of different variables such as delay, multiple retrieval or retrieval strategies. The relationship between experience and accuracy of memory could also be affected by these variables. For example, Mäntylä (1997) argues that *remember* experiences and *know* experiences are affected by the strategies employed by participants, which in turn would affect the discriminability of items. The fact that face recognition however is based on holistic and not feature processing (Tanaka & Farah, 1993) allows for an alternative interpretation of the results of Mäntylä's study because processing facial features does not increase discriminability but actually hinders recognition (Woodhead, Baddeley, & Simmonds, 1979), and hence the results of the Experiment 4 in Mäntylä's study (1997) which show that participants

who had processed faces by features reported fewer *remember* experiences when several photographs of the same person were presented.

Nevertheless, if in face recognition tasks, the relationship between recovery experience and accuracy remained constant, participants' assessment about the recovery experience that leads them to make a decision in a recognition line-up could be an additional source of valuable information to assess the reliability of their decision. Past studies show that speed may be a reliable predictor of reliability of participants' responses. Valentine, Pickering and Darling (2003), for instance, found fast decisions are more likely to result in the identification of a suspect (87%) than average or slow decisions (38% vs. 31%), indicating that differences in decision speeds are associated with differences in identification outcomes in real cases. Also Sauerland and Sporer (2009) have shown increased reliability based on a combination of response time and confidence. The majority of studies however tend to show that indicators such as confidence or latency response are rather unreliable predictors of accuracy (Bothwell, Brigham, & Deffenbacher, 1987; Luna & Martín-Luengo, 2010; Weber, Brewer, Wells, Semmler, & Keast, 2004).

To test the hypothesis that recovery experience may be a reliable predictor of accuracy, participants were asked to identify a face seen previously in two line-ups comprising of six photographs: one line-up contained the target photograph, and, in the other line-up, the target photograph was absent. Interpolating a target absent line-up has shown to have a strong interference effect on recognition (Deffenbacher, Bornstein, & Penrod, 2006). An additional aim of this study was to examine whether this interference effects may be affected by recovery experience.

## Method

### Participants

The study involved 86 participants, 64 women with an average age of 18.43 (SD=1.69) years and 22 men with an average age of 19.27 (SD=2.43). All of them were psychology students from the Universidad Complutense of Madrid (Spain) and had no expertise on eyewitness testimony.

**Design and procedure**

An unifactorial design was applied to examine the accuracy of identification and retrieval experience in absent of the target in the line-up. As for the target-present line-up, a 3 (accuracy of the response: omission, false alarm and hit) X 2 (interpolated line-up: yes vs. no) design was employed to study the effects of interpolating a line-up and the accuracy of the responses of the eyewitnesses, in, following Tulving (1985), the experience of recovering (remember/know responses). For post-hoc analyses, the Bonferroni correction was applied to correct for multiple comparisons.

All subjects began the experimental procedure by viewing the Learning Phase for 10 seconds. They were told to pay attention to the face and try to remember it for later recognition in the experimental session. Following this presentation, participants performed a distractor task, consisting of a Sudoku, for 5 minutes. When the allotted time was up for the distractor task, subjects in the interpolated target-absent line-up conditions were told that they would see a second slide and that they should judge whether any of the six individuals in this line-up was the same person as in the first photo by marking the number of the corresponding photo or the alternative response "no-one". Then they informed if the decision was based on a *remember* or *know* response. During this time, subjects in the no interpolated absent-target line-up conditions performed a second distractor task like in the first one.

Finally, all subjects tried to identify the target person in the present-target line-up and informed again about the kind of the response. They were told that they would see a set of six photographs of faces and that they should look for the person they had seen in the earlier slide.

**Materials**

The target photograph was a front photograph of a young Caucasian man (around 20 years old) with dark hair, and dressed in black. The distractor photographs were of men of the same sex, race, and approximate age (around 20 years) as the target, had similar hair colour and style, and were in similar black cloths, none had distinguishing special features. The distractor photographs were chosen on the basis of their physical resemblance with the target from a selection of 98 photographs of psychology students from the Universidad Autónoma of Madrid (Spain). Thus no previous differences were observed among them.

Two different line-ups were building with these photographs. Target-absent line-up contained six faces in two rows at the same slide. Target-present line-up was in a similar way including the target face in the fifth position. None of the individuals in either line-up appeared in the other line-up. The photos were projected from slides onto a blank white wall.

A questionnaire was also used, which included the distractor task (sudoku puzzle game), the identification questions and a final question asking them whether their responses were based on *remember* or *know* recovery experiences (Tulving, 1985).

## Results

### Accuracy

In the target absent line-up, the probability of false alarms (44%) was equal to the probability of correct rejections (56%), $\chi^2(1) = 0.58$, *ns*, that is, the probability of error and hit is the same with the target absent in the line-up.

In the target-present line-up, a 3 (accuracy of identifications: omission, false alarm, and hit) x 2 (interpolated line-up: yes vs. no) chi squared yielded significant differences, $\chi^2(2) = 14.62$, $p < .001$. Post hoc analysis with bonferroni correction (.05/3 = .017) indicated that the probability of hits was significantly greater, $\chi^2(1) = 11.77$, $p < .001$, $\phi^2 = .176$, in the non-interpolated line-up condition (87.5%) than in the interpolated condition (48,6%), while more omissions were reported in the interpolated condition (79.2%) than in the non-interpolated (34%). Post hoc also indicate that the probability of false alarms and hits was similar, $\chi^2(1) = 2.23$, *ns*, $\phi^2 = .056$, in the non-interpolated line-up than the interpolated line-up conditions. Finally, the probability of omissions and false alarms was analogous in both conditions, $\chi^2(1) = 0.08$, *ns*, $\phi^2 = .017$. In short, having previously participated in a target-absent line-up increased the omissions, while the number of hits decreased.

As for those submitted to target absent line-up, a 3 (accuracy of identifications: omission, false alarm, and hit) X 2 (target absent line-up identification: false alarm vs. correct rejection) chi squared showed no significant differences in the identification in the target present line-up, $\chi^2(2) = 3.50$, *ns*.

**Retrieval experience**

Responses for retrieval experiences were measured on a scale from 1 to 10 where low responses represented *know* responses based on familiarity and high responses represented *remember* responses. An ANOVA perfomed in the target absent condition with accuracy of identifications as the with-participants factor (false alarms vs. correct rejections) showed a significant main effect of accuracy of responses, $F(1,41) = 9.18$, $p < ,01$, $\eta^2 = .183$, $1\text{-}\beta = .841$, indicating that *remember* responses (i.e., episodic memory) were associated to hits ($M = 6.96$), while false alarms were associated to *know* responses (i.e., semantic memory), that is, responses based on perceptual facilitation or familiarity.

A 3 (accuracy of identifications: omission, false alarm, and hit) x 2 (interpolated line-up: yes vs. no) ANOVA on the retrieval experience revealed a significant effect of accuracy of the identifications, $F(2,80) = 15.47$, $p < .001$, $\eta^2 = .001$ $1\text{-}\beta = .061$, but not for the interpolated line-up, $F(1,80) = 0.10$, *ns*, $\eta^2 = .183$, $1\text{-}\beta = .841$, nor for the interaction between accuracy and interpolated line-up, $F(1,80) = 1.08$, *ns*, $\eta^2 = .026$, $1\text{-}\beta = .232$. Post hoc analysis with Bonferroni correction (.05/3 = .017) exhibited that false alarm ($M = 2.92$) and omission ($M = 6.34$) responses were more linked to a semantic memory, whilst hit responses ($M = 8.17$) were linked to an episodic memory.

## Discussion

The first result worth noting from this study is the large number of false alarms, equal to correct rejections, found in the target-absent first line-up. These results are in line with a study by Peters (1987) with children aged 3 to 8 years showing 71% of misidentifications in a target-absent line-up, or the study by King and Yuille (1987) who found that 74% of children between 8 and 11 years and 36% of children aged 13 and 14 years engaged in non-correct identification in a target-absent line-ups, even when participants were warned that the person to identify may have not been at the line-up. This supposes that the judgement strategy followed by the eyewitnesses was to maximize the identifications without considering the mistakes i.e. false alarms, while, in judicial setting, none misidentification is expected.

Secondly, the results of this study confirm the negative effect of interpolating line-ups, as these lead to a decreased correct identifications and increased omissions, in line with Deffenbacher, Bornstein and Penrod's (2006) meta-analysis.

In relation to recovery experience, this has an effect on the accuracy of identifications in the line-up, as responses of familiarity (know responses) seem to lead to more false identifications and fewer hits than identification responses (remember). Moreover, the relationship between the type of response in terms of its accuracy and recovery experience was not significantly affected by the interpolation of line-ups, even though the distance of the distributions between hits and false alarms decreased.

Previous studies suggest that evaluating participants' confidence in their own responses is not a good predictor of the accuracy of recognition (Bothwell, Brigham, & Deffenbacher, 1987; Brewer, 2006), and neither is the latency response (Brewer, Caon, Todd & Weber, 2006; Weber, Brewer, Wells, Semmler, & Keast, 2004). However, according to various authors (Tulving, 1985; Gardiner, 1988), participants are able to reliably evaluate the type of recovery experience. The results of this study suggest that this evaluation may be a good predictor of accuracy of recognition. It could therefore be useful to ask eye-witnesses before an identification line-up to report on the type of experience recovery that leads them to make the decision, that is, assessing whether they actually remember the person (identification) or the person looks familiar (know). Responses based on familiarity should be discarded as they lead the increased risk of errors, and in particular, increased false identifications (Horry, Wright, & Tredoux, 2010; Meissner, Tredoux, Parker, & Maclin, 2005).

Interestingly, the relationship between recovery experience and accuracy of identification remained constant in the different conditions of interference caused by the interpolation of a target-absent line-up. It is important however to ascertain in further research the possible influence of other factors such as delay, number of perpetrators or previous descriptions, on this relationship, before applying these indices in everyday (Brewer & Wells, 2006). Moreover, differences between laboratory and natural settings would be taken into consideration as some studies show there may be important differences between the two settings (Behrman & Richards, 2005; Fariña, Arce, & Real, 1994).

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