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# Metamemory for faces, names, and common nouns

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ABSTRACT

This study examined the metacognitive aspects of face–name learning with the goal of providing a comprehensive profile of monitoring performance during this task. Four types of monitoring judgments were solicited during encoding and retrieval of novel face–name associations. Across all of the monitoring judgments, relative accuracy was significantly above chance for face and name targets. Furthermore, metamemory performance was similar between both target conditions, even though names were more difficult to recognize than faces. As a preliminary test of the stability of monitoring accuracy across different categories of stimuli, we also compared metamemory performance between face–name pairs and noun–noun pairs. Prospective monitoring accuracy was similar across the categories of stimuli, but retrospective monitoring accuracy was superior for noun targets compared with face or name targets. Altogether, our results indicate that participants can monitor their memory for face–name associations at a level above chance, and retrospective monitoring is more accurate with nouns compared with faces and names.



## 1. Introduction

There are two fundamental aspects of metamemory: monitoring, which involves reflecting on the content and processes of memory, and control, which alters the content or processes of memory depending on the output of monitoring (Koriat, Ma'ayan, & Nussinson, 2006; Nelson & Narens, 1990). Researchers have relied on ease-of-learning judgments (EOLs) (e.g. Leonesio & Nelson, 1990), judgments-of-learning (JOLs) (e.g. Nelson & Dunlosky, 1991; Koriat, 1997), feeling-of-knowing judgments (FOKs) (e.g. Koriat & Levy-Sadot, 2001; Krinsky & Nelson, 1985; Reder, 1987, 1988), and retrospective confidence judgments (RCJs) (e.g. Koriat & Goldsmith, 1994, 1996) to examine the monitoring processes that occur prior to learning, immediately after learning, after a recall attempt, and after a recognition response, respectively (for a review, see Nelson & Narens, 1990). By and large, metamemory studies rely on general knowledge questions or noun–noun paired-associates to probe monitoring and control; consequently, their findings might not generalize to tasks that involve learning and retrieving items outside of the semantic realm. Indeed, metamemory researchers have acknowledged the need to extend the field into other areas of cognition (Diana & Reder, 2004; Nelson & Narens, 1994).

One area that could potentially benefit from exploring the contributions of metamemory research is face identification. Face identification is an important perceptual and cognitive capacity for humans, and as such it has received a great deal of attention in the literature. However, with the exception of a few recent studies (Hosey, Peynircioğlu, & Rabinovitz, 2009; Modirrousta & Fellows, 2008; Tauber & Rhodes, 2010), the accompanying metamemory processes of face–name learning have largely gone unnoticed. Indeed, seminal models of face identification either relegate metacognitive processes to a comprehensive but unspecified cognitive system (e.g. Bruce & Young, 1986) or do not include them at all in the architecture (e.g. Burton, Bruce, & Johnston, 1990). Yet, recent research reveals that difficulties with proper name learning can be attributed to inaccurate monitoring during study (Tauber & Rhodes, 2010), and false facial recognition in patients with frontal lobe damage stems from impairments in monitoring and control (Rapcsak, Reminger, Glisky, Kaszniak, & Comer, 1999).

Although a handful of studies have solicited monitoring judgments using face–name pairs (Hosey et al., 2009; Modirrousta & Fellows, 2008; Pannu, Kaszniak, & Rapcsak, 2005; Tauber & Rhodes, 2010), disparities in the selection of stimuli (i.e. familiar faces versus unfamiliar faces), in the type of retrieval task (i.e. cued-recall versus associative recognition), in the monitoring judgments that were solicited (i.e. JOLs versus FOKs versus RCJs), and in the measures of monitoring accuracy (i.e. relative accuracy versus absolute accuracy)[1] among these studies make it difficult to elucidate metamemory performance during encoding and retrieval of novel face–name associations. To cite one example, the relative accuracy of JOLs reported in Modirrousta and Fellows (2008) was based on an aggregate of items rather than on an item-by-item

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[1] Measures of relative accuracy are useful for examining how participants monitor items relative to each other, whereas measures of absolute accuracy are useful for determining if monitoring judgments reflect overall memory performance (for a review, see Schraw, 2009).

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basis, which limits the generalizability of their findings. Moreover, these studies focused on name retrieval and neglected the monitoring processes involved in retrieving a recently learned face when cued with a name. Thus, there are aspects of monitoring face–name learning that remain unclear.

One question that has yet to be addressed is whether monitoring accuracy for face–name associations differs depending on the type of target during retrieval. For instance, if participants are not aware that their memory for names is typically poorer compared with faces (e.g. Bahrick, 1984; Cohen & Faulkner, 1986; Young, Hay, & Ellis, 1985), they may place a greater degree of confidence in their ability to remember names than what is warranted, which would attenuate their metamemory accuracy and could ultimately prompt sub-optimal study and retrieval strategies for names compared with faces. Indeed, on the basis of inferential theories of monitoring judgments (Koriat, 1993, 1995, 1997, for a review see Koriat, 2007), monitoring accuracy should be superior in situations where a face must be retrieved from memory when prompted with a name compared with situations where a name must be retrieved when prompted with a face. Name cues can prompt a mental image of a face target, which contributes to the efficacy of JOLs (Begg, Duft, Lalonde, Melnick, & Sanvito, 1989) and strengthens the association between faces and names (Groninger, 2006). Furthermore, face targets have fewer competing alternatives in memory compared with name targets (i.e. individuals often share the same name but rarely share the same face), which could potentially increase the accuracy of monitoring judgments for face targets compared with name targets.

In contrast to the aforementioned studies, which typically solicited monitoring judgments at only one or two stages of learning, and did not compare monitoring accuracy between faces and names, the primary aim of this study was to produce a comprehensive profile of monitoring performance for novel face–name associations at multiple stages of learning. In particular, participants learned a series of face–name pairs, and were solicited with a monitoring judgment prior to learning (i.e. EOLs), after learning (i.e. JOLs), after a recall attempt (i.e. FOKs) and after a recognition response (i.e. RCJs). In one condition, the study and retrieval tasks involved face cues and name targets, whereas in another condition, the tasks involved name cues and face targets. This enabled us to determine whether participants can monitor their memory for novel face–name associations at various stages of learning, and whether the accuracy of monitoring judgements differs between face and name targets.

A secondary aim of this study was to assess differences in monitoring performance between traditional stimuli (i.e. noun–noun paired-associates) and face–name paired-associates. To this end, we included a noun–noun[2] condition into the design of the experiment as a control. By doing so, we could compare monitoring performance between face–name pairs and noun–noun pairs, which would speak to the validity of generalizing metamemory findings from one category of stimuli to another. We should note that face–name pairs and noun–noun pairs vary on a number of dimensions (e.g. episodic versus semantic; visual versus verbal; spatial and visual characteristics), and our goal is not to single out a particular dimension as being diagnostic for differentiating monitoring performance between one category of stimuli with another; rather, we wanted to determine whether, at a gross level of comparison, there would be any differences in monitoring between conditions that used traditional stimuli (i.e. noun–noun paired-associates) and face–name paired-associates.

To the best of our knowledge, only three studies have compared monitoring performance between different categories of stimuli within the same experiment (Bornstein & Zickafoose, 1999; Perfect, Watson, & Wagstaff, 1993; Perfect & Hollins, 1996). These have reported conflicting results. On the one hand, Perfect and Hollins (1996) have found that the relative accuracy of FOKs and RCJs is superior for general knowledge questions compared with eyewitness memory. On the other hand, Bornstein and Zickafoose (1999) have found that the relative accuracy of RCJs is similar across both general knowledge questions and eyewitness events. Thus, there is some ambiguity in the literature with regards to the stability of monitoring accuracy across different categories of stimuli, especially those relating to episodic (i.e. eyewitness events) and semantic (i.e. general knowledge) information. Directly comparing metamemory performance between face–name pairs and noun–noun pairs could shed some light on this issue.

A second reason for including noun–noun pairs in the experimental design was to ensure that we could replicate the delayed-JOL effect with traditional stimuli prior to investigating the effect with face–name stimuli. JOLs made after a delay are more accurate predictors of retrieval performance than JOLs made immediately following study (Connor, Dunlosky, & Hertzog, 1997; Dunlosky & Nelson, 1992, 1994; Nelson & Dunlosky, 1991; Nelson, Narens, & Dunlosky, 2004; Thiede & Dunlosky, 1994). However, this effect has yet to be demonstrated with face–name pairs, or indeed with any stimuli outside the semantic realm. If the delayed-JOL effect transfers to face identification tasks, it would provide some insight into whether delayed reports of prospective confidence from an eyewitness should be considered trustworthy predictions of future memory performance, and would lend credence to the hypothesis that the same metamemory mechanisms operate over different categories of stimuli (Diana & Reder, 2004).

## 2. Experiment 1

We followed the framework developed by Nelson and Narens (1990) in order to compare metamemory performance among face, name and noun targets. Specifically, participants learned a series of face–name pairs or noun–noun pairs, and were solicited with a monitoring judgment prior to learning (i.e. EOLs), after learning (i.e. JOLs), after a recall attempt (i.e. FOKs) and after a recognition response (i.e. RCJs). The accuracy of the monitoring judgments was assessed with Goodman–Kruskal gamma correlations (Nelson, 1984) between the magnitude of the monitoring judgments and accuracy on the cued-recall or recognition tests.[3]

This experiment is designed to test five hypotheses. First, on the basis of previous findings from studies that used faces or names as targets (Busey, Tunnicliff, Loftus, & Loftus, 2000; Hosey et al., 2009; Modirrousta & Fellows, 2008; Pannu et al., 2005; Sommer, Heinz, Leuthold, Matt, & Schweinberger, 1995; Tauber & Rhodes, 2010), we expect that participants can monitor their memory while learning novel face–name associations. In particular, the gamma correlation between EOLs, JOLs, FOKs, or RCJs and cued-recall or recognition accuracy for face and name targets are expected to be significantly greater than zero. Second, we expect that relative accuracy will be superior for face targets compared with name targets. If memory for names is poorer compared with faces, as suggested by previous findings (e.g. Bahrick, 1984; Cohen & Faulkner, 1986; Young et al., 1985), and if participants are unaware of this deficit, then the magnitude of the gamma correlations should be greater for face targets compared with name targets.

Third, the magnitudes of the monitoring judgments are expected to be greater for nouns compared with faces and names. Nouns are thought to belong to an associative semantic network (Collins & Quillian, 1969;

[2] For this study, noun refers to a common noun rather than a proper name.

[3] In keeping with previous literature, our primary hypotheses concerned relative accuracy. However, interested readers can consult the Appendix for analyses concerning absolute accuracy.