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# No enhanced recognition memory, but better source memory for faces of cheaters☆

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**Abstract**

Previous studies sought to test for the existence of a "cheater-detection module" by testing for enhanced memory for the faces of cheaters, but past results have been inconclusive. Here, we present four experiments showing that old–new discrimination was not affected by whether a face was associated with a history of cheating, trustworthy or irrelevant behavior. In contrast, source memory for faces associated with a history of cheating (i.e., memory for the cheating context in which the face was encountered) was consistently better than source memory for other types of faces. This pattern held under a variety of conditions, including different types of judgments participants made about the stimulus persons (attractiveness in Experiment 1; likeability in Experiments 2–4), different retention intervals (a few minutes in Experiments 1, 2 and 4; 1 week in Experiment 3), whether the behaviors were exceptional or ordinary (Experiments 1–3) and whether the social status of the characters was low or high (Experiment 4). Given no differences in old–new discrimination, enhanced source memory for faces of cheaters may be useful for avoiding cheaters in future interactions.


*Keywords:* Cheater detection; Human memory; Source memory

## 1. Introduction

Social cooperation is a universal feature of human societies and groups that may have evolved because individuals can increase their fitness by cooperating with each other (Axelrod & Hamilton, 1981; Cosmides & Tooby, 1989; Trivers, 1971). However, cooperation is also risky.

Some individuals may exploit their social-exchange partners by benefiting from them, but failing to reciprocate. Therefore, a strategy in which individuals cooperate regardless of the behavior of their exchange partners cannot be successful in the long run and would be replaced by more egoistic strategies. Cooperative strategies are only evolutionarily stable if they are accompanied by cognitive mechanisms that enable the individual to detect and avoid cheaters in social interactions (Axelrod & Hamilton, 1981; Trivers, 1971). Based on these considerations, it has been suggested that specialized modules have evolved within the human mind that help us to deal with social-exchange situations. Specifically, social contract theory (Cosmides, 1989; Cosmides & Tooby, 1989; Tooby & Cosmides, 2005) postulates brain mechanisms to have been selected during human evolution that are functionally specialized in the detection of cheaters. Integrated into a "cheater-detection module," these mechanisms supposedly allow the individual to quickly and easily draw inferences on whether someone has cheated in prior exchanges or is about to cheat in future interactions. Mealey, Daood, and Krage (1996) derived from this theory the prediction that faces of cheaters should also be remembered better than faces associated with other types of behavior. Indeed, it seems evident that avoiding potential cheaters based on memory for their previous behaviors may be of considerable benefit because harm can be avoided before it occurs. Mealy et al. reported that old–new discrimination of faces varied as a function of whether the depicted persons were described as cheaters, as trustworthy or in a way that was irrelevant to the cheating–trustworthiness dimension. For faces associated with low-status

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professions, old–new discrimination was better for cheaters than for faces of people described as trustworthy. Unexpectedly, the pattern was reverse for faces associated with high-status professions. In both cases, old–new discrimination was intermediate for faces with descriptions that were irrelevant to the cheating–trustworthiness dimension. The authors interpreted their results as evidence of better memory for faces of cheaters. This finding is referred to in many evolutionary psychology handbooks and textbooks (e.g., Burnstein, 2005; Buss, 2004; Cartwright, 2000; Cummins, 2005; Gaulin & McBurney, 2001; Palmer & Palmer, 2002) and has been interpreted as evidence in favor of social contract theory (e.g., Buss, 2004; Cartwright, 2000; Mealey et al., 1996).

However, more recent studies using carefully controlled materials have been unable to replicate the Mealey et al. (1996) finding (Barclay & Lalumière, 2006; Mehl & Buchner, 2008). These findings are not problematic for social contract theory because it was inappropriate from the outset to focus selectively on old–new discrimination. This is so because improved old–new face discrimination per se, that is, just perceiving a face as familiar, cannot help avoiding cheaters and thus cannot provide an evolutionary benefit as long as the source or context in which the face had been encountered is not remembered concurrently. Even worse, greater familiarity of faces of cheaters without context information might increase the risk of being exploited because of the preference often exhibited towards familiar stimuli (Bornstein, 1989; Zajonc, 1968). In any case, given the finding of no difference in old–new discrimination (Barclay & Lalumière, 2006; Mehl & Buchner, 2008), social contract theory may allow deriving the prediction that source memory is improved for individuals with a history of cheating relative to individuals encountered in other situations. A source memory advantage for cheaters should be instrumental in avoiding cheaters and thus should be beneficial to socially cooperating individuals and groups.

Here we present four experiments designed to test the possibility of a source memory advantage for cheaters. The experiments followed the basic design of those reported by Mehl and Buchner (2008) which were modeled after the original experiment of Mealey et al. (1996). In an exposition phase, participants rated the attractiveness (Experiment 1) or likeability (Experiments 2, 3 and 4) of facial photographs presented together with descriptions of the depicted person's behavioral history. In a test phase, previously seen and new faces were judged as old or new. New in the present experiments, if a face was judged as old, participants indicated whether they thought that the person had been characterized by a history of cheating, of trustworthiness or by neither of these. We expected to replicate earlier findings that old–new discrimination does not differ for faces associated with different types of behavior. Our central hypothesis, however, was that if there was any validity in the derivation from social contract theory that humans have a specialized module for remembering cheaters, then source memory for faces characterized as cheaters should be better than source memory for faces associated with other behavior descriptions.

## 2. Measuring source memory

A problem when measuring memory for source is which measurement tool to use. Early approaches relied on ad hoc measures which confound old–new discrimination (item memory) with source memory and guessing processes (e.g., see the discussion of the conditional source identification measure, or CSIM, in Bayen, Murnane, & Erdfelder, 1996; Murnane & Bayen, 1996). Fortunately, alternative measurement tools exist in terms of multinomial models[1] of source memory (Batchelder, Hu, & Riefer, 1994; Batchelder & Riefer, 1990; Bayen et al., 1996; Hu & Batchelder, 1994; Riefer, Hu, & Batchelder, 1994). Compared to more conventional approaches, these models may appear slightly more complex at first sight, but they are nevertheless to be preferred because they have many advantages over other approaches to the analysis of source memory data. One important advantage is that multinomial models of source memory allow for the independent measurement of old–new discrimination, source memory and various types of guessing processes. We therefore analyzed the source memory data of the present experiments using the multinomial source memory model developed and successfully validated by Bayen et al. (1996). This model has been used successfully in a number of experiments (e.g., Bayen, Nakamura, Dupuis, & Yang, 2000; Bell, Buchner, & Mund, 2008; Dodson & Shimamura, 2000; Ehrenberg & Klauer, 2005; Simons et al., 2002; Spaniol & Bayen, 2002). An adaptation of the model for the present purposes is presented in Fig. 1.

The model displayed in Fig. 1 contains 12 parameters. Each parameter represents the probability with which certain cognitive processes occur. Parameter $D_{\text{Cheat}}$ represents the probability of recognizing a cheater face shown in the exposition phase as old. Parameter $d_{\text{Cheat}}$ represents the conditional probability of remembering correctly that a recognized face was encountered in the context of a history-of-cheating description. If the source of a correctly recognized face is not known (with probability $1-d_{\text{Cheat}}$), then the correct history-of-cheating source may still be guessed with probability $a_{\text{CheatTrust}} \cdot a_{\text{Cheat}}$. Alternatively, it may be guessed (incorrectly) that the face is that of a person described as trustworthy with probability $a_{\text{CheatTrust}} \cdot (1-a_{\text{Cheat}})$. Finally, it may be guessed (again incorrectly) that the face is that of a person described as neither cheating nor trustworthy with probability $(1-a_{\text{CheatTrust}})$. If a cheater face from the

[1] Historically, multinomial models seem to have their roots in statistical genetics where such models were used to infer gene frequencies from phenotypic category frequencies, such as the well-known multinomial model for the ABO blood group (Bernstein, 1925).