BRIEF REPORT

Is he important to me? Source memory advantage for personally relevant cheaters

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Abstract A popular assumption in evolutionary psychology claims that reciprocal altruism is supported by a cognitive module that helps individuals to detect and remember cheaters. Previous studies found a source memory advantage for faces of cheaters rather than faces of cooperators. The present study examines memory for social-exchange relevant information. More precisely, faces were shown together with behavior descriptions of cheating, trustworthy and neutral behavior either high or low in relevance for a student population. A multinomial model was used to measure old–new discrimination, source memory, and guessing biases separately. The study showed a source memory advantage for cheaters high in relevance. However, source memory for trustworthy persons low and high in relevance was also enhanced. The results are in line with the assumption of a flexible mechanism that focuses on exchange-relevant information. A system that is able to take into account the relative significance of information may be more beneficial than a system focusing on every cheater independently of his or her relative importance.

Keywords Evolution · Cheater recognition · Source memory

Introduction

Cooperation is a universal feature of human societies (Fehr & Fischbacher, 2004). However, from an evolutionary standpoint cooperation among unrelated individuals is an

interesting phenomenon. Obviously, humans can increase their fitness by cooperating with each other. Nevertheless, cooperation usually implies some kind of fitness costs for the acting individual and is therefore risky (Trivers, 1971). The concept of reciprocity suggests that cooperation should only occur when there is the possibility that the favor of the helping individual is returned later on (Axelrod, 1984; Axelrod & Hamilton, 1981; Trivers, 1971). A number of experimental games have already shown that people actually engage in direct (Wedekind & Milinski, 2000) and indirect reciprocity (Barclay, 2004). Other studies demonstrated that tit for tat (counter each action with a matching response: always cooperate on the first encounter but also retaliate against cheating in subsequent interactions) is a very successful strategy when interacting with the same persons repeatedly (Axelrod & Hamilton, 1981). Such strategies require the ability to recognize and remember who cheated or who cooperated to either exclude or include them from further social exchange. In line with these ideas, it has been shown that cooperation is not stable when there is no possibility to identify or punish cheaters (Fehr & Gächter, 2000; Janssen, 2008). From these premises, Tooby and Cosmides (1992, 2005) concluded that humans are equipped with a cheater detection module, a cognitive module that comprises a cheater detection algorithm. Beside the successful detection of cheaters, memory for social interaction partners is another important part of this module. Enhanced memory for cheating persons would allow the individual to avoid these persons in future interactions. Based on these ideas, Mealey, Daoood, and Krage (1996) found enhanced old–new recognition for cheaters in comparison to trustworthy persons. However, Mehl and Buchner (2008) were not able to replicate these findings. But, as

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Buchner, Bell, Mehl and Musch (2009) argued, recognizing a face as old is not enough for a successful reciprocal social exchange. To avoid cheaters, it is more important to remember that a face was associated with a history of cheating (= source memory). Indeed, several studies could show that source memory for faces of defectors is enhanced in comparison with source memory for faces of persons described as trustworthy or cooperative (Bell & Buchner, 2009; Buchner et al., 2009).

However, recent findings indicate that source memory for cheaters is not generally enhanced. It could be shown that persons have better source memory for expectancy-incongruent information than for expectancy-congruent information (e.g., Bell, Buchner, Kroneisen, & Giang, 2012; Kroneisen & Bell, 2013; Kroneisen, Woehe, & Rausch, 2015). This finding also fits with evolutionary theories claiming that it is more important to focus on unexpected information illustrating a flexible cognitive system than have a fixed focus on cheaters. A mechanism that is sensitive to expectancy violations may represent an efficient way to optimize information processing in social exchange in a constantly changing environment (Bell et al., 2012).

According to Cosmides (1989), a cheater detection module should function independently of the specific content of cheating. She claims that any situation recognized as social exchange or social contract situation should evoke a “look for cheaters procedure” (p. 199). In line with this, Cosmides (1989) demonstrated that participants were able to give the correct answers in the Wason Selection Task (Wason, 1966) independently of the familiarity with the material as long as the task was presented as a social contract situation. She concluded that “social contract algorithms operate just as well in novel situations as they do in familiar ones” (p. 228). Gigerenzer and Hug (1992) were able to replicate these results. However, should an adapted cognitive system treat all information equally? It can be argued that it would not be an optimal strategy to remember every cheater independently of the probability to actually meet this person. An optimal system should distinguish between persons who are relevant in the immediate future and persons who are not. It is, for example, well known that intentions can influence memory (Badets, Blandin, Bouquet & Shea, 2006; Goschke & Kuhl, 1993). Goschke and Kuhl (1993) showed that the stored representation of an intention has a privileged status in memory as compared with other information. Marsh, Hicks, and Bink (1998) replicated this effect and showed that interrupted and uncompleted intentions also have a heightened accessibility. The present experiment was designed to test the hypothesis that behavior of others with immediate relevance to ourselves influences one’s memory of these persons. The design of the experiment was very similar to the design used in previous

studies (e.g., Buchner et al., 2009) with the only exception that the behavioral descriptions differed not only in behavioral history (cheating vs. trustworthy) but also in relevance (cheating or trustworthy behavior that is of high vs. low relevance for a student population). In addition, irrelevant descriptions as neutral comparison were included. These descriptions did not differ according to their relevance for students. The basic hypothesis was that source memory should be enhanced for cheating behavior of high relevance in comparison to cheating behavior of low relevance for a student population.

Measuring source memory

Multinomial models are stochastic models that allow us to disentangle different cognitive processes underlying task performance. A well-established multinomial source-monitoring model was developed by Bayen, Murnane, and Erdfelder (1996). It can distinguish between old–new recognition, source memory, and various types of guessing biases. An advantage of this model is that its source memory parameters remain unaffected by differences in old–new recognition and by guessing manipulations (Bayen & Kuhlmann, 2011; Bayen et al., 1996; Bayen, Nakamura, Dupuis, & Yang, 2000). This model was already used in previous studies examining source memory for cheaters (e.g., Buchner et al., 2009; Kroneisen & Bell, 2013). An adaptation of the model for the present Experiment is illustrated in Fig. 1. The model parameter most relevant for the current study is the source memory parameter d , which is part of all MPT models designed for the source-monitoring paradigm. All parameter estimations were performed with the program MultiTree (Moshagen, 2010). As a goodness-of-fit measure, the log-likelihood ratio statistic, G^2 , which is asymptotically chi-square distributed (Hu & Batchelder, 1994), was used.

Experiment

Method

Participants

Participants were 63 students (50 female) of the University of Mannheim. All of them received a participation credit. Their age ranged from 18 to 31 years ($M = 21.53$; $SD = 2.77$).

Apparatus and materials

The stimuli consisted of color portrait photographs (640×480 pixels) of 72 white male adults (mean age = 23.83, $SD = 5.02$) from the lifespan database of adult facial stimuli (Minear & Park, 2004). This database has already been extensively used

Fig. 1 Bayen et al.'s (1996) source memory model as adapted for the present experiment using the example of relevant behavior descriptions. The rectangles on the left side represent the picture shown (male faces that were associated with cheating (–), neutral (n), or trustworthy (+) behavior descriptions or that were new). Letters along the links represent the probabilities with which certain cognitive states occur. Rectangles on the right side represent the answers of the participants (cheating (–), neutral (n), trustworthy (+), or new). The first tree in this figure represents test trials with faces associated with a cheating context high in relevance during the encoding phase. Parameter D_{-r} represents the probability of recognizing a face associated with a negative context (cheating behavior) as old. Parameter d_{-r} represents the conditional probability of also remembering correctly that the face was encountered in a negative context (cheating behavior). If the negative source of the face is not remembered (with probability $1 - d_{-r}$), it is still possible to guess the correct source with

probability ($a_{+} \cdot a_{-}$). Alternatively, it may be incorrectly guessed that the face was associated with a positive context (trustworthy behavior) with probability ($a_{+} \cdot (1 - a_{-})$) or to a neutral context with probability ($1 - a_{+}$). If a cheating face is not recognized as old (with probability of $1 - D_{-r}$), it may still be guessed (with probability b) that the face is old. For these faces, the correct behavior history may be guessed with probability ($g_{+} \cdot g_{-}$). Similarly, it is possible to incorrectly guess that the face was associated with a trustworthy context with probability ($g_{+} \cdot (1 - g_{-})$), or to a neutral context with probability ($1 - g_{+}$). Faces neither recognized as old nor guessed to be old (with probability $1 - b$) are incorrectly classified as new. Analogous statements apply to faces associated to neutral behavior (tree 2) or trustworthy behavior relevant for students (tree 3) and to new faces (tree 4). In addition, the same set of four trees has to be applied for the faces associated with behavior not relevant for a student population

in face research (e.g., Kroneisen & Bell, 2013; Kroneisen et al., 2015). All faces were unfamiliar to the participants. Only forward-facing pictures with a neutral facial expression

were selected. The faces were randomly assigned to two sets of 36 photographs (set 1 or 2, counterbalanced across participants).

Short descriptions conveyed the behavioral history (*cheating, irrelevant to the cheating-trustworthiness dimension* [= *neutral*], *trustworthy*) of the person shown. Twelve descriptions each of cheating, trustworthy, and neutral behavior were shown during the encoding phase. The descriptions differed from those used by other researchers in that descriptions of cheating or trustworthy behavior were either of high or of low relevance for a student population. For instance, “P. L. sneaks into student parties and pours knockout drops into the drinks of other party guests,” would convey a history of cheating with high relevance for students. “P.O. fulfills his military service. Because he has free access to the armory, he steals ammunition and sells it on the black market,” would convey a history of cheating with low relevance. “K.R. stays awake after a long student dorm party and helps to clean up and take out the garbage,” would convey trustworthy behavior with high relevance for a student population. “B.F. is the owner of a hot-dog stand. Every evening he opens his doors for homeless people and gives them the rest of his food,” would convey trustworthy behavior of low relevance. “H.T. is a person who loves to cook and now works in one of the most reputable restaurants in the city,” would convey irrelevant behavior that is emotionally neutral (for a complete overview of the descriptions, see the Appendix).

The descriptions were selected from the results of a norming study. In this pre-study 16 students rated 65 behavior descriptions on a scale ranging from -2 [cheating] to $+2$ [trustworthy]. In addition, they should rate how probable it is that the described behavior could concern them in the next 5 years on a scale ranging from -2 [unlikely] to $+2$ [likely]. Interestingly, most of the students rated that it is very unlikely that a cheating behavior could concern them in the next 5 years. This happened even for behavior descriptions that are in fact highly likely to happen at a German university (e.g., “F.A. secures a spot in the library early in the morning during the busy exam prep period, but then shows up 3 hours later to study”). This could be the effect of a

false control illusion (Thompson, 2017). Because of this, each of the 12 most distinct cheating (six cheating descriptions high in relevance, six cheating descriptions low in relevance for students) and trustworthy descriptions (six trustworthy descriptions high in relevance, and six trustworthy descriptions low in relevance for students) were chosen and another study was conducted. This time, eight students had to answer three different questions to each of the behavior descriptions: (1) What do you think, how likely is it that you or another student is affected by this kind of behavior? [on a scale ranging from 1 [not very likely] to $+6$ [very likely]; (2) Have you heard of someone who has shown this behavior in the past? (3) Do you know somebody who was affected by a behavior like this?). The results are summarized in Table 1. As can be seen, the descriptions low and high in relevance clearly differ in their expected likelihood of occurrence in a student population. Moreover, the descriptions high in relevance for students seem to be more common or familiar in comparison to the descriptions low in relevance.

The 12 neutral descriptions were the same as the ones already used by Kroneisen and Bell (2013). These descriptions did not differ on the factor relevance.

Procedure

Each participant was asked to rate the likability of 12 cheaters (six of high relevance and six of low relevance for students), 12 trustworthy (six of high relevance and six of low relevance for students) and 12 irrelevant persons with neutral behavior descriptions presented in random order during the encoding phase. Each trial started with a headline (“How likable do you find this person?”) and a photograph shown for 2 s. Next, the photograph disappeared and the behavior description was shown for 5 s. The descriptions of cheating, trustworthy, and irrelevant behaviors were randomly

Table 1 Results (means and SDs) of the two norming studies (see text for details)

	Norming study 1: How would you describe this behavior? -2 [cheating] to $+2$ [trustworthy] Mean (SD)	Norming study 2: What do you think, how likely is it that you or another student is affected by this kind of behavior? (1 = not very likely, 6 = very likely) Mean (SD)	Norming study 2: Have you heard of someone who has shown this behavior in the past? (Proportion of Yes responses) Mean (SD)	Norming study 2: Do you know somebody who was affected by a behavior like this? (Proportion of Yes responses) Mean (SD)
Cheating low relevance	-1.85 (0.10)	2.02 (0.50)	0.38 (0.21)	0.15 (0.14)
Cheating high relevance	-1.50 (0.47)	4.52 (0.78)	0.46 (0.23)	0.48 (0.24)
Trustworthy low relevance	1.62 (0.21)	2.58 (0.75)	0.31 (0.27)	0.04 (0.08)
Trustworthy high relevance	1.17 (0.20)	5.17 (0.30)	0.90 (0.15)	0.81 (0.17)

assigned to the photographs. Subsequently, the likability rating scale ranging from 1 (not likable) to 6 (extremely likable) was shown. Participants made their choice by using the computer mouse and then initiated the next trial. To absorb primacy and recency effects, two buffer photographs and descriptions were included at the beginning and at the end of the encoding phase. After a short break of 20 s, the test phase followed. Here, participants received the instructions for the surprise source memory test. Seventy-two male faces were presented. Half of the faces were old (set 1 or 2, depending on the encoding-phase assignment), and the other half were new. Each trial started with a headline *How likable do you find this person?* and a photograph. After 2 s participants were again asked to rate the likability of the faces on a scale ranging from 1 (not likable at all) to 6 (very likable). After the rating, participants were asked whether or not they had seen the face during the encoding phase. If participants indicated that they had seen the face before, they were required to decide whether the face belonged to a cheater, to a trustworthy or to a neutral person. After selecting one of these answers, the next face was shown. The experiment lasted approximately 35 min.

Design

A 2×3 design was used with relevance (high vs. low relevance for students) and behavioral history (cheating, trustworthy, neutral) as within-subject factors. Likability ratings, old–new recognition, and source memory were the dependent variables.

Given a sample size of $N = 63$, 72 responses in the source memory test, and $\alpha = .05$, the power to detect a difference between the source memory parameters with an effect size of $w = 0.06$ (which is in the order of magnitude of the source memory effect observed by Buchner et al., 2009) was $.96$. All power calculations were conducted using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007)

Results

Encoding-phase likability ratings

A 2×3 ANOVA showed that the likability ratings differed as a function of the behavioral history variable, $F(1.41, 87.10^1) = 111.65$, $p < .001$, $\eta^2 = .64$. A simple contrast indicated that cheating persons were rated as less likable than trustworthy persons, $F(1, 62) = 142.45$, $p < .001$, $\eta_p^2 = .70$, and less likable than neutral persons, $F(1, 62) = 57.32$, $p < .001$, $\eta_p^2 = .48$. There

¹ Greenhouse-Geisser correction.

Fig. 2 The results of encoding phase likability ratings (1 = not likable; 6 = extremely likable), old–new recognition (P_r), and parameter estimates for the source memory parameter d as a function of behavioral history and relevance. The error bars represent standard errors of the means. Note that the neutral descriptions did not differ in relevance

was no effect of relevance ($F(1, 62) = .28$, $p = .60$, $\eta_p^2 = .005$) and no significant interaction between behavioral history and relevance, $F(1.71, 106.11^1) = 2.35$, $p = .11$, $\eta_p^2 = .04$ (Fig. 2).

Old–new recognition

Old–new recognition is reported in terms of P_r (a sensitivity measure of the two-high threshold model), calculated by subtracting the false alarm rate from the hit rate.² P_r as a

² Data are available via the Open Science Framework (OSF) and can be accessed at: <http://doi.org/10.17605/OSF.IO/AE37K>.

sensitivity measure was evaluated in validation studies (Snodgrass & Corwin, 1988) and avoids the problem of undefined values arising from the use of d' .

Behavioral history did not affect old–new discrimination (Fig. 2), $F(2, 124)=2.33$, $p=.10$, $\eta_p^2=.04$. A simple contrast indicated no difference in P_r between cheating and trustworthy persons, $F(1, 62)=0.01$, $p=.91$, $\eta_p^2<.001$, and between cheating and neutral persons, $F(1, 62)=3.13$, $p=.08$, $\eta_p^2=.05$. In addition, relevance had no influence on old–new discrimination, $F(1, 62)=0.69$, $p=.41$, $\eta_p^2=.01$. The interaction between both variables was not significant, $F(2, 124)=1.45$, $p=.24$, $\eta_p^2=.02$.

Source memory

In line with previous studies, in a next step participant's source memory was analyzed. However, ad hoc measures of source memory are problematic because they confound source memory with old–new discrimination and guessing biases (Bröder & Meiser, 2007). To disentangle the processes involved in source memory and guessing the multinomial model illustrated in Fig. 1 was used. To analyze if source memory for cheating or trustworthy persons is different depending on their relevance for students we need two sets of the model trees, one set of four trees for the four different types for the persons high in relevance for students (cheating, trustworthy, neutral, and new) and one set of four trees for the persons low in relevance (cheating, trustworthy, neutral, and new). Therefore, we have two sets of parameters in these trees. Because the 12 neutral descriptions did not differ on the factor relevance, the answers of the participants were randomly assigned to two groups (neutral 1 and neutral 2; six answers each).

As in previous studies, the analysis was started with a base model that builds on the fact that old–new discrimination did not differ as a function of behavioral history. Therefore, in the base model all parameters representing old–new discrimination for the different types of faces were set to be equal. Furthermore, the parameter of representing the probability of detecting new faces as new was set to be equal to the old–new discrimination parameters (a standard assumption of the two-high threshold model of signal detection). Thus, the base model is characterized by the restrictions that $D_{r-}=D_{r+}=D_{n1}=D_{n2}=D_{rnew}=D_{lr-}=D_{lr+}=D_{n2}=D_{lrnew}$. The base model fitted the data (line 1, Table 2). This result further supports the hypothesis that old–new discrimination of the faces was independent of relevance and behavioral history. Next, it was examined if the source memory parameter d differed for faces associated with cheating and trustworthy behavior either high or low in relevance

(Fig. 2). The null hypothesis of no differences can be implemented by imposing the restrictions $d_{r-}=d_{lr-}$ and $d_{r+}=d_{lr+}$, respectively, on the base model. An incompatibility of these assumptions with the data should lead to a significant increase in model misfit caused by these restrictions as expressed in the goodness-of-fit statistic ΔG^2 . As can be seen in line 2 in Table 2 there was a difference in source memory for cheating faces depending on relevance. Faces associated with a cheating context relevant for students were remembered better than faces associated with cheating contexts low in relevance. However, source memory for trustworthy faces did not differ depending on relevance (line 3, Table 2). For the relevant behavior descriptions, no source memory advantage for cheaters in comparison to trustworthy persons could be found (line 4, Table 2). Yet, for the behavior descriptions low in relevance, source memory for trustworthy persons proved to be better than source memory for cheaters (line 5, Table 2). In comparison to neutral behavior descriptions, a source memory advantage for relevant cheaters and trustworthy persons low in relevance could be detected (line 6–9, Table 2).

Test phase likability ratings

A supplementary analysis of the test-phase likability ratings showed a significant main effect of behavioral history $F(2, 116)=7.73$, $p=.001$, $\eta_p^2=.12$. Again, cheating persons were rated as less likable. There was no effect of relevance ($F(1, 58)=1.24$, $p=.27$, $\eta_p^2=.02$) and no significant interaction between behavioral history and relevance, $F(2, 116)=0.73$, $p=.48$, $\eta_p^2=.01$.

Discussion

In the present experiment, whether the factor relevance affects the source memory advantage for cheaters was tested. Relevance was manipulated by behavior descriptions that differed according to their probability of occurrence and familiarity (for a student population).

The results replicate previous findings (e.g., Buchner et al., 2009; Kroneisen & Bell, 2013) that old–new discrimination is not affected by whether faces were associated with negative, positive, or emotionally neutral contexts. As predicted, participants had better source memory for cheaters high in relevance in comparison to cheaters low in relevance and in comparison to neutral persons. No difference in source memory according to relevance for the trustworthy persons was found. Relevant cheaters and relevant trustworthy persons were remembered equally well. However, trustworthy persons low in relevance were remembered better than cheaters low in relevance. In addition, they were remembered

Table 2 Goodness-of-fit values for the model-based results of source memory (see text for details)

Model test (parameter restrictions)	Results
Base model	
1 $D_{r-} = D_{r+} = D_{n1} = D_{mew} = D_{lr-} = D_{lr+} = D_{n2} = D_{lmew}$	$G^2(11) = 11.55, p = 0.398$
Additional restrictions on the base model	
2 $d_{r-} = d_{lr-}$	$\Delta G^2(1) = 10.40, p = .001$
3 $d_{r+} = d_{lr+}$	$\Delta G^2(1) = 0.56, p = .45$
4 $d_{r-} = d_{r+}$	$\Delta G^2(1) = 1.38, p = .24$
5 $d_{lr-} = d_{lr+}$	$\Delta G^2(1) = 4.61, p = .03$
6 $d_{r-} = d_{n1} = d_{n2}$	$\Delta G^2(2) = 14.20, p < .001$
7 $d_{r+} = d_{n1} = d_{n2}$	$\Delta G^2(2) = 4.14, p = .13$
8 $d_{lr-} = d_{n1} = d_{n2}$	$\Delta G^2(2) = 0.11, p = .94$
9 $d_{lr+} = d_{n1} = d_{n2}$	$\Delta G^2(2) = 8.27, p = .02$

“*lr*” and “*r*” in the indices refer to the factor relevance (*lr* = low relevance, *r* = relevance); “*n*” refers to the neutral descriptions (*n1* and *n2*).

The goodness-of-fit of the base models and all additional restrictions were tested using the goodness-of-fit statistic G^2 , which is asymptotically χ^2 distributed. P values smaller than .05 indicate that the additional restrictions are not compatible with the data, as a result of which the hypothesis implied by these restriction must be rejected

better than neutral persons. This pattern of results suggests two things:

First, the frequently observed source memory advantage for cheating or immoral behavior is not a general advantage for all behaviors implying some kind of norm violation. It seems to be that motivational factors also influence source memory. This is in line with findings from Bell, Schain, and Echterhoff (2014). They found that personal benefits or costs influence memory for cheaters but not memory for trustworthy persons. More precisely, their participants remembered faces showing immoral behavior well when they were associated with personal costs but poorly when associated with personal benefits. For faces associated with moral behavior no difference in memory depending on personal benefits or costs could be found. They all were remembered as well as immoral faces associated with personal costs.

Second, the morality of others seems to be important information independently of personal relevance. Again, this is in line with other findings. Bell, Buchner, and Musch (2010), for example, found enhanced source memory for both defectors and cooperators in comparison with irrelevant persons. As discussed above, Bell et al. (2014) found no difference in memory for moral behavior depending on personal consequences. They suggested that people’s memory for the

immorality of others’ behaviors is subject to egoistic biases in contrast to the memory for the morality of others. This is also consistent with findings suggesting that morality is an important factor to categorize people (Wojciszke, Bazinska, & Jaworski, 1998). Possibly, trustworthiness is less determined by situational factors than cheating.

These results provide support for the hypothesis that memory should be enhanced for information that is relevant for social exchange (Tooby & Cosmides, 1992, 2005). As discussed above, models of direct reciprocity suggest that cooperation is not evolutionarily stable unless it is made contingent on the cooperation of the interaction partner in other encounters. According to Barclay (2008), this requires different cognitive abilities like remembering who showed cooperative behavior and who not. Source memory for the behavior of an opponent can be seen as adaptive because it allows one to alter one’s own behavior according to the opponent’s behavior in previous encounters. However, according to Cosmides (1989), every situation that includes a social contract should activate a cheater detection module independent of familiarity. The type of cheating should not influence the results. The experiment presented here arrives at a different conclusion: Social contract violations that are more relevant or familiar to participants are better remembered. It seems to be that the relative importance of defecting depends on the circumstances. There may be situations in which specific types of cheaters are more important than others. For instance, when being a student, remembering someone who secures a spot in the library but only shows up a few hours later is more important because the possibility to meet him again is higher in comparison to someone who steals ammunition and sells it on the black market. It can be argued that focusing on all cheaters equally may be maladaptive. With such a strategy an individual is not able to adapt to the changing demands on different environments. Instead, a flexible system that allows the individual to integrate all information and adjust according to the relevance of this information in a specific situation seems to be more plausible. However, source memory for trustworthy persons seems to be more robust. Overall, it was less affected by situational factors than memory for cheaters. Clearly, this result is also in violation of the idea of a simple cheater-detection module. Situational factors or familiarity with the shown behavior did not influence the ability to memorize persons high in morality. Maybe information about trustworthy persons is of more long-term importance to us. Future research should try to clarify this point.

Appendix

Table 3 Behavior descriptions

	Relevant for students	Not relevant for students
Cheating	P.L. sneaks into student parties and pours knockout drops into the drinks of other party guests	P.W. is a nurse. He often steals the dessert of his demented patients and asserts that they have already eaten it
	F.L. works for an Internet provider. He secretly sells customers data without their permission to enrich himself.	F.E. pays his foreign workers less money for the factory work than his German employees with equal employment and qualification
	R.Z. wants to buy tickets for a student party. Suddenly, he pushes himself forward in the line and others, who have been waiting for an hour, don't get any tickets.	M.R. is a Bundesliga referee and favors the team that payed the highest bribe
	R.K. works as a bartender in a discotheque and intentionally returns less change to drunken guests to enrich himself	P.O. fulfills his military service. Because he has free access to the armory, he steals ammunition and sells it on the black market
	F.A. secures a spot in the library early in the morning during the busy exam prep period, but then shows up 3 hours later to study	J.L. works for an autoshop. When he loses a tool, he secretly steals it from his colleagues and then claims it as his own
	A.B. eats the food supplies of his roommates during the night while they are asleep	A.W. exploits his demented grandmother. Month after month he educes money from her to squander it with his friends
Trustworthy	L.H. lends money to his friends or buys a round in the evening, when they are short of cash	S.O. is a professional soldier. During long marches, he carries the water reserves for the squad voluntarily
	G.Z. meets with a weaker classmate twice a week and teaches him the complicated lecture material without payment	W.W. is a pharmacist in a deprived area. He distributes necessary medication at his own expense to the residents
	D.F. shares his foot with his roommates when they did not have time to cook	W.S. plays guitar in a children home twice a month to entertain the children
	M.F. often queues for the drinks at parties, in order to spare his friends the lining up	D.P. works as a bank clerk 40 hours per week. At the weekends, he helps in a homeless shelter
	K.R. stays awake after a long student dorm party and helps to clean up and take out the garbage	B.F. is the owner of a hot-dog stand. Every evening he opens his doors for homeless people and gives them the rest of his food
	S.H. gets up at 3 am to pick up his roommate from the train station and helps him carry the heavy luggage	Y.L. donates a part of his pension to an orphanage in his home country because it does not receive financial support from the state
Neutral	K.I. has a large backpack with several compartments to transport documents safely and protected from the rain	
	E.J. works in a pet shop and has a lot of fun watching animals even outside his working hours	
	R.M. has a radio alarm clock and sets the alarm to the news every morning at seven o'clock	
	H.T. is a person who loves to cook and now works in one of the most reputable restaurants in the city	
	U.P. enjoys sport and relaxes with a long run through the forest regularly	
	I.R. was born in Italy, likes Italian food very much and travels to Tuscany every summer	
	P.M. loves classical music. Every Saturday he watches a symphony concert on TV	
	J.Z. has a small massage studio in a suburb and treats many local customers	
	H.V. has given all three of his children the names of famous composers and sent them to a musical school	
	J.L. likes to walk with the dog during his free time and enjoys every weather situation	
	N.L. always buys ten stuffed toys from every country he visits to open a museum with them in the near future	
	G.C. makes seismographic records of earthquakes in California, snowdrifts in Alaska, and hurricanes in New Jersey	

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