Journal of Personality and Social Psychology

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Online First Publication, May 6, 2021. http://dx.doi.org/10.1037/pspa0000269

Journal of Personality and Social Psychology:
Attitudes and Social Cognition

ISSN: 0022-3514

https://doi.org/10.1037/pspa0000269

How Trust and Distrust Shape Perception and Memory

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Trust is a key ingredient in decision making, as it allows us to rely on the information we receive. Although trust is usually viewed as a positive element of decision making, we suggest that its effects on memory are costly rather than beneficial. Across nine studies using three different manipulations of trust and distrust and three different memory paradigms, we find that trust reduces memory performance as compared with distrust. In Study 1, trust leads to higher acceptance rates of misinformation. Studies 2a and 2b demonstrate that participants in a distrust and a control condition perform better at a memory-recognition task than participants in a trust condition. Studies 3a and 3b show that trust also reduces free recall of memory content. Examining the underlying mechanism, we find that reduced memory performance in a state of trust is caused by an increased perception of similarities between items that are to be memorized. Following a causal chain design, Study 4 shows that trust increases the sensitivity to similarities as compared with distrust and a control condition, and Study 5 shows that a processing focus on similarities reduces memory accuracy. Studies 6 and 7 create circumstances that either leave the proposed mediator free to vary or interrupt it via the induction of a similarity-focus (Study 6) or a difference-focus (Study 7). The disadvantage of trust is only present if the mediating processing focus can freely operate. Overall, these studies show that trust impairs memory performance due to an increased perception of similarities between memory content.

Keywords: distrust, memory, misinformation, similarity-focus, trust

Supplemental materials: https://doi.org/10.1037/pspa0000269.supp

Memories that accurately represent the past help individuals successfully navigate their everyday lives. Forgetting to buy certain grocery items or not remembering where one read about an important issue are trivial examples of everyday memory failures. Some memory errors are more consequential. A witness who incorrectly remembers elements of an alleged offense may cost an innocent suspect prison time or prompt an unwarranted acquittal, for instance. Notably, some level of experienced trust or distrust naturally accompanies many social interactions in which humans memorize information, including criminal settings. We argue that the differently operating cognitive mechanisms under trust and distrust critically influence how well individuals memorize and remember information.

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Materials, data sets, and analysis scripts are made available on OSF through the following link: osf.io/ag86w. This research was supported by the German Science Foundation (DFG) through a fellowship (PO 1850/1-1) and the Edmond J. Safra Center for Ethics at Harvard University.

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Information Processing in the State of Trust

Situations in which individuals experience trust or its counterpart, distrust, are fundamentally different. When humans trust, they believe that another person has their best interest in mind, and they act accordingly (Rousseau et al., 1998; Schoorman et al., 2007). When humans distrust, they believe that another person acts against their interests and potentially conveys misleading information (Schul et al., 2004, 2008). A growing body of literature shows that people adapt information-processing strategies under trust and distrust to the needs of these fundamentally different states of mind (for a review see Mayo, 2015). When trusting, individuals rely on routine information-processing strategies (Kleiman et al., 2015; Mayer & Mussweiler, 2011; Mayo et al., 2014; Schul et al., 2004, 2008). Processing information with a focus on similarities is one of the many routine information-processing strategies (Corcoran et al., 2011; Posten & Mussweiler, 2017) that occurs when individuals experience trust (Posten & Mussweiler, 2013). When humans experience distrust, they focus more on differences. These alternate processing mechanisms under trust and distrust are observable even on a very basic level of perceptual information processing. In particular, when individuals experience trust, they perceive unrelated objects to be more similar to each other. In one study, for example, individuals who experienced trust perceived red wine and white wine to be more similar than did individuals who experienced distrust (Posten & Mussweiler, 2013; Study 3).

Note that on a functional level, these different processing styles seem to be highly adaptive. When experiencing distrust, for example, and people expect misleading information to be communicated to them, information-processing strategies that focus on differences seem to be advantageous. To detect lies, individuals use inconsistencies as a cue—for example, by detecting nonmatching facts (DePaulo et al., 2003). A focus on differences might facilitate this detection process. In all, this research suggests that distrust facilitates the perception of differences and trust the perception of similarities.

Effects of Similarity on Information Processing

The effects of similarity on information processing are vast. Processing information in terms of similarity may affect judgments (Mussweiler, 2001, 2003) or hamper decision-making (Rassin et al., 2008). On a more fundamental level of information processing, similarity crucially influences how information is related, integrated, and remembered (Hampton & Cannon, 2004; Wisniewski, 1996). Memorization of content depends on content similarity (Tulving & Thomson, 1973)—that is, similarity between the content to other information, including information observed on the spot (Jolicoeur, 1987) and existing mental representations manifested in prior knowledge structures (Rojahn & Pettigrew, 1992; Sentis & Burnstein, 1979; van Kesteren et al., 2012). Although similarity might help to clarify the underlying structures of to-be-learned information and integrate them into semantic knowledge structures (Hampton & Cannon, 2004; Wisniewski, 1996), it typically inflicts costs at the level of episodic memory. One of the most evidentiary findings in the long history of memory research is that similar content is harder to remember in a detailed manner than divergent content. This phenomenon emerges across a wide variety of domains, modalities, and paradigms (Baddeley, 1966; Johnson et al., 1993; Tversky & Gati, 1982). Multifold studies demonstrate the same principle: The more similar memory content is, the more likely it will be confused.

One explanation for this phenomenon is inherent to the similarity itself. The more similar items are perceived to be, the more features they share (Markman & Gentner, 1996; Tversky, 1977). The more features they share, the harder it is to differentiate them from one another (Criss, 2006). This is true for several kinds of memory tasks, such as word memory, visual memory, and event memory. For example, if events to be remembered are similar to each other, information from one event can be incorporated easily in the representation of the other event (Henkel et al., 2000; Lyle & Johnson, 2006). When individuals imagine an item that is perceptually similar to a seen item, they are more likely to falsely recall that they actually saw this item (Henkel et al., 1998). Furthermore, individuals often misattribute features of perceived events to similar false memories (Lyle & Johnson, 2006). Research on source confusion explains why differentiating similar content is harder than differentiating diverse content. For example, source-monitoring paradigms might ask which of four speakers (two females and two males) provided specific information. Correctly identifying the speaker would be the highest level of differentiation. On a lower level of differentiation, individuals may only remember that the speaker was female, but not which one of the two females delivered the information (Dodson et al., 1998). Thus, they remember some, but not all, of the differentiating information.

A second link between similarity and memory performance lies in the process of retrieving memory content. When specific information is retrieved from memory, similarity might impair recall (i.e., retrieval-induced forgetting; Anderson et al., 2000). Indeed, retrieving specific memory content may result in the forgetting of memory content that shares certain features, such as a common category (Murayama et al., 2014). Different content-based explanations have been suggested to account for the phenomenon (Jonker et al., 2015). First, similar memory content was argued to compete for retrieval based on an associative competition mechanism whenever a specific memory content is to be retrieved (Anderson et al., 1994). According to this framework, an inhibitory mechanism resolves retrieval interference at the time of recall. This mechanism reduces the accessibility of the nontargeted but similar and, thus, competing memory content and allows the targeted content to be accessed (Anderson et al., 2000; for a meta-analysis, see Murayama et al., 2014). An alternative account is based on the strength of the interference at the time of retrieval (Raaijmakers & Jakab, 2013; Verde, 2013). Whenever memory content is practiced during retrieval, the association between a category and a practiced exemplar of this category increases in strength. Forgetting occurs at the time of subsequent retrievals when this strengthened association interferes with the recall of (then) weaker associated exemplars of the same category (Jonker et al., 2015).[1] These accounts express different viewpoints about which mechanism leads to forgetting, but generally agree that the similarity between items is accountable for it.

Like the similarity of content itself, cognitive mechanisms that increase perceived content similarity also affect memory. Smith and Hunt (2000) suggest that actively processing differences between the same content enhances the ability of individuals to differentiate them and, thus, be less prone to memory errors. Empirical evidence supports this reasoning by showing that memory performance increases when people focus on different (vs. similar vs. neutral) facets of the exact same content. In one study, participants saw eight lists of words, each with six items from a single category. They either generated differences or similarities between the items on each list or related the items to a higher category. When asked to recall the items, those who generated differences had the highest recall rates (Study 1, Smith & Hunt, 2000). Thus, the way people process information in a memory task seems to alter how well they remember the content, independent of the content itself. The significance of how distinctive processing changes memory performance has since been demonstrated across several domains (Hunt et al., 2011; Van Overschelde et al., 2005). Overall, these results suggest that the way information is processed influences memory performance, independent of the content itself. Important for the present argument, generating differences (vs. similarities) between identical information enhances memory performance (Hunt et al., 2011; Smith & Hunt, 2000).

Notably, through simple mindset manipulations, people can be induced to focus on similarities while processing information, independent of the task and the content therein. Research showed that simple mindset manipulations in one task can focus participants to process information in terms of similarities. Once induced, such mindsets affect people's judgments and decisions in subsequent, independent

[1] For an additional, content-independent explanation, see Jonker et al. (2015).

tasks (Mussweiler, 2001, 2003). This raises the intriguing possibility that such a mindset manipulation might also influence memory performance in subsequent, unrelated memory tasks.

Trust, Similarity, and Memory

As reasoned above, trust and distrust differentially alter how people process information (for a review see Mayo, 2015; Mayo et al., 2014; Schul et al., 2004, 2008), which might also critically influence their ability to remember information. Trust, as compared with distrust, seems to set the stage for conditions that interfere with episodic memory performance. In short, trust leads individuals to perceive items as similar to each other (Posten & Mussweiler, 2013). In general, perceived similarity of memory content impedes the ability to differentiate content and remember it in a detailed manner (e.g., Baddeley, 1966; Johnson et al., 1993; Lyle & Johnson, 2006; Tversky & Gati, 1982). These findings have clear implications for how trust and distrust may relate to memory. Trust (as compared with distrust) comes with a similarity-focus, leading people to perceive entities as more similar to each other. The more similar information is perceived to be, the more likely it is to be confused. Following this reasoning, we expect that trust hampers individuals' ability to remember information accurately.

Moreover, research on procedurally induced mindsets, such as similarity-oriented processing, shows that a processing focus can be induced independently of a task at hand in content-free ways (Mussweiler, 2001, 2003). Mindsets mirroring social contexts, such as trust (Schul et al., 2008), also alter how information in subsequent, content-independent tasks is handled. Research shows that, like other mindsets (e.g., Galinsky et al., 2003), these states of mind, once elicited, influence information processing and, consequently, judgments and decisions in apparently unrelated follow-up tasks (Mayer & Mussweiler, 2011; Mussweiler, 2001; Schul et al., 2008; Weiss et al., 2018). Currently, research investigating the effects of mindsets on information processing, such as procedural mindsets (e.g., a similarity-focus) or socially relevant mindsets (e.g., a trust mindset), which induce similarity-oriented processing, remains disconnected from the recurring finding of cognitive psychology demonstrating that attending to similarities within studied materials reduces memory of them (e.g., Baddeley, 1966; Smith & Hunt, 2000). Bridging these two research areas might have important consequences for memory research. If content-free inductions of mindsets can influence information processing in subsequent tasks, then these effects should also hold for memory performance. Thus, we expect that socially relevant mindsets, such as trust mindsets, or procedural mindsets, such as a similarity-focus, will affect memory performance without being conceptually related to the context of the task or the memory content that is to be learned.

The Present Research

In nine studies, we examine the hypothesis that trust impairs memory performance as compared with distrust via a similarity-focus. The studies also explore whether procedural and socially relevant mindsets affect memory performance in unrelated, content-independent tasks.

The set of studies uses three inductions of trust and distrust, and three memory tasks, measuring the acceptance of false information, recognition memory, and free recall. We expect that across these different paradigms, the memory performance under the state of trust is reduced as compared with the state of distrust, which is caused by a sensitivity to similarities between items to be memorized. Four studies investigate the potentially mediating mechanism of the processing focus. Two studies follow the logic of a causal chain design (Spencer et al., 2005); two additional studies examine the entire process via moderation designs that allow versus do not allow the hypothesized mediating process (i.e., the processing focus) to operate freely (Jacoby & Sassenberg, 2011). In all studies, mindset inductions are unrelated to and content-independent of subsequent memory tests.

Study 1 (preregistered) examines the basic effect of trust and distrust, induced via an episodic recall task, in which participants recall an event in which they rightfully trusted versus mistrusted another person (Weiss et al., 2018); on eyewitness memory in a misinformation paradigm (adopted from Loftus, 1992; Loftus et al., 1978). Study 2a and its preregistered replication, Study 2b, examine the effect of trust, distrust, and a neutral control condition on recognition memory (Roediger & McDermott, 1995). Study 3a and its preregistered replication, Study 3b, test the effect of trust and distrust on free memory recall (Anderson et al., 2000, 1994). In these studies, a scrambled sentences task (Srull & Wyer, 1979) serves as a more subtle trust versus distrust induction (Conway et al., 2018; Mayer & Mussweiler, 2011). Studies 4 and 5 set out to test the underlying mechanism. Using a causal chain design, Study 4 examines whether trust, as compared with distrust and a neutral control condition, leads individuals to focus more on similarities (Mussweiler & Damisch, 2008; Ohmann & Burgmer, 2016). Study 5 tests the second link in the causal chain design, namely the differential effect of content-free similarity- and difference-oriented processing on memory performance in a free recall memory task (Anderson et al., 2000, 1994). Studies 6 and 7 test the mediating role of the processing focus on the effect of (dis)trust on memory performance via a moderation design (Jacoby & Sassenberg, 2011). In these studies, the contextual circumstances either allow the proposed mediator (i.e., a processing focus) to be freely carried out or they restrict it. If the processing focus is indeed mediating the effect of (dis)trust on memory, then the effect should only show when the mediator is free to vary. If the focus is set on similarities (as in Study 6), the advantage of a distrust over a trust mindset should vanish. If the focus is set on differences (as in Study 7), the disadvantage of a trust mindset should vanish, and participants should be able to remember content more accurately. Apart from thoroughly investigating the role of the underlying mechanism, Studies 6 and 7 use real interpersonal interactions to elicit trust versus distrust in participants. Participants engage in a two-person incentivized deception game (Gneezy, 2005) in which their counterpart either cheats them or honestly advises them (Posten & Mussweiler, 2013).

Based on previous studies using the same manipulations of trust and distrust used in the present research, we expected a medium effect of $\eta^2 = .06$ (Conway et al., 2018; Mayer & Mussweiler, 2011; Posten & Mussweiler, 2013; Weiss et al., 2018). We determined a sample size of at least 64 participants per cell based on a power analysis of a medium effect of $f = .25$ with a desired power of .80 and a two-tailed alpha level of .05. G*Power suggested a

sample size of 64 participants per cell for the analyses of variances (ANOVA) and two-cell comparisons (Faul et al., 2007). All studies (except Study 2a) exceed these minimum sample sizes. For the direct replications (Studies 1b and 2b) and study designs being similar to previous ones (Study 7), we predetermined the sample sizes based on the more accurate estimate of the previous studies.

We did not inspect the data of each study before the entire data of this experiment were collected. We report all measures, manipulations, and participation and exclusion criteria in the article. The sample size of each study was set in advance. Materials, deidentified data, and analysis scripts of all studies are available on the Open Science Framework (osf.io/ag86w).

Study 1

We have argued that good memory performance is particularly important for those testifying as eyewitnesses. To mirror such a situation, we used a misinformation paradigm as a memory test (adapted from Loftus, 1992; Loftus et al., 1978). Before engaging in the memory task, participants received the instruction to either recall and write about a past situation in which they had rightfully trusted or distrusted another person. Previous research on power (Galinsky et al., 2003) and envy (Crusius & Lange, 2014) has shown that vividly recalling episodes of psychological states evokes those states in participants. Once evoked, these states are likely to carry over and influence participants' information processing in subsequent tasks. Subsequently, the participants watched a video clip of a laptop theft and answered a first set of questions, some of which contained misleading information. After a two-minute filler task (solving math problems), participants engaged in a recognition memory test about the video clip, which included questions about the misleading information.

Method

Participants and Design

We recruited 236 native German speakers (81 female; one diverse; M_{age} = 29.16, SD = 9.26) via Prolific.[2] Eleven additional participants, who could not see the video clip for technical reasons, were excluded from any analysis. Participation was contingent on a minimal approval rate in previous tasks of 95%. Participants received £1.88 as compensation. Participants were randomly assigned to one of two experimental groups. We recruited a larger sample than our initial power analysis indicated to provide a conservative test of the expected effect. The sample size, design, and analysis plan were preregistered at aspredicted.org (https://aspredicted.org/blind.php?x=up5pq9).

Materials and Procedure

Upon consenting, participants engaged in a mindset manipulation and a memory misinformation task.

Mindset Manipulation

The mindset manipulation was an episodic recall task in which participants wrote about a past situation in their lives. In the trust condition, participants were asked to recall "a situation where [they] trusted another person, and the trust turned out to be justified in retrospect." In the distrust condition, the word "distrust" replaced the word "trust" (Weiss et al., 2018).

Misinformation Paradigm

To assess the participants' memory in typical eyewitness situations, we asked them to watch a 90-s video clip in which a person dressed as a motorcyclist stole a laptop that was sitting on an office desk. Subsequently, the participants answered a set of ten questions. Each question had four answer alternatives, one of which was correct. Four of the ten questions contained misinformation, which was embedded in the text of the question but not the answer alternatives. For example, one question containing misinformation asked: "Which color was the bicycle that was situated next to the motorbike in front of the building?" (answer options: *silver-green*; *silver-blue*; *silver-red*; *silver-black*). Although there was a silver-blue bicycle sitting in front of the building, making the question answerable, there was no motorbike shown in the video clip. Upon answering the first set of misinformation questions, the participants engaged in a two-minute filler task. They were instructed to solve as many math problems as possible out of a total of eight (e.g., "What is the sum of all numbers from 1–10?"; answer options: 58; 55; 56; 54). Then, they were auto-advanced to the critical memory test. Screen by screen, they were given 15 yes/no-questions about the content of the video clip. Four questions asked for the previously presented misinformation (for example, "Did a motorbike park in front of the building?" (1 = *yes*, 2 = *no*). Overall, four questions were answerable with yes and 11 questions with no. Of these 11 questions, four referred to previously presented misinformation.

Results

Misinformation Adoption

We expected trust to impede memory performance as compared with distrust. Therefore, we expected more misinformation to be misremembered under trust. Indeed, participants in the trust condition adopted significantly more pieces of misinformation (M = 2.27; SD = 1.13) than in the distrust condition (M = 1.95; SD = 1.03), $t(234) = 2.31$, $p = .022$, $d = .30$.

We also tested whether the effect on memory could be found on signal-detection theory memory parameters (Green & Swets, 1996); particularly the sensitivity index d', which indicates how well a participant can distinguish presented from nonpresented items based on the relation of hit rate and false alarm rate.[3] Again,

[2] In all studies, we restricted our analysis to participants who completed the entire experiment. In studies with memory tasks as dependent variables, we further restricted our analyses a priori to native speakers. This led to the exclusion of two participants in Experiment 1, 63 participants in Experiment 2a, 52 participants in Experiment 2b, 24 participants in Experiment 3a, zero participants in Experiment 3b, 41 participants in Experiment 4, 42 participants in Experiment 5, and 86 participants in Experiment 6, and 73 in Experiment 7.

[3] We calculated signal detection theory parameters according to (Stanislaw and Todorov, 1999). Hit rates and false alarm rates of 1 were substituted by $(n - 0.5)/n$ and values of 0 by $0.5/n$, where n equaled the number of presented items (n = 24). Negative values of d', which can suggest response confusion (Stanislaw & Todorov, 1999), were removed from any analysis. Only fully completed memory tasks were analyzed.

participants in the trust condition performed worse (M = 1.64, SD = .73) than those in the distrust condition (M = 1.91, SD = .71), $t(234) = 2.81$, $p = .005$, $d = .37$.

To assess whether participants differed in their degree of response bias, we computed the response bias c, which is unaffected by sensitivity. Negative values indicate a more liberal response bias, meaning that questions were more likely to be recognized as having been seen before. Positive values indicate a more conservative answer style, indicating that items were more likely to be rejected. The means of the response bias c between the two experimental conditions did not differ (M_{trust} = −.25, SD = .41; $M_{distrust,}$ −.22; SD = .42, $t(234) = .59$, $p = .558$.

Discussion

Study 1 demonstrates for the first time that trust promotes the adoption of misinformation as compared with distrust. This finding is in line with the expectations of forensic reasoning, which suggest that a trustful relationship fosters susceptibility to false information (Gudjonsson, 1995). Whereas Study 1 shows an effect of trust on memory, it does not test for the role of a similarity-focus as the proposed underlying mediator. However, in the present case, the information that was adopted was plausible (e.g., that a motorcycle sat outside the building, given that a person was dressed as a motorcyclist) and also similar to actually presented information in the video clip (a bicycle instead of a motorcycle was visible), rendering it likely that our proposed mediator of a similarity-focus has caused the effect. Note, however, that the effect extended even to the more general memory measures of d', even though the task was suboptimal as a signal-detection measure, as it relied on only a few memory items. For example, only four out of 15 items could potentially be classified as hits. The subsequent two studies allow us to test whether the effect of trust on memory holds for such general signal-detection memory parameters more systematically.

Study 2a and 2b

Study 2a and its preregistered exact replication, Study 2b, were designed to substantiate the findings of Study 1 in two ways. First, using the same trust and distrust manipulation as in Study 1, we added a neutral control condition, which served to clarify whether any observed effect would be mainly driven by trust, distrust, or both. In the neutral control condition, participants were asked to recall a social encounter they experienced the day before (Weiss et al., 2018). Second, we used a classic memory-recognition task that allowed for the testing of general memory parameters with a larger set of stimuli (Roediger & McDermott, 1995).

Method

Participants and Design

We recruited 253 participants (116 female; one value missing; M_{age} = 34.42, SD = 11.86) via Amazon's Mechanical Turk (MTurk) in Study 2a and 247 participants (132 female, one value missing) in Study 2b. The sample size, design, and analysis plan of Study 2b were preregistered at aspredicted.org (http://aspredicted.org/blind.php?x=5px9qq). Participation was contingent on a minimal approval rate in previous MTurk tasks of 95% and on being located in the United States. Participants received $.75 as compensation. The participants were randomly assigned to one of three experimental groups.

Materials and Procedure

After giving their consent, participants worked on two tasks, a mindset manipulation and a recognition task.

Mindset Manipulation

Participants worked on the same mindset induction as in Study 1. This time, we added a control condition, in which the participants were instructed to "think about yesterday" and recall a situation in which they "spent time with another person" (Weiss et al., 2018).

Recognition task

Next, participants engaged in a classic memory task (Roediger & McDermott, 1995). In a presentation phase, all participants watched a video clip with eight-word lists containing 15 words each. Each word appeared for two seconds. All word lists were taken from Roediger and McDermott (1995). To counterbalance presented and nonpresented words, we created three versions of the word lists, which were randomly assigned to the participants. In each version, eight lists of a pool of 12 lists were presented. Words from the remaining four lists served as distractor items in the final recognition test. Thus, all word lists served as presented and nonpresented items in the recognition task equally often. In the recognition phase, the participants judged 48 words, half of which had appeared in the presentation phase. Their task was to indicate whether a word had or had not been presented before. The recognition list consisted of words of all 12 lists (including the four nonpresented lists).

Results

Study 2a

To examine whether memory performance varied between the experimental conditions, we calculated the sensitivity index d', and entered it into a between-subjects one-way ANOVA. As expected, the ability to distinguish between presented and nonpresented items varied between experimental conditions, $F(2, 250) = 4.48$, $p = .012$, $\eta^2 = .035$. Simple contrast analysis revealed that participants in the trust condition showed less memory recognition (M = .70; SD = .55) than in the distrust condition, (M = 1.03; SD = .82), $t(136) = 2.99$, $p = .003$, $d = .48$, and the control condition (M = .95; SD = .78), $t(168) = 2.46$. $p = .015$, $d = .37$. The distrust and control condition did not differ, $t(163) = .69$, $p = .492$. Degrees of freedom were adjusted for unequal variances, $F(2, 250) = 6.20$, $p = .002$.

The means of the response bias c between the three experimental conditions did not differ (M_{trust} = .02, SD = .76; $M_{distrust}$ = −.05; SD = .56; $M_{control}$ = .07, SD = .69), $F(2, 250) = .74$, $p = .477$.

Study 2b

As in Study 2a, the ability to distinguish between presented and nonpresented items varied between experimental conditions, $F(2, 246) = 3.84$, $p = .023$, $\eta^2 = .031$. As preregistered, participants in the trust condition showed lower recognition abilities (M = .67; SD = .54) than in the distrust condition (M = .91; SD = .58), $t(244) = 2.72$,

$p = .007$, $d = .42$. They also performed worse than the control condition ($M = .83$; $SD = .52$), but this effect was not significant, $t(244) = 1.88$. $p = .062$, $d = .30$. Participants in the distrust and neutral conditions did not differ significantly from each other, $t(244) = .92$ $p = .360$.

The means of the response bias c between the three experimental conditions did not differ significantly ($M_{trust} = -.16$, $SD = .60$; $M_{distrust} = -.30$; $SD = .54$; $M_{control} = -.20$, $SD = .52$), $F(2, 246) = 1.37$, $p = .256$.

Discussion

The findings of Study 2a and 2b are the first to demonstrate that trust impairs recognition memory compared with distrust and neutral control conditions. We designed Study 3a and 3b to conceptually replicate this effect and extend its generalizability to a different (dis)trust manipulation, a different memory task, and a different sample and environment. Particularly, in Study 3a, we used a U.S. student lab sample to obtain a more controlled experimental environment; we replicated it with an online sample in Study 3b. To create (dis)trust in our participants, a scrambled-sentences procedure served as a more subtle tool to induce trust and distrust. Furthermore, we used a different memory task, this time investigating free recall instead of recognition memory.

Study 3a and 3b

In Study 3a and its preregistered replication, Study 3b, participants first completed a scrambled-sentences task (Srull & Wyer, 1979) to induce a trust versus distrust mindset (Conway et al., 2018). This task has been used successfully in prior research and been shown to carry over to subsequent tasks and influence answers therein (Conway et al., 2018; Mayer & Mussweiler, 2011). Participants then engaged in a free-recall memory task (Anderson et al., 2000, 1994; Smith & Hunt, 2000).

Method

Participants and Design

In Study 3a, 83 participants (36 female; $M_{age} = 22.89$, $SD = 4.06$) participated in a one-hour study session in the research lab of a U.S. university for a total compensation of $20. The sample size was determined by lab capacity and resulted in a medium effect of $d = .6$ with a post hoc power of .77. Based on the effect sizes obtained in the previous Studies 2a, 2b, and 3a between direct comparisons of the trust and distrust condition (i.e., d = .48, $d = .43$, $\eta^2 = .04$), in Study 3b, we opted for an effect size of $d = .40$ for an a priori power analysis. With a two-tailed alpha level of .05 and a power of .80, G*Power suggested a sample size of $N = 200$. To provide a conservative test of the hypothesis, we preregistered to recruit a total of 250 participants via MTurk, employing the same eligibility criteria as before. We analyzed 259 (93 female) completed data sets.[4] The sample size, design, and analysis plan of Study 3b were preregistered at aspredicted.org (http://aspredicted.org/blind.php?x=jn8n56).

Materials and Procedure

Participants were randomly assigned to either a trust or a distrust condition.

Trust and Distrust Manipulation

The first task was a scrambled-sentences task (e.g., Srull & Wyer, 1979), adapted to manipulate trust and distrust (Mayer & Mussweiler, 2011; adjusted for English-speaking samples by Conway et al., 2018). Participants were instructed to use four of five listed words to build coherent sentences. They completed 15 sentences, of which eight contained either trust- or distrust-related words (e.g., trusting vs. suspicious). The remaining word lists were trust-neutral and identical for all conditions. This procedure yields no effects on mood, alertness, or calmness (Mayer & Mussweiler, 2011).

Recall Task

The second task was a recall task using the materials of a retrieval-induced forgetting task (Anderson et al., 2000, 1994). In a presentation phase, participants saw eight different sets of items. Each set appeared on the screen for 30 seconds and contained six items. All items of one set belonged to the same category (e.g., beverages, weapons, or fish). In a subsequent retrieval-practice phase, participants practiced half the words of half the sets. During this practice phase, they saw the first two letters of the words they were supposed to practice. Their task was to complete the words they remembered from the presentation phase. Word material for the retrieval-practice phase was counterbalanced, such that all words served in the retrieval practice equally often. In the critical free-recall test, participants were asked to freely recall all the words they remembered having seen in the presentation phase.

Results

Study 3a

To assess the ratio of correct recall, we divided the number of correctly recalled items by the overall number of presented items. Free recall answers were computer-coded for their correctness. In the distrust condition, participants correctly recalled more items ($M = .51$, $SD = .18$) than in the trust condition ($M = .42$, $SD = .23$), but this effect was not significant, $t(81) = 1.94$, $p = .056$.

Study 3b

As preregistered, the results showed that participants in the distrust ($M = .40$, $SD = .21$) condition recalled more items than in the trust condition ($M = .34$, $SD = .21$), $t(257) = 2.27$, $p = .024$.[5]

Discussion

As a conceptual replication of Studies 1–2b, Studies 3a and 3b substantiate our hypothesis that trust impairs memory performance compared with distrust. Furthermore, they speak to the robustness and generalizability of the hypothesized effect. More specifically,

[4] In this study, we did not include questions regarding demographics in the questionnaire. Reported demographics were obtained via Turkprime. No measure of native speakers exists.

[5] For simplicity, for Studies 3a and 3b we report the results merged across the different materials (Rp+, Rp−, nRp) of the retrieval-induced forgetting paradigm. This is different from what we preregistered, as we expected the effect to particularly show for items that had not been practiced in the practice phase (i.e. Rp−, nRp). All of the preregistered expectations reached significance and are reported in the online supplemental materials.

Studies 3a and 3b demonstrate that trust decreases not only recognition memory but also free recall performance. In addition, Studies 1–3b show that eliciting content-independent socially relevant mindsets influences memory performance in subsequent unrelated tasks.

Study 4

Studies 4 and 5 test the role of the hypothesized underlying mechanism of a processing focus. We reason that if trust focuses people on similarities between items, and perceiving items as more similar reduces memory performance, then a similarity-focus (Mussweiler, 2001, 2003) might drive the effect of trust on memory performance. The following two studies examine this hypothesis by testing the two steps of this hypothesis separately.

Following a causal chain design, Study 4 first assesses whether trust leads individuals to perceive items to be more similar to each other. To do so, we first induced trust and distrust mindsets in participants. Subsequently, we asked them to judge the (dis)similarity of several pairs of objects (Mussweiler & Damisch, 2008). Our reasoning holds that trust should lead participants to focus on similarities rather than differences and thus make them perceive objects as more similar to each other. Apart from conceptually replicating Posten and Mussweiler (2013; Study 3), Study 4 includes a neutral control condition. This helps us address the question of whether trust increases a similarity-focus or distrust increases a difference-focus.

Method

Participants and Design

We recruited 213 (109 female; M_{age} = 33.62, *SD* = 11.72) U.S. participants via MTurk and randomly assigned them to one of the three conditions of a one factorial between-subjects design. Again, we tested rather conservatively by recruiting a larger sample than our initial power analysis had indicated. Participants received $.75 for participating and fulfilled the same participation criteria as in the previous online studies.

Materials and Procedure

Trust and Distrust Manipulation. The same scrambled-sentences procedure used in Study 3a and 3b served as trust versus distrust manipulation. We added a neutral control condition, in which participants constructed sentences that did not relate to the concepts of trust and distrust (Mayer & Mussweiler, 2011; Weiss et al., 2018).

Comparison Focus Measure. The second task was a comparison focus measure. Participants judged the similarity of five pairs of objects. Their task was to complete sentences such as, "To me, bus and truck are . . ." by choosing one answer on a Likert-type-scale ranging from 1 (*very similar*) to 9 (*very different*; Mussweiler & Damisch, 2008; Ohmann & Burgmer, 2016).

Results

We averaged the participants' similarity-difference judgments into one index (Cronbach's α = .61) and entered the index into a between-subjects one-way ANOVA. The ratings differed between experimental conditions $F(2, 210) = 4.12$, $p = .018$. As predicted, in the trust condition participants judged the objects to be more similar, and thus less different (M = 3.40, SD = 1.10), than in the distrust condition (M = 3.88, SD = 1.27), $t(210) = 2.14$, $p = .033$, $d = .40$, and control condition (M = 4.00, SD = 1.54), $t(210) = 2.72$, $p = .007$, $d = .45$. The control and distrust conditions did not differ significantly, $t(210) = .54$, $p = .591$.

Discussion

The results of Study 4 demonstrate that individuals who experience trust perceive the same objects to be more similar to each other than do individuals who experience distrust. This finding supports the claim of the first step in the causal chain design, namely that participants experiencing trust and distrust vary in the degree to which they perceive items to be different from each other.

Study 5

Investigating the second and final step in the causal chain design, Study 5 examines the immediate influence of the processing focus on memory performance. To do so, the participants first engaged in a task that directed their information-processing style toward similarity-oriented versus difference-oriented processing. Specifically, they compared pairs of pictures and listed either similarities or differences between them. Once such a procedurally induced processing style is active, it carries over to subsequent tasks and influences information processing therein (e.g., Mussweiler, 2003; Posten & Mussweiler, 2017). The subsequent task was a free-recall memory task.

Method

Participants and Design

We recruited 260 participants (121 female; M_{age} = 34.04, *SD* = 11.00) via MTurk and randomly assigned them to one of the two conditions of a one-factorial between-subjects design. Because in this study we manipulated a different variable, we opted for a rather conservative test and increased the sample size as compared with the previous studies. Participants were compensated with $.75 and eligible to participate if they fulfilled the same criteria as in the previous online Studies 1–2b, 3b, and 4.

Materials and Procedure

Focus Manipulation. We used a procedural priming method to activate a similarity-focused versus difference-focused information-processing style. On each of three consecutive screens, the participants compared two pictures to each other (Crusius & Mussweiler, 2012). One pair of pictures showed two scenes at a river, a second pair showed two city skylines, and a third pair showed underwater images. On each screen, the participants compared the two pictures and listed either three similarities or three differences between them, depending on the participants' experimental condition assignment.

Free Recall. The second task was a simpler version of the free-recall memory task used in Study 3a and 3b. The participants looked at eight lists of words consisting of six words each.

Participants rehearsed all items of half of the categories by being given the first two letters of the words and being asked to complete them. Separate analysis for the practiced and unpracticed words are reported in the online supplemental materials. We counterbalanced item presentation, such that each item served as a practiced and unpracticed item equally often.

Results

We expected that a similarity-focus would lead to less accurate recall than a difference-focus. To test this hypothesis, we again divided the number of correctly recalled items by the total number of items presented. Correct recall was computer coded, as in Study 3a-b. Overall, in the similarity-focus condition ($M = .40$, $SD = .20$) free recall rates were lower than in the difference-focus condition ($M = .46$, $SD = .21$), $t(258) = 2.65$, $p = .009$, $d = .33$.

Discussion

These results demonstrate that when information processing is oriented toward similarities, memory performance is worse than when information processing is oriented toward differences. This finding shows for the first time that not only does the active generation of similarities and differences between memory content (Smith & Hunt, 2000) affect memory, but that a stimuli-independent mindset of similarity- versus difference-focused information processing affects memory performance in an unrelated task.

More importantly, this study provides the final link in the causal chain design. The lineup of Studies 1 to 5 demonstrates that trust not only impairs memory, as compared with distrust (Studies 1, 2a and 2b, and 3a and 3b) and to a similarity-focus (Study 4), but also that such an oriented processing-focus, in turn, decreases memory performance (Study 5). Together, this set of seven studies suggests that a difference-focus mediates the effect of distrust on memory.

Study 6

Studies 6 and 7 examine whether a processing focus mediates the memory effects of (dis)trust by investigating the hypothesized indirect effect of the processing focus via a moderation design (Jacoby & Sassenberg, 2011; Spencer et al., 2005). In particular, we create contextual circumstances that interrupt the proposed mediating mechanism (i.e., the processing focus) versus allowing it to be freely carried out. In Study 6, the interruption is achieved via the induction of a similarity-focus, while in Study 7, the focus-interruption is achieved via the induction of a difference-focus. This moderation approach does not rely on correlations to infer causality but rather systematically manipulates the proposed mediator. Therefore, this method arguably has substantial advantages over traditional mediation analyses (Baron & Kenny, 1986; MacKinnon et al., 2002).

In Study 6, the adapted procedure used to demonstrate the role of the processing focus as mediator was as follows. First, we used an economic deception game (adapted from Gneezy, 2005) to induce trust versus distrust in participants. During this incentivized economic game, participants either received true or false advice from a counterpart. Second, the participants either engaged in a control task that should not affect their processing focus or engaged in a task that disrupted the processing focus. To do so, the participants engaged in a task that fostered similarity-oriented processing. We expected that for the focus-uninfluenced participants, the effect of trust and distrust would remain comparable with the effect observed in prior studies. However, for the focus-interrupted participants, we expected the memory advantage of distrust over trust to be reduced.

Method

Participants and Design

We recruited 326 participants (216 female; $M_{age} = 23.38$, $SD = 4.42$) on the campus of a German university. Participants were randomly assigned to one of the four conditions of a 2 (Mindset: trust vs. distrust) x 2 (Focus: uninfluenced vs. similarity-oriented). The recruited sample size exceeded the minimum sample size determined in the initial power analysis. The participants received a chocolate bar or coffee voucher for their participation and took part in a raffle for Amazon vouchers worth a total of €200. The amount of lottery tickets each participant received was determined by their choice in an incentivized economic deception game (Gneezy, 2005).

Materials and Procedure

Participants were randomly assigned to one of four experimental between-subjects conditions.

Trust and Distrust Manipulation

To manipulate trust and distrust, we used an economic deception game (Gneezy, 2005; Posten & Mussweiler, 2013). All participants had to make a choice between Option A and Option B. They learned that each option represented a different payoff distribution for earning tickets for a raffle. The prices were six Amazon vouchers: one with a value of €100, and five with a value of €20 each. The participants then received advice in an envelope from a previous participant telling them that either Option A or Option B would result in more lottery tickets for them.[6] Then they chose between Option A or Option B. On the next screen, they learned about the actual payoff distribution. Option A represented a payoff of three lottery tickets for them and three lottery tickets for their advice giver. Option B represented a payoff of zero lottery tickets for them and four lottery tickets for their advice giver. Thus, if their counterpart advised them to choose Option A, they received truthful advice. However, if their counterpart advised them to choose Option B, the counterpart lied to them.

Focus Manipulation

As a focus manipulation, the participants looked at three pictures (a beach scene, a view of a city, a jungle scene). In the control condition, they listed three features for each picture that came

[6] In a prestudy, we collected 92 answers from independent participants (56 females, $M_{age} = 22.40$; $SD = 3.19$) on the same campus. Seventy-two participants gave truthful advice; 20 participants gave false advice. Paper-and-pencil messages from these participants were given to the actual participants in Experiment 5. These messages served multiple times as advice in Experiment 5 to allow a random distribution of participants across the experimental conditions.

to their mind. In the focus interruption task, they listed three similarities between the vertical halves of each picture.

Memory task

The second task was the memory task used in Studies 2a and 2b. Unlike in Studies 2a and 2b, we only used one version of the study materials (because we did not find any effect for the materials in Study 2a and 2b).

Results

We expected that distrust would result in better memory performance as compared with trust when the focus remained uninfluenced. Figure 1 (left) shows this was indeed the case. Overall, distrust tended to lead to better memory performance, but this effect was not significant, $F(1, 322) = 3.17$, $p = .076$. No main effect for focus emerged, $F(1, 322) = .46$, $p = .498$. Critically, this pattern resulted in a significant interaction effect, $F(1, 322) = 8.62$, $p = .004$, $\eta^2 = .026$, suggesting that trust and distrust differentially affected memory performance, dependent on the processing focus.

A simple contrast analysis showed that in the uninterrupted focus conditions, distrust led to a higher sensitivity d' ($M = 1.23$; $SD = .53$) than trust ($M = .92$; $SD = .58$), $t(322) = 3.22$, $p = .001$. More importantly, if a similarity-focus was induced, no such difference occurred ($M_{distrust} = .99$; $SD = .57$; $M_{trust} = 1.07$; $SD = .61$), $t(322) = .85$, $p = .396$. Moreover, participants in the distrust condition whose focus was oriented toward similarities no longer showed any memory advantage. They performed worse than participants in the distrust condition with an uninfluenced focus, $t(332) = 2.59$, $p = .010$. Trust participants with a similarity-focus did not differ significantly in their performance from participants with an uninfluenced focus, $t(322) = 1.58$, $p = .116$.

To assess whether participants varied in their degree of response bias, we computed the response bias c. Neither a main effect for mindset, $F(1, 322) = .15$, $p = .697$, for focus, $F(1, 322) = .27$, $p = .605$, or an interaction effect, $F(1, 322) = .91$, $p = .340$, occurred.

Overall, the likelihood of following the given advice did not differ between the trust (72%) and distrust condition (67%), $\chi^2(1) = .82$, $p = .365$.

Discussion

The results of Study 6 demonstrate that distrust only leads to better memory as compared with trust when the processing focus can freely operate and be oriented toward differences. Under these circumstances, the results of Studies 1–3b replicate. However, when the processing focus cannot operate freely (i.e., when a similarity-focus is induced), the advantages of distrust are no longer evident. This finding gives credence to the notion that, indeed, the processing focus drives the effects of trust and distrust on memory.

Furthermore, Study 6 demonstrates that the effects of trust and distrust on memory replicate within a German lab sample, indicating that they hold for a different culture.

Study 7

Study 7 sets out to test this understanding using the same design as Study 6. But instead of interrupting the processing focus by inducing a similarity-focus to reduce the advantage of a distrust mindset, in Study 7, the induction of a difference-focus is used to interrupt the free variation of the processing focus.

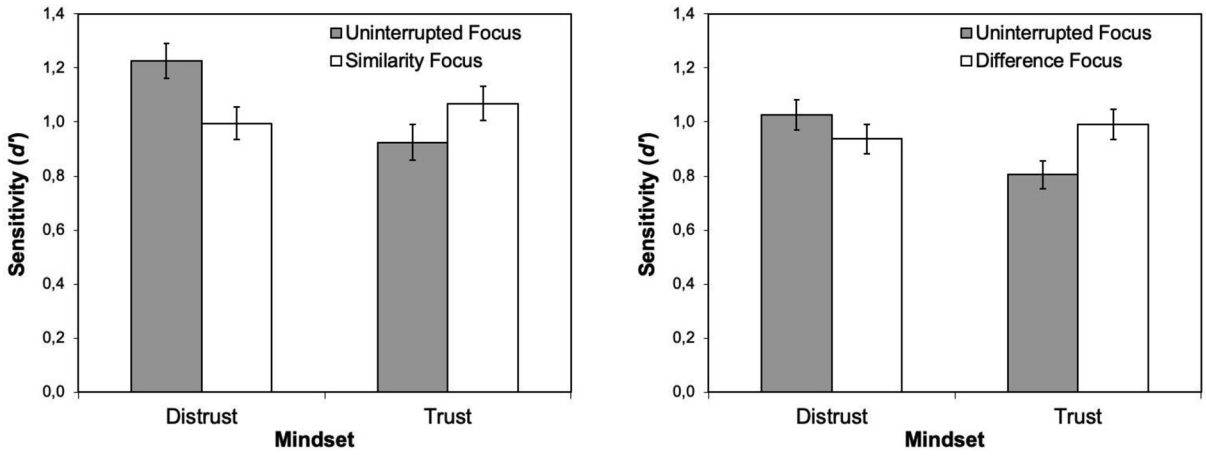
Method

Participants and Design

We recruited 315 participants whose native language was German (140 female, 1 diverse; $M_{age} = 30.35$, $SD = 9.75$) via Prolific. Participants were randomly assigned to one of the four conditions of a 2 (Mindset: trust vs. distrust) x 2 (Focus: uninfluenced vs. difference-oriented) between-subjects design. The recruited sample size was based on the effect size obtained in Study 6 with a power of 80% and a two-tailed alpha level of .05, as the manipulations and dependent measures of Study 6 were comparable to those employed in Study 7. The participants received £1.88 for their

Figure 1

Sensitivity as a Function of Mindset and Focus Interruption in Study 6 (Left) and Study 7 (Right)



Note. Error bars represent ±1 *SE*.

participation and additionally took part in raffle for Prolific bonus payments totaling £200.00. As in Study 6, choices in an incentivized economic deception game determined the amount of lottery tickets for each participant (Gneezy, 2005). The sample size, study design, and analysis plan were preregistered (https://aspredicted.org/blind.php?x=zv2ii6).

Materials and Procedure

Participants were randomly assigned to one of four experimental between-subjects conditions.

Trust and Distrust Manipulation

To manipulate trust and distrust, we used the same experiential recall task as in Study 6.[7]

Focus Manipulation

To manipulate participants' focus, we employed the same stimuli as in Study 6. The control condition was identical to that used in Study 6. Different from Study 6, participants in the focus-interruption condition were asked to list three differences.

Memory Task

The second task was the memory task used in Study 6.

Results

Overall, neither a main effect for Mindset, $F(1, 311) = 2.37$, $p = .125$, nor a main effect for Focus, $F(1, 311) = .79$, $p = .375$, emerged. Importantly, and as preregistered, this pattern resulted in a significant interaction effect, $F(1, 311) = 6.42$, $p = .012$, $\eta^2 = .02$.

Simple contrast analyses revealed that the differences between the experimental conditions were in line with our preregistered expectations (see Figure 1, right). For the uninterrupted focus, distrust led to a higher sensitivity d' ($M = 1.03$; $SD = .44$) than trust ($M = .81$; $SD = .42$), $t(311) = 2.93$, $p = .004$. Upon the induction of a difference-focus, we expected this difference to be reduced. In line with this expectation, no significant difference between the distrust ($M = .94$; $SD = .54$) and the trust condition emerged ($M = .99$; $SD = .51$), $t(311) = .69$, $p = .490$. Moreover, participants in the trust condition, whose focus was oriented toward differences, now showed a memory advantage as compared with participants in the trust condition without the difference-focus induction, $t(311) = 2.44$, $p = .015$. No significant difference between means was obtained for the participants in the distrust conditions for the difference versus uninterrupted focus, $t(311) = 1.15$, $p = .250$.

No such pattern emerged for the response bias c. No main effect for Mindset, $F(1, 311) = .08$, $p = .78$, Focus, $F(1, 311) = 1.09$, $p = .297$, or an interaction effect emerged, $F(1, 311) = .02$, $p = .899$.

The likelihood of following the given advice did not differ between the trust (78%) and the distrust condition (74%), $\chi^2(1) = .78$, $p = .378$.

Discussion

The results of Study 7 further demonstrate that a processing focus seems to mediate the effect of trust and distrust on memory. Similar to the results of Study 6, the results of Studies 1–3b replicated only if the hypothesized mediator of a processing focus was free to vary. If the processing focus was manipulated and oriented toward differences, no such difference could be observed between the trust and distrust condition. Instead, the disadvantage of trust was reduced, showing that under trust, good memory performance is possible if the focus is directed toward difference-oriented processing.

General Discussion

The converging evidence of nine studies (four of them preregistered) shows that trust, as compared with distrust, results in impaired memory performance. Studies 1, 2a and 2b, and 3a and 3b show that individuals in a state of distrust perform better in three types of memory tasks even when the memory task is unrelated to the (dis)trust-evoking context. In Study 1, more misinformation was accepted upon an incidental trust induction as compared with a distrust induction, in which participants recalled trust versus distrust episodes from their lives. In Studies 2a and 2b, distrust led to better performance than trust in a recognition memory task. Using an alternative means of inducing trust and distrust in participants, Studies 3a and 3b demonstrate that distrust, as compared with trust, resulted in better memory performance in a free-recall memory task. Studies 4–7 examined the process underlying the influence of the mental states of trust and distrust on memory performance. Because trust leads individuals to process information with a focus on similarities rather than differences (Posten & Mussweiler, 2013), and because the perception of similarities rather than differences between items typically reduces memory performance (Smith & Hunt, 2000), we expected the orientation of the processing focus to mediate the effect. Studies 4 and 5 explore the role of the underlying processing focus by applying the logic of a causal chain design (Spencer et al., 2005). Study 4 shows that trust, as compared with distrust, leads individuals to perceive items as more similar to each other, suggesting that under trust information is processed with a greater focus on similarities. Building on this finding, Study 5 demonstrates that experimentally inducing a processing mode that focuses on similarities (vs. differences vs. a control condition) reduces memory performance in a free-recall task. Thus, trust seems to prompt a focus on similarities, which reduces memory performance. Studies 6 and 7 used a moderation design to demonstrate the role of the processing focus as a mediator (Jacoby & Sassenberg, 2011). Specifically, Studies 6 and 7 examined the finding that trust reduces memory performance as compared with distrust under two contextual conditions. In both studies, one condition allowed the hypothesized underlying mechanism of a processing focus to operate freely, whereas the other restricted the processing focus, via the induction of a similarity-focus in Study 6 and a difference-focus in Study 7. The findings of both studies show that the difference in memory performance between the trust and distrust condition appears if the processing focus is not restricted. Thus, when the processing focus is able to operate freely, trust leads to worse memory performance than distrust. However, if the processing focus is restricted and cannot operate freely, the effects of trust and distrust on memory disappear. If the focus is set

[7] As in Study 6, we collected answers from 100 independent participants (37 females, 2 diverse; $M_{age} = 28.76$; $SD = 10.09$) via Prolific. Eighty-two participants gave truthful advice.

on similarities, the advantage of distrust over trust vanishes (Study 6). If the focus is set on differences, the disadvantage of trust is reduced, and trusting participants' memory performance improves. In addition to investigating the underlying process, Studies 6 and 7 also increase the ecologic validity of the findings by using trust and distrust manipulations that rely on actual experiences of trust and distrust induced via an interaction in which participants were deceived or truthfully advised by their counterpart in an incentivized economic decision (Gneezy, 2005). Overall, the effects of trust and distrust on memory were consistent across different samples: U.S. online samples (Studies 2a, 2b, 3b, 4, and 5), a U.S. student sample (Study 3a), German online samples (Studies 1 and 7), and a German student lab sample (Study 6). This indicates that the effect is generalizable across different age groups, educational backgrounds, and cultures.

Theoretical Implications

The present research has implications for the link between memory and similarity. Much of the research showing the detrimental effect of similarity on memory (e.g., Baddeley, 1966; Tversky & Gati, 1982) investigates how similarity inherent to memory content impairs memory performance. This is the case for research on semantic similarity (Baddeley, 1966), perceptual similarity (Tversky & Gati, 1982), source similarity (Johnson et al., 1993), and event similarity (Henkel et al., 2000). Smith and Hunt (2000) were the first to use identical memory content, varying only how individuals processed the content by asking participants to actively generate similarities or differences between the same memory content. Their results showed the same impairing effect of similarities on memory performance. The present research goes beyond these findings to show that content-independent mindsets directing the processing focus toward similarities or differences influence subsequent memory performance in independent tasks. Thus, over and above previous research on memory and similarity, the studies show that once individuals process information with a focus on similarities, this focus may carry over to an independent memory task and impair performance therein. To our knowledge, this study is the first to show that a content-free similarity induction that is independent of the memory task itself impairs memory performance. Taken together, the processing style itself influences the memorability of content.

Apart from the challenge of remembering detailed information accurately in episodic terms, whenever people deal with novel information, they are typically confronted with the challenge of organizing and integrating it into a coherent picture, contributing to their semantic knowledge. One way to form semantic information structures is to extract similarities between individual pieces of information (e.g., Gentner & Markman, 1994; Markman & Gentner, 1993; Sloutsky, 2003). In the case of category formation (such as developing the category "dog"), this principle becomes readily apparent: To detect general patterns, differences (e.g., between distinct species) need to be disregarded and common features extracted (e.g., McClelland & Rogers, 2003; Sloutsky, 2003). Advantages for similarities on encoding information also have been shown in research investigating how novel information is similar to existing knowledge, the congruence effect (van Kesteren et al., 2012). Information congruent with existing knowledge is typically easier to integrate into already existing structures (such as schemas and scripts). Therefore, and as previous literature suggests, a similarity-focus could also enhance learning effects by helping to integrate novel information into existing semantic knowledge structures (Hampton & Cannon, 2004; Wisniewski, 1996). The present research shows that trust fosters a similarity-focus, which in turn leads individuals to perceive entities as more similar to each other. Although this may result in less accurate episodic memory for individual information, as we have shown, trust may facilitate the organization and integration of information by building and refining semantic structures. Thus, although trust may hinder the memory of detailed, episodic information, it may facilitate semantic learning when experiential information needs to be integrated.

One interesting mechanism that might operate in parallel to a dis(trust)-induced processing focus could be different levels of information construal, such as an item versus category level. Typically, high levels of construal refer to information being construed in psychologically more abstract ways, leading to higher-order and broader categorizations. Low levels of construal refer to psychologically more concrete, detailed ways of information processing. These effect of high levels of construal have been argued and shown to have similar effects as similarity-oriented processing, for example, with respect to assimilation effects and stereotyping (Borovoi et al., 2010; McCrea et al., 2012; Trope & Liberman, 2010). Therefore, one might assume that these processes also account for the effects obtained in the present set of studies. Although, in general, it seems exceedingly plausible that high level of construal might result in comparable memory errors as similarity-oriented processing, the relation of construal level to trust and distrust is not as clear. Note that high levels of construal have been argued and shown to relate to the concept of psychological distance, including social distance, and low levels of construal to relate to psychological closeness, including social closeness. Trust, in contrast, has been argued and shown to be particularly present in socially proximate contexts, as when one is interacting with ingroup members, whereas distrust prevails when one is interacting with distant others (Foddy et al., 2009; for ways in which diversity promotes trust, see Cao & Galinsky, 2020). If this relationship maps onto the construct of psychological distance, then trust might be accompanied by more social and psychological closeness, which could be argued to lead to more proximal, concrete processing on a lower construal level. This would predict findings different from those obtained in the present set of studies. Nevertheless, how trust and distrust relate to the level of information construal remains speculative and would need to be addressed in future research.

The theoretical argument that individuals typically default toward trusting one another has been repeatedly put forward (cf. Légal et al., 2012; Schul et al., 2008). However, research findings suggests that the question of whether trust or distrust constitutes the default seems to be more complex (Ainsworth et al., 2014; Rand et al., 2012; Schul et al., 2008). For one, trust is subject to the situation and can easily be influenced by surrounding environmental cues (Lount, 2010; Schul et al., 2004, 2008). Second, moderating factors, such as self-control, may affect the default of whether to trust or distrust others (e.g., Evans et al., 2011). Third, individuals can quickly switch back and forth between trust and distrust mindsets (Schul et al., 2004), a fact that challenges the general assumption of one relatively stable default mindset. Fourth, the results of the World Values Survey suggest that people

from different countries experience higher or lower levels of trust (Inglehart et al., 2014), suggesting that trust levels vary between groups with different cultural backgrounds. In the present Studies 2a and 2b, the control condition yielded similar results as the distrust condition, suggesting that distrust resembled the default for the current sample population. The particular circumstances of the study setting itself may have promoted a distrust mindset over a trust mindset in these participants (e.g., participating in a psychology study might have created distrust in participants). We do not feel confident that our data speaks convincingly to the discussion of a general default state of trust or distrust. The results of the control conditions could be evoked due to the specific background of the sample or study contexts. To speak to the discussion of a default state, further empirical evidence is needed. Nevertheless, we feel confident that the two experimental conditions of trust and distrust throughout the set of studies consistently show that trust and distrust differ with respect to their effects on memory performance.

Alternative Explanations

The present research hypothesized that the differential effects of trust and distrust on memory are mediated by the direction of one's information-processing focus (i.e., similarity- vs. difference-oriented). However, there are possible alternative mechanisms that may also relate to trust and/or similarity and/or memory performance. Factors easily associated with trust, including mood (Bauml & Kuhbandner, 2007; Bower, 1981; Forgas et al., 1988; Teasdale & Russell, 1983) and analytical thinking (Craik & Tulving, 1975), have been found to influence memory performance. Although the positive relationship of systematic thinking to memory performance is straightforward (Craik & Tulving, 1975); the influence of mood on memory appears to be more complex. It has been shown that mood affects state-dependent memory retrieval (Bower, 1981) but has no effects on the recall of neutral information (Teasdale & Russell, 1983). Some research shows that negative mood reduces forgetting and thus increases memory performance (Bauml & Kuhbandner, 2007), whereas other research shows that negative mood decreases memory performance (Forgas et al., 1988). Nevertheless, the potential effects of mood and systematic thinking on memory raise the question of whether the current findings go over and beyond the effects of these two memory influencers. In principle, distrust could evoke a negative mood and/or more analytical thinking (or analytical thinking as a consequence of negative mood; Chartrand et al., 2006; Fein, 1996; Priester & Petty, 1995), which could result in enhanced memory performance (Bauml & Kuhbandner, 2007; Craik & Tulving, 1975; Petty et al., 1986). Hence, possible effects of trust and distrust on memory performance could be evoked via differences in mood and/or analytical thinking.

To investigate whether these variables might account for the effects of trust and distrust on memory, we assessed participants' mood with two different mood measures (Steinmetz & Posten, 2017; Watson et al., 1988) and recorded participants' response latencies as an indicator of analytical thinking. To assess effects on mood, we employed a single-item mood measure in Studies 2a and 2b (1 = *very sad;* 3 = *sad;* 5 = *neutral;* 7 = *happy;* 9 = *very happy;* Steinmetz & Posten, 2017) and the positive and negative affect scale (PANAS; Watson et al., 1988) in Study 3b. None of the studies found significant effects between experimental conditions (Study 2a: $p = .359$, Study 2b: $p = .875$, Study 3b: $p = .598$; for means, standard deviations, and test statistics see SOM). To assess effects on analytical thinking, we measured the time spent on the memory tasks in Studies 2b, 3a, 3b, 5, and 7, and the difference-focus measure in Study 4. No significant effects appeared in any of the studies between the experimental conditions (Study 2b: $p = .857$, Study 3a: $p = .464$, Study 3b: $p = .152$, Study 4: $p = .204$, Study 5: $p = .338$, Study 7: all p's $> .300$; for means, standard deviations, and test statistics, see the online supplemental materials). Mirroring previous research on trust and distrust (e.g., Kleiman et al., 2015), none of the present studies found effects of (dis)trust on mood (Studies 2a, 2b, and 3b) or response latencies (Studies 2b, 3a, 3b, 5, and 7), suggesting that neither mood nor analytical thinking are driving the effects of (dis)trust on memory. Notably, however, we employed rather subtle inductions of trust and distrust. When trust and distrust increase, there may be resultant mood effects and differences in the depth of processing (Fein, 1996; Petty et al., 1986; Priester & Petty, 1995). If this were the case, the effects demonstrated here could amplify.

The findings that trust and distrust influence memory without inducing changes in mood or response latencies also speak to the occurrence of possible alternative mediating mechanisms that would presuppose existing differences in mood and/or response latencies. For example, a concern for accuracy evoked under the state of distrust could easily be hypothesized and would also result in good memory performance. However, a concern for accuracy is also effortful and time-consuming and thus would produce differences in response latencies that typically occur when accuracy comes at the cost of speed (Reed, 1973; Wickelgren, 1977; for a discussion, see Vandierendonck, 2018). Hence, one could expect longer response times when a concern for accuracy is present. Given that the current findings did not show such differences in processing times, they are unlikely to be explained by variables that presuppose differences in response times.

With respect to the similar results produced in the distrust and control conditions, one could argue that our manipulation of distrust might not have been as effective as planned, leading the distrust condition to resemble the control condition. In the present set of studies, we did not explicitly measure the level of trust and distrust that the participants might have experienced. However, we did use three different ways to manipulate trust and distrust throughout the set of studies that have been successfully used in prior research to manipulate these states (Conway et al., 2018; Kleiman et al., 2015; Mayer & Mussweiler, 2011; Posten & Mussweiler, 2013; Weiss et al., 2018). Given their diverse nature and settings (episodic recall vs. scrambled sentences vs. economic game), it is notable that all of the manipulations resulted in comparable effects on memory performance in the present set of studies. Although they might have put different emphases on the multifold facets of trust and distrust, we feel confident that, via the principle of triangulation, all of these manipulations captured the nature of trust and distrust. This reasoning renders it unlikely that all of these diverse manipulations might have triggered the same alternative mechanisms to the hypothesized one, unrelated to the concepts of trust and distrust.

Boundary Conditions and Future Directions

The present research shows that trust impedes memory performance as compared with distrust. Memory performance depends on

two crucial steps: Information first needs to be encoded and then needs to be retrieved (e.g., Karpicke & Blunt, 2011; Tulving & Thomson, 1973). In the present studies, the encoding and retrieval of memory content both occurred once the states of trust and distrust had been elicited. Thus, our research cannot speak directly to the question of whether processes in the encoding or retrieval phase drive the effects of trust and distrust on memory performance. Previous research demonstrates that distrust leads to the spontaneous activation of incongruent associations if individuals experience this state in the encoding phase (Schul et al., 2004). This finding might suggest that, indeed, distrust already fosters different information processes than trust during the encoding phase. Importantly, the processes that distrust elicits in the encoding phase might set the stage for a distrust-congruent difference-focus to be particularly powerful. Once incongruent associations are activated, differences might be easily detected. Thus, the automatic activation of incongruences might facilitate the perception of differences. As a result, the effect of trust and distrust on memory performance might already take place during the encoding stage. At the same time, however, Studies 3a and 3b demonstrate that trust and distrust lead to different results in a paradigm that relies on forgetting caused by retrieving information (Anderson et al., 2000). Study 5 shows similar results if participants remember content while under a similarity versus different focus. This suggests that, indeed, trust (and a similarity-focus) might lead to better memory performance based on them being operant in the retrieval phase. In summary, evidence for the effects of trust and distrust during the encoding phase is just as plausible as evidence for the effects of trust and distrust during the retrieval phase. Therefore, it may be possible that the presence of distrust during both phases leads to the present results. Exploring whether trust decreases memory during the encoding phase, the decoding phase, or both phases (and, if so, to what extent) seems to be a fruitful path for future research.

The organization of memory content and their relation to each other raises another intriguing question: Could the impairing effects of trust on episodic memory be limited to information that is to some degree relatable to other information at hand or to preexisting semantic information structures? If information is relatable—for example, by being similar to other memory content—then similarity-oriented processing might be facilitated, impairing episodic, detailed memory performance (yet, possibly facilitating semantic integration). Unrelated, stand-alone content, that is hardly relatable to other content, could constitute a boundary condition to the effect of trust on episodic memory. If no relation is extractable, confusion with other content remains unlikely. Research shows that, to a certain degree, content needs to be relatable to other information to be misremembered (Hinze et al., 2014; Pezdek et al., 2006; Pezdek & Hodge, 1999). Consider the classic Loftus misinformation paradigm, in which participants often falsely remember that a stop (vs. yield) sign was present at a street corner. This information seems to be somewhat relatable to each other. However, imagine that experimenters tried to communicate the misinformation that a pink elephant rather than a stop sign was present. Because this misinformation is not as easily relatable to the critical information, participants likely would not as easily pick it up as false information. Therefore, for unrelatable information, differentiating effects of trust and distrust on episodic memory performance might disappear.

In the present research, we focused on simple memory tasks, such as recognition memory and the free recall of semantic words. Yet, the spectrum of memory content is far broader. Memory can contain information regarding sequential event information, a series of (similar) events, or one's past thoughts (e.g., Henkel et al., 2000). Currently, we can only make the claim that memory performance is affected by trust and distrust for the type of simple memory materials used in the present studies. However, other factors, such as general similarity, also have been shown to affect memory performance for comparable simple materials (Baddeley, 1966; Johnson et al., 1993; Tversky & Gati, 1982); as well as more complex event memory (Henkel et al., 2000; Lyle & Johnson, 2006). Thus, similar mechanisms seem to underlie basic and more complex memory processes. Therefore, we feel confident that the mechanisms that influence memory once the states of trust or distrust are present in simple memory tasks also influence memory performance for more complex memory content. Ultimately, however, empirical evidence still needs to confirm this claim.

From an applied perspective, this finding has further interesting implications for the legal system. In witness interrogations, interviewers often try to establish trust and rapport with witnesses, based on the idea that witnesses might willingly cooperate once trust is established (Roberts, 2010). Although this may be a valuable goal from a motivational account, the present research suggests that such a trusting relationship may come at the cost of memory itself. Thus, when memory performance is critical to a witness's testimony, it may be questionable whether increasing trust leads to the most reliable testimony. A potential loophole to escape this dilemma might lie in the fact that distrust not only leads to better memory performance than trust, but also that merely focusing on differences leads to better memory performance than focusing on similarities (Study 5). A focus on differences, in turn, does not automatically and necessarily lead to distrust (Posten & Mussweiler, 2019). Therefore, an interview strategy that leads witnesses to focus on differences might prompt better memory without the costs of distrust, including a reduced motivation to provide information.

Conclusions

Many important societal outcomes rely on accurate human memory, such as eyewitness testimony. However, the accuracy of human memory is fragile and affected by numerous factors. One of the most detrimental factors is similarity (Baddeley, 1966; Tversky & Gati, 1982). The current research demonstrates that two omnipresent factors in social life, namely trust and distrust, systematically influence human memory. In particular, trust leads individuals to perceive entities as more similar to each other as compared with trust. This difference in similarity-perception then decreases individuals' ability to accurately recall and recognize memory content. Thus, trust may vary information processing in ways that oppose memory performance.

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Received March 16, 2020
Revision received January 23, 2021
Accepted January 31, 2021 ■