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Psychological Distance Can Improve Decision Making Under Information Overload Via Gist Memory

Jun Fukukura and Melissa J. Ferguson
Cornell University

Kentaro Fujita
The Ohio State University

Making a decision can be especially difficult when it is based upon a large amount of information. A number of demonstrations in the literature suggest that decision making under information overload leads to suboptimal outcomes. In this article, we draw on construal level theory (Trope & Liberman, 2003) and fuzzy-trace theory (Brainerd & Reyna, 1993) to suggest that psychologically distancing oneself from the information can be beneficial to decision making under information overload. Specifically, we propose that distancing prompts organization of information in terms of its gist. Across 4 studies, we demonstrated that increasing spatial distance, temporal distance, and abstraction lead to better decision outcomes when decision makers were overloaded with many pieces of information per decision. Furthermore, we showed that the relationship between psychological distance and decision outcome is mediated by gist memory.

Keywords: psychological distance, decision making, memory, gist, information overload

Imagine you are on the market for a new cell phone. There are currently over 180 U.S. wireless service providers. Let's say you decide to go with Verizon Wireless. The Verizon website currently lists 74 phones, all of which can be judged by approximately 40 features. In sum, you are faced with over 2,900 pieces of information. You think you've decided on the best phone but when you go to the store, you are confronted with even more information. For example, after holding the phone you thought you wanted in your hand, you find the buttons to be too small for your fingers. How do you choose which phone is best for you?

People now have access to an unprecedented amount of information. Greater numbers of people have easy access to the Internet, where they can find an ever-growing trove of information about innumerable topics. This means that people typically face considerable information overload when making decisions about everything from hair dryers to health plans. Although classic economic theories, such as rational choice theory (von Neumann & Morgenstern, 1947), have assumed that more information is better and that consumers can rationally process all available information, empirical research indicates that beyond a certain threshold, information quantity becomes detrimental to decision making.

The information overload research programs of the 1970s and 1980s (e.g., Jacoby, 1977; Malhotra, 1982; Wilkie, 1974) demonstrated several negative outcomes associated with having *too much information*, defined as too many choices and/or too many attributes per choice. Drawing on Miller's (1956) findings that human information processing capacity in short-term memory is limited to approximately seven units of information, researchers demonstrated that having too much information leads people to stray from an objectively best option (i.e., the option with the most positive features that are most important to people) and choose a worse option instead (Jacoby, Speller, & Kohn, 1974a, 1974b; Keller & Staelin, 1987; Lee & Lee, 2004; Malhotra, 1982). When people are confronted with too much information that they must use to make a decision, they can experience information overload, which increases confusion (Lee & Lee, 2004; Malhotra, 1982; Schick, Gordon, & Haka, 1990), creates paralysis and delay of decision making (Bawden, 2001; Schick et al. 1990), decreases motivation (Baldacchino, Armistead, & Parker, 2002), and ultimately decreases satisfaction (Jacoby, 1984; Lee & Lee, 2004).

More recently, research on choice overload (e.g., Iyengar & Lepper, 2000; Schwartz et al., 2002) has similarly revealed counterproductive outcomes when people are faced with too many choices. To make matters worse, more current work on memory capacity has shown that Miller's estimation of seven units of information may have been overly optimistic (see Cowan, 2004, for a review), suggesting that even a few pieces of information are not easily remembered. Therefore, information overload may occur with even less information than originally thought.

Because the amount of information available and number of choices facing consumers is only likely to grow,[1] a central question for researchers into decision making is whether simple decision aids exist that could optimize decision making in information-

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Jun Fukukura and Melissa J. Ferguson, Department of Psychology, Cornell University; Kentaro Fujita, Department of Psychology, The Ohio State University.

Correspondence concerning this article should be addressed to Jun Fukukura, Department of Psychology, Cornell University, Uris Hall, Room 230, 204 Cayuga Heights Road, Ithaca, NY 14850. E-mail: jf399@cornell.edu

[1] A striking example comes from updating this very article. From the time the article was first drafted 2 years ago, to when it was submitted, the number of U.S. wireless providers has more than quadrulpled and the number of phones offered by Verizon Wireless increased from 51 to 74 phones.

rich environments. Work on psychological distance suggests that manipulations distancing people from the information at hand could be used as a cognitive intervention in information-overload situations. In the four studies presented here, we provide evidence that psychologically distancing can lead people toward more optimal decisions when faced with an overwhelming amount of information.

Psychological Distance and Memory

Psychological distance refers to removal of an object, person, or event from the self in the here and now. A vast body of research has identified multiple dimensions of psychological distance, such as time, space, social distance, and hypotheticality (Fujita, Henderson, Eng, Trope, & Liberman, 2006; Henderson, Fujita, Trope, & Liberman, 2006; Liviatan, Trope, & Liberman, 2008; Trope & Liberman, 2000; Wakslak, Trope, Liberman, & Alony, 2006). Furthermore, this line of work has demonstrated cognitive and behavioral effects of psychological distance under the framework of construal level theory (CLT; Trope & Liberman, 2003). According to CLT, to conceptualize distant events, people construe events by their abstract, essential, invariant features (high-level construals). As events become more proximal and detailed information becomes more readily available and reliable, people construe events increasingly by their concrete, secondary, idiosyncratic features (low-level construals). This association between distance and abstraction becomes overgeneralized (Bar-Anan, Trope, & Liberman, 2006), such that merely imagining distant events provokes more abstract, high-level construals (Förster, Friedman, & Liberman, 2004).

Several findings in this line of work are suggestive that psychological distance may improve decision making, particularly in situations of information overload. Trope and Liberman (2000) have shown that psychological distance increases weighting of central (as opposed to peripheral) features, which suggests that people in an information-overload situation would hone in on the important information and pay less attention to negligible information. Psychological distance has also been shown to increase working memory capacity (Schmeichel, Vohs, & Duke, 2011), which should prove useful in an information-overload situation.

Psychological distance may also enhance a person's focus on the gist of the information. According to fuzzy-trace theory (FTT; Brainerd & Reyna, 1990; Reyna & Brainerd, 1991), gist representations—in contrast to verbatim representations, which capture the exact wording of information (e.g., the cell phone is 4.5 inches long, 2.3 inches wide, and 0.3 inches in depth)—capture the broader meaning of information (e.g., the cell phone is compact). Research in FTT has shown that although there is initial parallel storage of verbatim and gist trace, there are differential survival rates such that verbatim traces become inaccessible more rapidly than gist traces, leading to a tendency to recall information in terms of gist rather than specifics (for a review, see Reyna & Brainerd, 1995). Experiments on FTT showed that gist processing allows decision makers to reduce confusion and interference (Brainerd & Reyna, 1993; Reyna, 1995). Similarly, by highlighting gist, psychological distance could allow people to organize and process information more efficiently in information-overload situations, and thus be less likely to become distracted and confused by too much information.

Studies have demonstrated that just as gist traces increase with the actual passing of time, gist memory increases with psychological distancing. For example, Smith and Trope (2006), using the Deese–Roediger–McDermott (DRM) false recognition paradigm (Deese, 1959; Roediger & McDermott, 1995), showed that increasing social distance enhances gist memory. In the DRM, participants are presented with lists composed of words (e.g., door, glass, curtain) that are highly associated with a critical, nonpresented word (e.g., window). This nonpresented word is known as the *critical lure*, which people misremember seeing because its gist-based similarity with words that were actually presented. Psychological distance exacerbated this effect and led people to misremember seeing the critical lure more often than psychological proximity. Similarly, Rim, Uleman, and Trope (2009) showed that both spatial and temporal distance (vs. proximity) led people to misbelieve they had read a trait about a target person, when in fact they read about more specific behaviors that implied that trait.

Interestingly, gist representations may also be related to Miller's (1956) concept of *chunks*. Miller proposed that one of the techniques by which people can retain more than seven pieces of individual pieces of information (i.e., bits) is to group bits of information into organized groups (i.e., chunks). The main idea Miller established was that although the memory span is a fixed number of chunks, people can increase the number of bits of information remembered by organizing information into larger and larger chunks. Although it has been pointed out that the concept of chunks, 50 years after Miller's proposal, is still surprisingly vague and tentative (e.g., Mathy & Feldman, 2012), we find strong parallels between the gist representations and chunks. For example, Cowan (2000) defined chunks as "a collection of concepts that have strong associations to one another and much weaker associations to other chunks" (p. 89). Similarly, gist traces have been defined as "episodic interpretations of concepts (meanings, relations, patterns)" (Brainerd & Reyna, 2002, p. 155).

Research has shown that psychological distance leads people to increase chunking of information. For example, when people are induced with spatial distance, they interpret actions of a scene into fewer and broader units of actions (Henderson et al., 2006). Similarly, Wakslak et al. (2006) showed that increased psychological distance leads people to segment ongoing behavior into fewer units (Study 4) and organize objects into broader categories (Study 1). The chunking feature of psychological distance may aid in decision making under information overload by organizing information into more manageable units of information.

Overview of the Studies

Although it is clear that psychological distance leads people to treat information differently, it is an open question whether psychological distance can improve decision making under information overload. On the one hand, psychological distance could improve decision outcomes by leading people to focus on central versus peripheral features and organize information into more schematic gist representations. On the other hand, it is possible that psychological distance could lead to poor decision outcomes by leading people to misremember the verbatim specific details and overgeneralize information. Therefore, we tested the effect of psychological distance across four studies. After demonstrating in Study 1a that psychological distance (via temporal distance) does indeed lead to better decision outcomes when there is information overload, we tested several potential mechanisms behind the effect since, as previously discussed, psychological distance could affect the decision-making outcome in multiple ways. Because retaining some form of memory of the information would be optimal for reaching the correct decision, we suspected that memory must be at least partly involved in the task.

Thus, we tested memory outcomes across the remaining studies. In Study 1b, we replicated our effect by using physical distance and tested for specific memory of the information. However, we found that there were no differences across conditions for specific memory, nor did distance increase memory for central as opposed to peripheral information. In Study 2, we turned to participants for insights into their memorizing strategies, who indicated that when they were in the distant condition, they were more likely to use a gist strategy compared with when they were in the near and control conditions. Thus, in Study 3, we tested and showed that psychological distance (via abstraction) increased gist memory, which mediated the relationship between psychological distance and the decision outcome.

Studies 1a and 1b

Throughout the studies, we modified an information presentation paradigm of research on complex decision making (Dijksterhuis, 2004), which involves 12 pieces of information each about four different cars. In a pre-study, we established the relative importance of the 12 attributes. People indicated that central features such as mileage and repair service were more important than peripheral features such as car color and cup holders. Having established in a pilot study the relative importance of each car attribute, we designed Studies 1 and 2 so that each of the four cars we presented would have six positive and six negative features, but differed only in terms of which features were positive and negative (e.g., the Hatsdun has good gas mileage; the Dabusi has poor gas mileage). Thus, the best car had positive features that were determined in the pilot study as the most important to people (rankings 1–6), the worst car had positive features that were determined to be the least important (rankings 7–12), and the other two cars had positive features for those that were determined to be of average importance (rankings 4–9) and split rankings (rankings 1–3 and 10–12). Therefore, although all the cars had equal numbers of positive and negative characteristics, they differed in the relative importance of those positive versus negative features (see Table 1).

In Study 1a, distance was manipulated by having participants write about purchasing a car in the near or distant future, To ensure that the factor of interest was psychological distance (vs. some other temporal-based factor), we manipulated physical distance in Study 1b. We included a control condition in both studies to see how people would perform on the task without a distance manipulation. We hypothesized that people in the control condition would perform similarly to people in the near condition for two reasons: (a) without any cues about time or space, people would be likely to make their decisions as if they were in the here and now, and (b) because the task involved reading specific pieces of information, the majority of the task was essentially a locally focused presentation of concrete information, which should map onto a near, as opposed to a distant, mindset.

Table 1
Information Shown to Participants in Studies 1a, 1b, and 2

Feature	Car model			
	Hatsdun	Kaiwa	Dasuka	Nabusi
1. Mileage (good, poor)	+	−	+	−
2. Handling (smooth, poor)	+	−	+	−
3. Year (new, old)	+	−	+	−
4. Repair service (excellent, bad)	+	+	−	−
5. Emissions (low, high)	+	+	−	−
6. Gear shifts (smooth, awkward)	+	+	−	−
7. Leg room (lots, little)	−	+	−	+
8. Sound system (high quality, low quality)	−	+	−	+
9. Trunk room (large, small)	−	+	−	+
10. Sunroof (has, does not have)	−	−	+	+
11. Cup holders (many, few)	−	−	+	+
12. Colors (many, few)	−	−	+	+

Note. The features are listed from most important (e.g., mileage) to least important (e.g., colors) as determined in the pre-study. A plus sign indicates that the car was positive for that feature (e.g., the Hatsdun has good mileage), while a minus sign indicates that the car was negative for that feature (e.g., the Hatsdun comes in a few colors).

Method

Participants. Participants in Studies 1a and 1b were students from Cornell University who participated for course credit. Eighty-six undergraduates (52 women, 34 men) participated in Study 1a, and 74 undergraduates (42 women, 32 men) participated in Study 1b.[2] Participants were randomly assigned to the distant, near, or control conditions, and they completed the task alone in separated computer cubicles.

Procedure. Participants were asked to be part of a study on decision making and were seated at a computer cubicle. In the distant and near conditions for Study 1a, participants were asked to write about purchasing a car next year or tomorrow, respectively, for 3 min (Förster et al., 2004). In the distant and near conditions for Study 1b, participants were asked to write about buying a car far away (in Portland, Oregon) or locally (in Ithaca, New York). Participants were explicitly told that the writing task was given to them so that they could “prepare for the upcoming decision task involving cars.” In the control condition, due to the difficulty of designing a task that was neither near nor distant, participants did not engage in a writing task prior to reading about the cars. Participants then read 12 pieces of information each about four different cars in random order for 7 s per piece of information on a computer screen. Thus, each participant had to process a great amount of information, 48 pieces of information total, within a short time frame in order to decide among the four choices. Before participants read about the four cars, they were informed that they would be asked to decide which car was best after they were done reading all of the information.

After reading about the four cars, participants were then asked to write down which car they thought was the best. Additionally,

[2] Consistent with the recommendation of Simmons, Nelson, and Simonsohn (2011), our decision rule was to have at least 20 participants per cell. Thus, at the end of each week of conducting each experiment in all of the studies reported in this article, we stopped collecting new data when all cells contained at least 20 people.

in Study 1b, after participants decided which car was best, they were given a list of all 12 features and were asked to indicate which cars were positive or negative on each feature. We were interested in investigating the possibility that the distant condition would increase short-term memory capacity, particularly for central features, and enable people to determine which car was best. Conversely, the near manipulation might have weakened memory capacity and encouraged memory of the peripheral features, thus making it more difficult for people to determine which car had positive central features.

Results

Two participants' data were eliminated from the analysis in Study 1a because they reported knowing about CLT research. As predicted, distance led to better decision making in the two studies. In Study 1a, participants in the distant condition chose the best car more often (69%) than participants in the control and near (39% and 40%, respectively) conditions, $\chi^2(2, N = 84) = 6.38$, $p = .04$ (see Figure 1). Participants in the distant condition chose the best option significantly more often than participants in either the control, $\chi^2(1, N = 57) = 5.06$, $p = .02$, or near, $\chi^2(1, N = 56) = 4.51$, $p = .03$, conditions. Similarly, in Study 1b, participants in the distant condition chose the best car more often (69.0%) than participants in the control or near (38.5% and 36.8%, respectively) conditions, $\chi^2(2, N = 74) = 6.87$, $p = .03$. Again, participants in the distant condition chose the best option more often than participants in the control, $\chi^2(1, N = 48) = 4.8$, $p = .03$, or near, $\chi^2(1, N = 55) = 5.15$, $p = .02$, conditions.

In Study 1b, participants indicated if each car was positive or negative on all 12 features (e.g., "Did the Dubasi have good handling?"). There were no differences in memory of all the features across condition, $F(2, 72) = 0.74$, $p = .48$, and there were no differences in memory of the features by condition depending on whether the features were central, $F(2, 72) = 0.02$, $p = .98$, or peripheral, $F(2, 72) = 1.30$, $p = .28$. Thus, improvements in decision making due to psychological distance do not appear to be caused by better memory for specific information. Across conditions, although participants were reporting memory for specific features statistically above chance ($Z = 4.19$, $p < .001$), none of the conditions yielded higher than 55% of correctly recalled information (chance = 50%), which is presumably why there was no relationship between memory of the specific information and decision outcome, $\chi^2(2, N = 74) = 0.08$, $p = .77$.

The results of both Studies 1a and 1b demonstrate that psychological distance can improve decision making under information overload. The findings also show that memory of the specific information does not appear to explain the effect. Although past research is consistent with the notion that psychological distance would aid in memory of central versus peripheral features while psychological proximity would aid in memory of specifics versus gist, the present task did not demonstrate such an effect. However, the low percentage of correctly recalled information suggests that the memory task was very difficult and that people were relying on something other than specific memory to determine the best option. In situations that involve fewer pieces of information, memory for specific information may play a larger role in decision making and psychological distance may lead to different memory outcomes of specific information. Nevertheless, we were interested in understanding how psychological distance aids in decision making in information overload situations. In subsequent studies, we sought to replicate our main effect of psychological distance and decision outcome, as well as to further examine a more specific mechanism by which psychological distance can improve decision making.

Study 2

Having established that psychological distance can significantly improve decision making under information overload, we turned to our participants, asking them what kind of memory strategy they used during the task. Furthermore, we tested whether the effect would persist when the information was presented in a more ecologically valid manner. One criticism of the decision-making

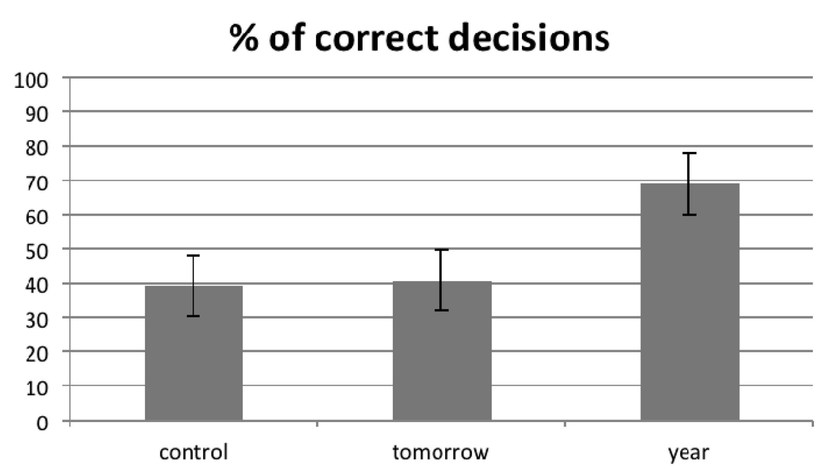

Figure 1. Results from Study 1a: Percentage of participants who chose the best car by condition. Participants who wrote about purchasing a car next year chose the best car more often (69.0%) than those who wrote about buying a car the next day (40.7%) and those in the control condition (39.3%), $\chi^2(2, N = 84) = 6.38$, $p = .04$. Error bars represent the 95% confidence interval.

paradigm used in the previous two studies is that decision makers are unlikely to come into contact with information in such a fragmented manner (e.g., Shanks, 2006). Thus, in this next study, all of the information was presented to participants simultaneously per option, and participants had as much time as they wanted to arrive at their decision. Finally, in this study, we further tested the operationalization of distance by asking people to think about a day in their recent versus distant past. This also helped to ensure that the manipulation of distance was not based on differences in the likelihood of buying a car in the near or distance future.

Method

Participants. Eighty-nine Cornell University undergraduates (57 women, 32 men) participated in this study for course credit or $5. Participants were randomly assigned to the distant, near, or control conditions, and they completed the task alone in separated computer cubicles.

Procedure. Participants in the near condition wrote for 3 min about the experiences they had during the day before the day of the experiment, and those in the distant condition wrote for 3 min about experiences they had during a day that had occurred approximately 1 year ago. Participants were explicitly told in this study that the writing task was unrelated to the subsequent decision-making task. Again, participants in the control condition did not engage in a writing task.

The subsequent information presentation differed from previous studies in that all of the information about each car was presented on its own screen. When participants decided they were done reading the information for a car, they pressed the space bar to read all of the information for the next car. The order of the cars, as well as the order of information for each car, was randomly distributed. After participants read about all four cars, they indicated which car they would buy.

Immediately following the decision-making task, participants were asked to indicate the extent to which they used different memory strategies to make their decision. Specifically, we asked, "To what extent do you feel like you used a gist impression to make your decision?" and "To what extent do you feel like you used the details of the information to make your decision?" Participants responded using a Likert scale ranging from 1 (*not at all*) to 7 (*very much*).

Results

Participants in the distant (last year) condition chose the best car 59% of the time. Their performance exceeded that of participants in the near (the previous day) and control conditions, who chose the best car 34% and 29% of the time, respectively, $\chi^2(2, N = 89) = 6.06$, $p < .05$ (see Figure 2).[3]

The self-report responses to the process questions suggest that participants in the distant condition experienced a different memory process to make their decision in terms of gist memory. Consistent with the memory data from Study 1b, an analysis of variance revealed that there were no differences across conditions in the extent to which participants felt they used the details of the information to make their decision, $F(2, 87) = 0.33$, $p = .72$. Similarly consistent with the previous data, the low means across conditions for self-reported use of specific memory (*M*s = 2.19, 2.24, and 2.41, for the control, previous day, and last year, respectively) suggest that people did not feel that they remembered the specific information well at all. In contrast, there was a difference across conditions in the extent to which participants felt they used gist processing, $F(2, 87) = 4.88$, $p < .01$. A contrast analysis showed that people who wrote about a day last year reported using gist processing ($M = 4.37$) significantly more than people who wrote about the previous day ($M = 3.14$) or people in the control condition ($M = 3.48$), $F(2, 87) = 9.20$, $p < .01$.

These results suggest that gist processing may be a potential mechanism underlying distance effects on decision-making quality. However, because people may possess different levels of access to their decision-making process and interpret questions about gist differently, in the next study we sought to measure evidence of gist memory more directly.

Study 3

Study 2 extends our earlier results by shedding light on the mechanism underlying the observed effect. Because participants in the distant condition reported using more gist processing than participants in the other conditions, in the final study we sought to measure gist processing more directly and without relying on self-reports. As previously noted, Rim et al. (2009) showed that psychological distance increases people's tendency to infer personality traits from specific behaviors. Based on this finding, we designed Study 3 so that more specific pieces of information could be grouped into broader traits.

Additionally, our hypotheses about the effects of distance on decision making under information overload all rely on the assumption that our distance manipulations changed people's construals. To provide more direct evidence for this assumption, we directly manipulated construal levels in this study, rather than manipulating distance, capitalizing on priming manipulations validated in past research (Freitas, Gollwitzer, & Trope, 2004; Fujita, Trope, Liberman, & Levin-Sagi, 2006).

Previous studies have shown that asking *why* one engages in an action activates abstract representations, whereas asking *how* one engages in an action activates concrete representations (Freitas et al., 2004; Vallacher & Wegner, 1987). Thus, we manipulated abstract, high-level construals by having people write about why people buy cell phones versus how people buy cell phones. Abstraction maps on to distance such that people describe distant events more abstractly, while people describe near events more concretely (Fujita et al., 2006; Liberman & Trope, 1998). Conversely, abstract manipulations lead people to judge a target as more distant (Liberman, Trope, McCrea, & Sherman, 2007).

We hypothesized that gist processing (measured by memory of the traits) is the proximal cognitive process by which an abstract, high-level construal promotes decision making under information overload and that gist processing would mediate the relationship between abstraction and decision outcome.

[3] There were no differences in completion time among conditions, $F(2, 87) = 0.22$, $p = .80$. The effect of condition on decision quality was reliable even when time was controlled, $\chi^2(2, N = 89) = 6.09$, $p < .05$.

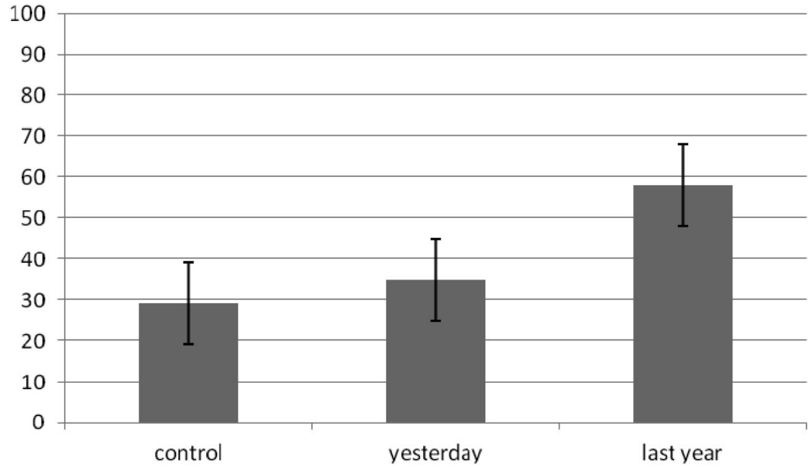

Figure 2. Results from Study 2: Percentage of participants who chose the best car by condition. Participants who wrote about a day 1 year ago chose the best car more often (58.6%) than those who wrote descriptions of the previous day (35.7%) and those in the control condition (29.0%), $\chi^2(2, N = 89) = 6.06$, $p < .05$. Error bars represent the 95% confidence interval.

Method

Participants. Forty-four Cornell University undergraduates (27 women, 17 men) participated in this study for course credit.

Procedure. Participants were seated in front of a computer. We manipulated abstraction by having people write for 3 min about why people purchase cell phones or how people purchase cell phones. As in Studies 1a and 1b, participants were informed that the writing task was designed to prepare them for the subsequent tasks. Participants then read about a recent product survey that found that consumers in the market for a cell phone are most interested in a phone's compactness, durability, ease of use, camera quality, battery life, memory, and music options. These were the six phone "traits" that characterized 12 more specific pieces of information (e.g., the pieces of information that indicated size and weight map onto the trait of compactness). Thus, each trait corresponded to two specific pieces of information.

Participants read about three phones and 12 pieces of information per phone in random order for 7 s per piece of information. One of the phones was the best in terms of four of the six categories while the worst phone was the worst in four of the six categories. The middle phone ranked between the other two phones in all six categories.

Immediately after viewing all of the information, participants completed the measurement of gist memory. Namely, they were asked to indicate which phone was best for each of the traits that we had previously brought to their attention. For example, we asked participants, "Which phone is the most compact?" and "Which phone is the most durable?" After completing the six trait questions, participants were then asked to indicate which phone they would purchase.

Results

One participant's data were incomplete due to a computer malfunction and were excluded from the analyses. Replicating the past three studies, participants in the why condition were significantly more likely to choose the best phone (86%) than participants in the how condition (57%), $\chi^2(1, N = 43) = 4.56$, $p = .03$.

Gist memory was determined from the responses to the six trait questions. We calculated the mean for gist memory by assigning 1 point for choosing each correct answer, 0 for choosing the next best phone for that category, and –1 for choosing the worst car for that category and then averaging the score across the six categories. Participants in the abstract (why) condition had better gist memory (i.e., correctly answered more of the trait questions, $M = 3.91$) than participants in the concrete (how) condition ($M = 2.67$), $t(41) = 4.58$, $p < .04$. It is important to note that this effect was not driven by participants in the why condition, which shows general positivity toward the best phone as participants in the why condition were also marginally better at recognizing the two categories in which the best phone was actually the worst, $t(41) = 3.26$, $p = .08$.

Next we tested our hypothesis that the effect of abstraction on decision outcome is mediated by gist memory. In order to test this possibility, we conducted a meditational analysis (Baron & Kenny, 1986). As can be seen in Figure 3, although abstraction predicted decision outcome and gist memory, we found that the effect of abstraction on decision outcome was no longer significant when controlling for gist memory, Sobel $Z = 1.65$, $p = .04$.

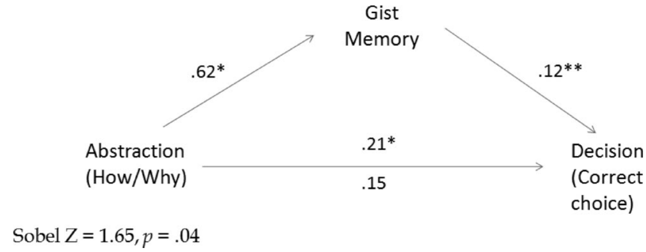

Figure 3. Mediational pathway for Study 3. Gist memory mediated the relationship between abstraction and decision outcome.

General Discussion

Across four studies, we demonstrated that psychological distance improved decision making in an information overload situation. This robust effect occurred with temporal (Studies 1a and 2) and spatial (Study 1b) distance and with abstraction (Study 3); it persisted regardless of whether the manipulation was linked with the decision context (Studies, 1a, 1b, and 3) or not (Study 2). In addition, the distance effect was reliable when information was presented piece by piece (Studies 1a, 1b, and 3) as well as when information was presented more naturalistically as a complete list of features for each choice (Study 2; see Usher et al., 2011).

The findings also demonstrated that psychological distance improved decision making via gist memory, such that those in the distant mindset were more likely to show greater organization of the related specific features (via the traits) compared with those in the near and control conditions. The effect was not due to increased memory for specific features or for central versus peripheral features.

Because accessibility of gist has been shown to increase with the actual passing of time (e.g., Reyna & Kiernan, 1994), psychologically induced distance may serve as a proxy for the actual passage of time and afford all the same benefits of extracting the gist from a large set of information. That people in our control conditions performed virtually the same as people in the near conditions suggests that people may enter an information-overload situation with a psychologically near mindset (indeed, the information overload may induce a low-level construal). Thus, psychological distance should be helpful to decision makers under information overload in a variety of situations.

A potential alternative explanation for our findings is that the distance and abstraction manipulations are leading to different decision outcomes due to possible differences in effort involved with the manipulations. For example, it may be more effortful to think about a day in the distant past compared to thinking about yesterday. However, extensive past work on psychological distance has shown no differences in effort or difficulty between distant/abstract and proximate/concrete manipulations (e.g., Fujita, Eyal, Chaiken, Trope, & Liberman, 2008; Henderson et al., 2006; Smith & Trope, 2006; Wakslak et al., 2006).

One limitation of our findings is that we have no data that speak to how psychological distance affects online processing of information since we only measured memory after people completed reading about the different options. Just as more organized and simpler presentations of information affect information processing and improve decision outcomes (e.g., Johnson, Payne, & Bettman, 1988; Moorman, 1990), we believe that psychological distance is affecting people's decision outcomes throughout the information presentation stage and not simply at the retrieval process. However, more research would be needed to confirm this hypothesis.

Although our findings appear to be highly reliable, it is important to consider situations in which psychological distancing may not improve decision making under information overload. As previously discussed, psychological distance has been shown to increase people's tendency to misremember information that is consistent with, but not exactly the same as, the information they were actually presented. This effect occurred even though people were explicitly told that the point of the task was to correctly recall what they had actually seen (e.g., Smith & Trope, 2006). Therefore, psychological distancing may not be beneficial to decision makers when it is necessary to remember the details of given information.

Due to the robustness and potential applicability of this effect in the real world, we are interested in demonstrating that psychological distance can be used as intervention for improving decision making. Decision aids in the judgment and decision-making literature are notoriously modest in their ability to lead to real improvements (for a review, see Milkman, Chugh, & Bazerman, 2009). We are currently investigating if the effect of psychological distance on decision making persists even when people are told about the manipulation and its intended effects. Thus, when confronting a decision with many pieces of information, people may improve their decision outcome by self-inducing psychological distance.

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