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Pre-Crastination: Hastening Subgoal Completion at the Expense of Extra Physical Effort

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Abstract

In this article, we describe a phenomenon we discovered while conducting experiments on walking and reaching. We asked university students to pick up either of two buckets, one to the left of an alley and one to the right, and to carry the selected bucket to the alley's end. In most trials, one of the buckets was closer to the end point. We emphasized choosing the easier task, expecting participants to prefer the bucket that would be carried a shorter distance. Contrary to our expectation, participants chose the bucket that was closer to the start position, carrying it farther than the other bucket. On the basis of results from nine experiments and participants' reports, we concluded that this seemingly irrational choice reflected a tendency to *pre-crastinate*, a term we introduce to refer to the hastening of subgoal completion, even at the expense of extra physical effort. Other tasks also reveal this preference, which we ascribe to the desire to reduce working memory loads.

Keywords

planning, procrastination, reaching, walking

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Unless you have put it off for a long time, you know that procrastination is the tendency to delay tasks. Less well known, and even missing a term in English, is the opposite of procrastination—what we call *pre-crastination*. We define pre-crastination as the tendency to complete, or at least begin, tasks as soon as possible, even at the expense of extra physical effort.[1]

You might expect pre-crastination to show up in only a small proportion of people. We were surprised, therefore, to discover an overwhelming tendency to pre-crastinate in the 257 university-student participants we tested in the nine experiments reported here. When we consulted with colleagues about our finding—many of whom are renowned experts in fields as diverse as self-control, prospective memory, and metacognition—all of them confirmed that this is a new phenomenon, which nonetheless can be understood through the lens of other established facts in psychological science.

We embarked on this study to get a better understanding of the evaluation of different kinds of costs in action planning. This topic has been pursued by behavioral ecologists, who have developed models of such things as the probability that male birds forage for food or sing for sex (Cuthill & Houston, 1997). Much less attention has been paid by psychological scientists to analogous "apples-and-oranges" problems. However, one of us (Rosenbaum, 2012) approached this problem by predicting the probability that participants would walk some distance or reach some distance. It was possible to predict the likelihoods of the relevant behaviors when the cost of leaning to reach over some distance was set to 11 times the cost of walking over that same distance.

The present study shifted the focus from leaning versus walking to carrying versus walking. We wondered how willing participants would be to carry a light load a

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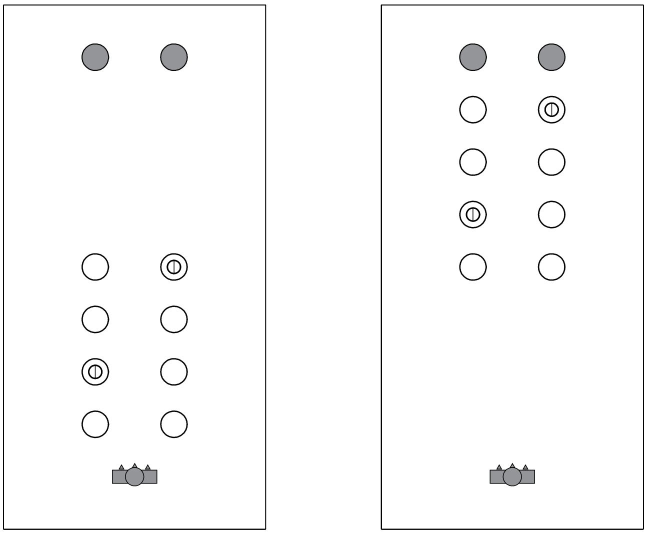

Fig. 1. Schematic diagrams of the setups used in Experiments 1, 2, 3, 6, 8, and 9 (left panel) and Experiments 4 and 5 (right panel). A participant, shown in cartoon form at the bottom of both panels, faces the alley at the start position. The filled gray circles at the top of each panel represent the two target platforms. The empty circles represent the possible bucket platforms, one to the left and one to the right on each trial. In these examples, the buckets in the left panel are at left and right approach distances of 4 feet and 8 feet, respectively, and left and right carrying distances of 12 feet and 8 feet, respectively, and the buckets in the right panel are at left and right approach distances of 10 feet and 14 feet, respectively, and left and right carrying distances of 6 feet and 2 feet, respectively.

long distance versus a heavy load a short distance. Prior to addressing this question (which we pursued in the ninth experiment of this study), we decided to conduct an experiment just to check that participants would carry a load of some weight a short distance rather than another load of the same weight a long distance. To our surprise, we found that participants did the opposite: They precrastinated, picking up the load that was closer to them rather than the load that was farther away, thereby carrying the chosen load over a longer path. In this article, we describe and provide a theoretical interpretation of this astonishing phenomenon, which reflects a tendency that may be more widespread than we first imagined.

Experiments 1, 2, and 3

Method

The objects to be carried were two plastic beach buckets. Participants hefted the buckets at the start of every experiment, getting useful haptic information about the buckets (Turvey, 1996). In Experiment 1, each of the two buckets was empty. In Experiment 2, each of the two buckets held 3.5 pounds (1.59 kg) of pennies. In Experiment 3, each of the two buckets held 7 pounds (3.18 kg) of pennies. In each of the three experiments, we varied where the two objects were positioned relative to the participants' start position (Fig. 1, left panel). Given that the targets were a fixed distance away (16 feet, or 4.88 m), we therefore varied the carrying distances (CL and CR for the left and right buckets, respectively) in addition to the approach distances to the buckets (AL and AR for the left and right buckets, respectively).

Participants stood at one end of a 3-foot- (0.91-m-) wide alley facing the two buckets, which occupied waist-high platforms to the left and right of the alley and stood 2 feet (0.61 m), 4 feet (1.21 m), 6 feet (1.83 m), or 8 feet (2.44 m) from the start position. The two target platforms were identical to the ones on which the buckets stood. Participants were asked to walk down the alley without stopping and to do whatever seemed easier—pick up and carry the left bucket to the far left platform with the left hand, or pick up and carry the right bucket to the far right platform with the right hand. To make sure participants understood the task, we asked them to paraphrase the instructions. We let them start the trials only when it was clear they understood what we wanted them to do.[2]

The foot of the alley was marked by a masking-tape T (not shown in Fig. 1) whose stem extended out from the alley. Participants were instructed to place their feet on either side of the T's stem at the start of each trial, putting their toes against the T's top.

The buckets were two bright yellow plastic beach pails, each standing on its own circular platform to the left or right of the alley. On each trial, each bucket's dark-blue handle stood upright and was oriented perpendicular to the long edge of the alley. The buckets were 5 in. (12.7 cm) high, with bases 4 in. (10 cm) in diameter and tops 7 in. (17.8 cm) in diameter. The buckets stood on the centers of the circular platforms, which were 24 in. (0.12 m) high and 36 in. (0.91 m) in diameter. Every possible left-bucket distance was paired with every possible right-bucket distance for each participant. The resulting 16 pairs were tested once per participant in a random order.

Before each trial, the participant stood beyond the start position of the alley, facing away from the alley, while the experimenter set up the tables and buckets. When the experimenter moved off to the side, he or she called out "OK," whereupon the participant turned around, placed his or her feet as described above, looked up, and proceeded to do whichever task seemed easier—walking along and, without stopping, picking up the left or right bucket with the left or right hand, respectively, and carrying the chosen bucket to its respective target platform. After carrying the selected bucket to its target, the participant turned around and walked back to the start position, facing away until the experimenter said "OK" again.

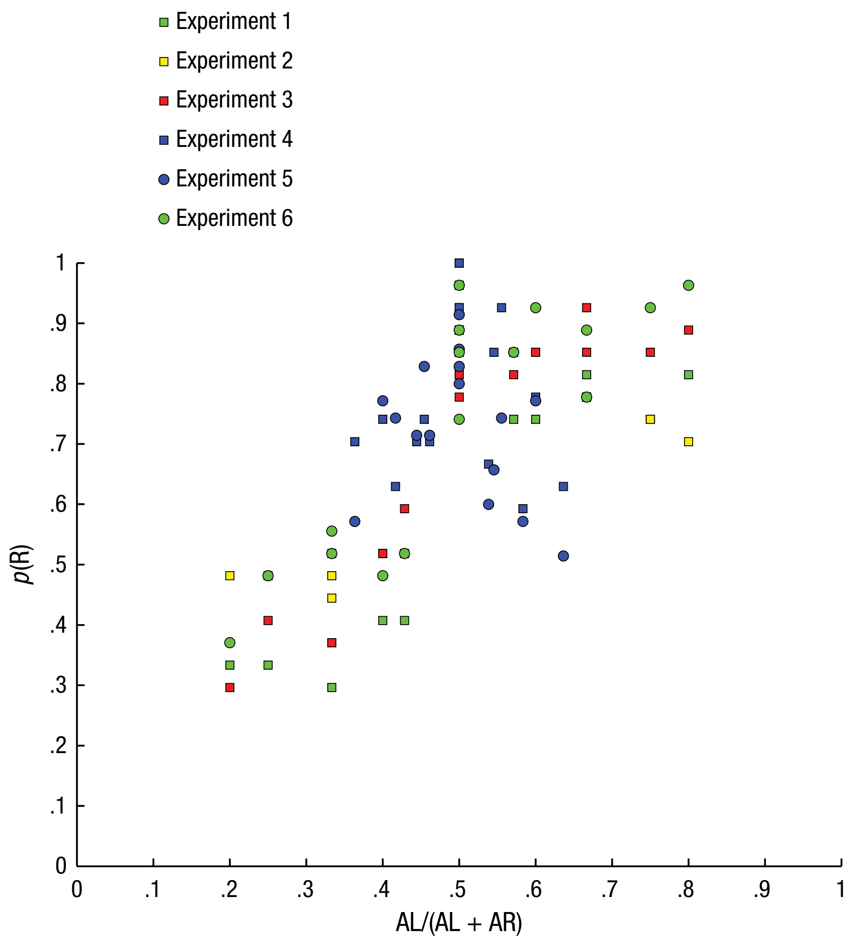

Fig. 2. Results from Experiments 1 through 6: probability, p(R), of choosing to carry the bucket on the right side of the alley as a function of the approach distance to the left bucket (AL) divided by the sum of that approach distance and the approach distance to the right bucket (AR).

At the end of the 16 trials, there was a debriefing session. During debriefing, the experimenter invited the participant to comment on the task—how hard or easy it was, any concerns he or she had about the procedure, and, if the participant did not indicate why he or she made the choices he or she did, what the basis for those choices was.

Groups of 27 participants each took part in Experiments 1, 2, and 3. At least 90% of the participants were right-handed in each experiment, according to their scores (7 or higher out of 10) on the short form of the Edinburgh Handedness Inventory (Oldfield, 1971). This preponderance of right-handedness was true of our samples in all subsequent experiments, so handedness will no longer be discussed. Each of the participants tested in this series of experiments was tested in only one experiment. All of the participants were Pennsylvania State University students who took part in return for course credit. The experiments were approved by the Pennsylvania State University Institutional Review Board.[3]

Results

We expected participants to select the bucket that had to be carried a shorter distance or, equivalently, given the design of Experiments 1 through 3, that had a longer approach distance. As seen in Figure 2, we got the opposite result. The probability, p(R), of picking up the right bucket grew with AL/(AL + AR). So, the greater the approach distance to the left bucket relative to the approach distance to the right bucket (or the sum of the two approach distances), the greater the chance that participants selected the right bucket. Quantifying this result, in Experiments 1, 2, and 3, the Pearson product-moment correlation (r) between p(R) and AL/(AL + AR) was .75, .66, and .85, respectively (all ps $< .01$), with no significant difference between any of the three *r* values (all *p*s > .2, Fischer's *z*, two-tailed). The *p*(R) values for the equal-distance cases, AL/(AL + AR) = .5, fell on the general trend line but with a bump, reflecting the right-hand bias we expected to see in our mainly right-handed participants.

Summing up Experiments 1 through 3, participants chose the bucket that had a shorter approach distance or—equivalently, but surprisingly—a longer carrying distance. This effect did not depend on bucket weight within the range tested. During debriefing, virtually all participants said, in effect, "I wanted to get the task done as soon as I could." This same remark was made in all of the subsequent experiments in which the bucket weights were equal (Experiments 1–8). Consequently, this aspect of the debriefing will not be repeated for those experiments.

Experiment 4

In the fourth experiment, we checked the reliability of the relation between *p*(R) and AL/(AL + AR) by testing the prediction that the range of *p*(R) values would be smaller if the range of possible AL/(AL + AR) values were compressed relative to what they were in the first three experiments. As seen in the right panel of Figure 1, we achieved this compression in the fourth experiment by simply moving the possible bucket positions forward 6 feet (1.83 m) while keeping the target bucket positions where they were before, 16 feet (4.88 m) from the start position. The range of possible values of AL/(AL + AR) therefore shrank from .20 to .80 in Experiments 1 through 3 to .36 to .64 in Experiment 4.

Method

The method was identical in all respects to that of Experiment 1, except for the forward shift of the bucket positions. A new group of 27 Pennsylvania State University students took part.

Results

The *p*(R) data from Experiment 4 are included in Figure 2. As in Experiments 1 through 3, *p*(R) grew with AL/(AL + AR), and, as predicted, its growth was smaller in Experiment 4 than in Experiments 1 through 3. In Experiment 4, the Pearson product-moment correlation (*r*) between *p*(R) and AL/(AL + AR) was .04 ($p > .2$, Fischer's *z*, two-tailed). This value was significantly different from the *r* value in each of the first three experiments (*p*s < .02, Fischer's *z*, two-tailed).

The main result of Experiment 4, then, was that compressing the range of AL/(AL + AR) values narrowed the range of obtained *p*(R) values, as predicted by the hypothesis that participants would choose a bucket by considering its relative approach distance.

Experiments 5 and 6

Although participants did not minimize carrying distance in Experiments 1 through 4, it does not follow that they were oblivious to the physical demands of the task. One possibility is that they planned with respect to the difficulty of hand-foot coordination.

Lifting an object while standing can be done more easily while standing on the foot ipsilateral to the lifting hand than while standing on the foot contralateral to the lifting hand (Carnahan, McFadyen, Cockell, & Halverson, 1996). When one walks, one's hands and feet normally move in a contralateral (anti-phase) rather than ipsilateral (in-phase) fashion. Consequently, preparing to pick up an object while walking can require a change in the phase relation of the hands and feet. Such a change of phase relation would likely have been more challenging during approaches to the far targets of Experiments 1 through 3, when one was likely to be walking quickly, than during approaches to the near targets, when one was likely to be walking more slowly. Consistent with this expectation, van der Wel and Rosenbaum (2007) found that it is easier to adjust the leading foot for a walk to a near to-be-lifted object than for a walk to a far to-be-lifted object. The hypothesis, then, is that participants in Experiments 1 through 3 may have selected the nearer object because they appreciated that this would take less "fancy footwork" than selecting the farther object.

Some preliminary evidence against this hypothesis might be taken from Experiment 4. In that experiment (see the right panel of Fig. 1), the nearest buckets were reached well into the walk down the alley, when participants were likely to be walking relatively quickly, but the farthest buckets were reached near the end of the alley, when participants were likely to be slowing down. If the likelihood of taking a bucket depended on walking speed, which in turn would have affected the ease of changing the hand-foot phase relation, we would have seen a strong far-bucket preference in the fourth experiment. We did not see such a far-bucket preference in that experiment, however, so this outcome is inconsistent with the hand-foot-coordination hypothesis. Still, we did not explicitly record walking speed, which is a limitation of our procedure that we freely acknowledge. We therefore sought another test of the hand-foot-coordination hypothesis.

Method

In Experiments 5 and 6, our participants sat in a wheelchair. The bucket positions in Experiment 5 were the same as in Experiment 4, and the bucket positions in Experiment 5 were the same as in Experiment 1. Except for the wheelchair, the conditions in Experiment 5 and 6 were the same as in Experiments 4 and 1, respectively.

The wheelchair (Grainger 4EKE3, Grainger, Lake Forest, IL; armrests removed) was pushed by Pennsylvania State University students, all of whom were naïve to the hypothesis. At the beginning of each trial, participants in the wheelchair were asked to keep their eyes closed while the experimenter set up the buckets. The students who pushed the wheelchair were asked to push it in a straight path down the center of the alley at a steady rate that would allow the participant to pick up whichever bucket he or she wanted. We did not formally monitor the wheelchair positions over time, although we were aware that a "Clever Hans" phenomenon might apply here: The person pushing the wheelchair might subtly bias the actual participant's choices. We cannot rule out this possibility, though we realized that we could potentially have done so by using extreme measures such as depriving our "pushers" of visual, auditory, and kinesthetic feedback about their whereabouts in the alley. We decided not to do this. Instead, we reasoned that the simplest way to interpret a close-bucket preference for wheelchair-driven participants would be unrelated to hand-foot coordination. If the close-bucket preference were replicated with the wheelchair, that outcome would argue against the hand-foot-coordination hypothesis.

Procedurally, the method was generally the same as in the earlier experiments. After the participant set the selected bucket on its target platform, the wheelchair was pulled back to the start position, whereupon the participant was asked to close his or her eyes while the experimenter (not the pusher) set things up for the next trial. Two different groups of 35 Pennsylvania State University students each participated in Experiments 5 and 6, respectively. We tested more participants in these experiments than in the other experiments because of the departure from the already-used procedure for which we had a lot of prior information about the number of needed participants.

Results

The p(R) data from Experiments 5 and 6 are included in Figure 2 to show how comparable they are to the other data. The data from the two wheelchair experiments were in line with the data from the earlier walking experiments. The Pearson product-moment correlation (r) between p(R) and AL/(AL + AR) was −.25 ($p > .4$) in Experiment 5 and .85 ($p < .001$) in Experiment 6. The difference between the Pearson product-moment correlations for Experiment 5 ($r = -.25$) and Experiment 4 ($r = .04$), its analogous walking experiment, was not significant (ps > .4). Hence, Experiment 5 replicated Experiment 4. The same was true of the difference between the Pearson product-moment correlations for Experiment 6 ($r = .85$) and Experiment 1 ($r = .75$), its analogous walking experiment ($p > .5$, Fischer's z, two-tailed). Hence, Experiment 6 replicated Experiment 1. Overall, participants who sat in a wheelchair showed the same pattern of choices as did participants who walked in the corresponding experiments. This outcome is inconsistent with the hypothesis that participants chose the near bucket because of concerns about hand-foot coordination.

Experiment 7

In all of the experiments described so far, when approach distance was short, carrying distance was long, and vice versa. This left open the possibility that participants actually preferred long carrying distances to short carrying distances.

Method

To test this hypothesis, in Experiment 7, we decoupled approach and carrying distances, assigning all possible pairs of 2 feet (0.61 m) and 8 feet (2.44 m) to AL, AR, CL, and CR, yielding 16 conditions, as before. In all other respects, the method was identical to that of Experiment 1. Twenty-seven Pennsylvania State University students participated.

Results

The choice data from Experiment 7, shown in Figure 3, did not support the hypothesis that participants preferred long to short carrying distances. The Pearson product-moment correlation (r) between p(R) and the ratio of the carrying distances, CL/(CL + CR), was not statistically significant ($r = .38$, $p > .1$), although the correlation between p(R) and the ratio of the approach distances, AL/(AL + AR), was highly significant ($r = .80$, $p < .001$). This outcome accords with the hypothesis that participants preferred short to long approach distances.

Participants in Experiment 7 also favored short total distances, contrary to the view that all they cared about was approach distances. The reason we show the p(R) data from Experiment 7 in a new figure (Fig. 3) is to plot p(R) both as a function of AL/(AL + AR), as in Figure 2, and, separately, as a function of PDL/(PDL + PDR), where PDL = (near bias × AL) + CL, and PDR = (near bias × AR) + CR, with the value for the near-bias term set to 3, an empirically fit constant designed to maximize goodness of fit. The Pearson product-moment correlation (r) between p(R) and PDL/(PDL + PDR) was .88. This correlation was not significantly better than $r = .80$ for p(R) versus AL/(AL + AR), but we think the improvement is informative for suggesting that total distance, and not just

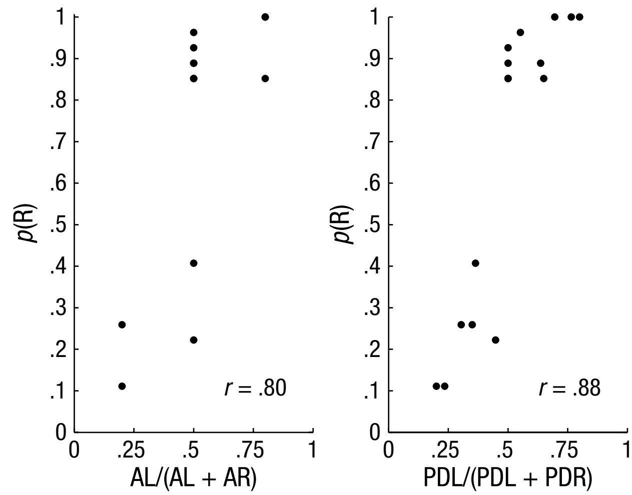

Fig. 3. Results from Experiment 7: probability, *p*(R), of choosing to carry the bucket on the right side of the alley as a function of AL/(AL + AR), where AL is the approach distance to the left bucket and AR is the approach distance to the right bucket (left panel), and as a function of PDL/(PDL + PDR), where PDL is the product of the near-bias term and AL plus the left-bucket carrying distance, and PDR is the product of the near-bias term and AR plus the right-bucket carrying distance (right panel).

approach distance, entered into participants' decisions. It is especially interesting that goodness of fit was maximized by setting the near-bias term to a value that implied approach distance was three times more important than carrying distance in defining the psychological representation of the total distance.

Experiment 8

The eighth experiment was designed to test the hypothesis that the source of the close-object preference was attention. According to the attention hypothesis, participants may have been attracted to the nearer object, grabbing it without considering the farther object because their attention was grabbed by the object that was closer at hand. It is well known that attention to objects can beckon action toward them (Tipper, Lortie, & Baylis, 1992).

Method

To test the attention hypothesis, we put a large computer monitor (32-in. Philips Model 32PFL4507/F7, Koninklijke Philips N.V., Amsterdam, The Netherlands) at the end of the alley and asked participants to pay attention to the monitor at the start of each trial. Twenty-eight Pennsylvania State University students participated. The experimental conditions and procedure were the same as in Experiment 1, but the participants in this experiment were asked to watch the monitor after positioning themselves at the start position. Once the experimenter saw that the participant had placed his or her feet in position and looked up at the monitor, which was centered between the target platforms and 1.5 feet (0.46 m) beyond the platforms, he hit a computer key that caused the word "WAIT" to appear on the monitor.

For odd-numbered participants, the word "WAIT" remained on-screen for 2 s. For even-numbered participants, the word "WAIT" remained on-screen for 4 s. After the "WAIT" signal disappeared, the word "OK" appeared, indicating that the participant could complete the task. The "OK" signal remained on the screen until the chosen bucket was placed on its respective target platform. Participants were asked to perform in a leisurely way, as in the previous experiments, and were told that they could enter the alley any time they wished after the "OK" signal appeared, but not before.

Our rationale for placing the screen at the end of the alley was to get participants to look down the alley so they would see the far as well as the near bucket. Our rationale for showing the word "WAIT" for 2 or 4 s was to discourage participants from impulsively initiating their excursion into the alley. We reasoned that if the attention hypothesis was correct, the close-bucket preference would be weaker in this experiment than in the others and would also be weaker in the 4-s wait condition than in the 2-s wait condition.

Results

The data from Experiment 8 are shown in Figure 4, where *p*(R) is plotted as a function of AL/(AL + AR), but with results for the 2-s and 4-s wait times shown separately. Replicating what we found before, *p*(R) increased with AL/(AL + AR). Therefore, the close-object preference was replicated even though participants were asked to direct attention to the screen beyond the end of the alley. The range of *p*(R) values in Experiment 8 was remarkably similar to the range of *p*(R) values in Experiments 1 through 6. There was also no difference between the 2-s- and 4-s-wait groups. For both groups, the Pearson product-moment correlation (r) between *p*(R) and AL/(AL + AR) was .81. These results are inconsistent with the attention hypothesis.

Experiment 9

The results of Experiments 1 through 8 indicated that participants cared more about picking up the bucket that had the shorter approach distance than they did about the physical effort associated with carrying the buckets to the targets. A reasonable concern about this conclusion is that the loads may not have been heavy enough to tax the muscle system. It is possible that

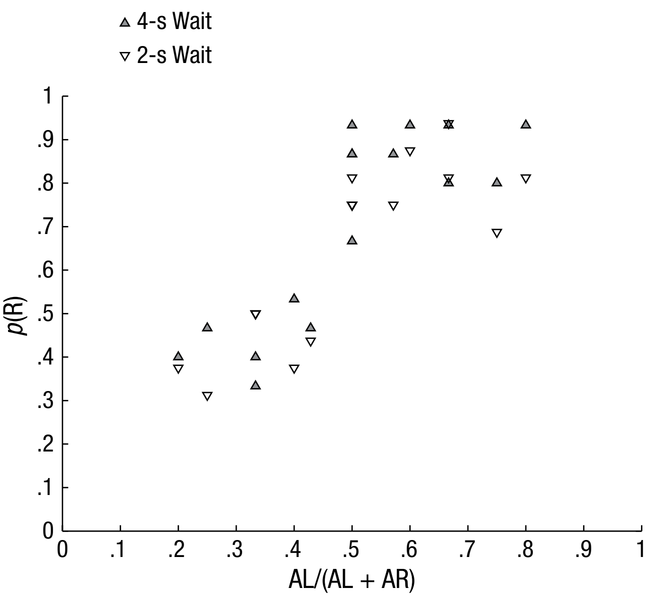

Fig. 4. Results from Experiment 8: probability, *p*(R), of choosing to carry the bucket on the right side of the alley as a function of the approach distance to the left bucket (AL) divided by the sum of that approach distance and the approach distance to the right bucket (AR) and the number of seconds (2 vs. 4) participants awaited a visual "OK" signal on a screen at the end of the alley.

participants judged the physical demands of the tasks to be too low to outweigh the cognitive demands. Alternatively, participants may have been oblivious to the buckets' weight.

Method

One way to distinguish between these possibilities would have been to increase the weight of the buckets until the close-object preference went away. We decided not to take this approach, however, because we felt that such a test would be ethically unacceptable, not only to our university's institutional review board but also to us. Therefore, we did something we had not done before, even though it was inspired by the question we began with: What would happen if we paired heavy and light buckets within trials?

To address this question, we had our odd-numbered participants in Experiment 9 get the fully loaded (7-pound) bucket on the left and the empty bucket on the right, whereas we had our even-numbered participants get the empty bucket on the left and the fully loaded bucket on the right. In all other respects, the design was identical to that used in Experiments 1 through 3. We reasoned that if participants were oblivious to weight, their data would look like the data for participants in Experiments 1 through 3. However, if participants were not oblivious to weight, their data would reflect a preference for the light bucket, and the pre-crastination effect would be weakened or perhaps even eliminated. We tested 24 Pennsylvania State University students to find out.

Results

As seen in Figure 5, participants for whom the heavy bucket was on the left and the light bucket was on the right favored the right (light) bucket. Conversely, participants for whom the heavy bucket was on the right and the light bucket was on the left favored the left (light) bucket. The difference between the *p*(R) values for the two groups was highly significant ($p < .01$, two-sample *t* test, two-tailed). Overall, participants chose the light bucket 70% of the time, a rate that differed significantly from chance, 50% ($p < .001$, one-sample *t* test). Only one participant out of all 24 participants did not favor one weight over the other; that participant chose the light bucket eight times and the heavy bucket eight times. Of the remaining 23 participants, 22 favored the light bucket over the heavy bucket. The one participant who always chose the heavy bucket told us she was a personal trainer who enjoyed weight lifting.

In contrast to the significant effect of weight, there was not a significant effect of side or approach distance. The overall probability of choosing the right bucket rather than the left bucket was .60, which did not differ significantly from chance, .50 ($p > .2$, one-sample *t* test). The overall probability of choosing the closer bucket was .54, which also did not differ significantly from chance ($p > .2$, one-sample *t* test).

Interestingly, despite these results, there still was a hint of the close-bucket preference in the heavy-left-bucket group. The Pearson product-moment correlation between *p*(R) and AL/(AL + AR) was not significant for the heavy-right-bucket participants ($r = .08$), who favored the light left bucket at a rate that did not depend on the two approach distances. On the other hand, the Pearson product-moment correlation between *p*(R) and AL/(AL + AR) was significant for the heavy-left-bucket participants ($r = .62$, $p < .05$), who generally preferred the light right bucket but were less likely to pick it up if the heavy left bucket had a shorter approach distance. These participants, ironically, were willing to use the left hand to carry a heavy object if it was nearby and had to be carried further!

These results show that participants were not oblivious to weight. The pre-crastination effect, as reflected by a preference for the close bucket, was eliminated when the heavy bucket was on the right but not when it was on the left. Participants therefore made their choices on the basis of weight, proximity, and laterality.

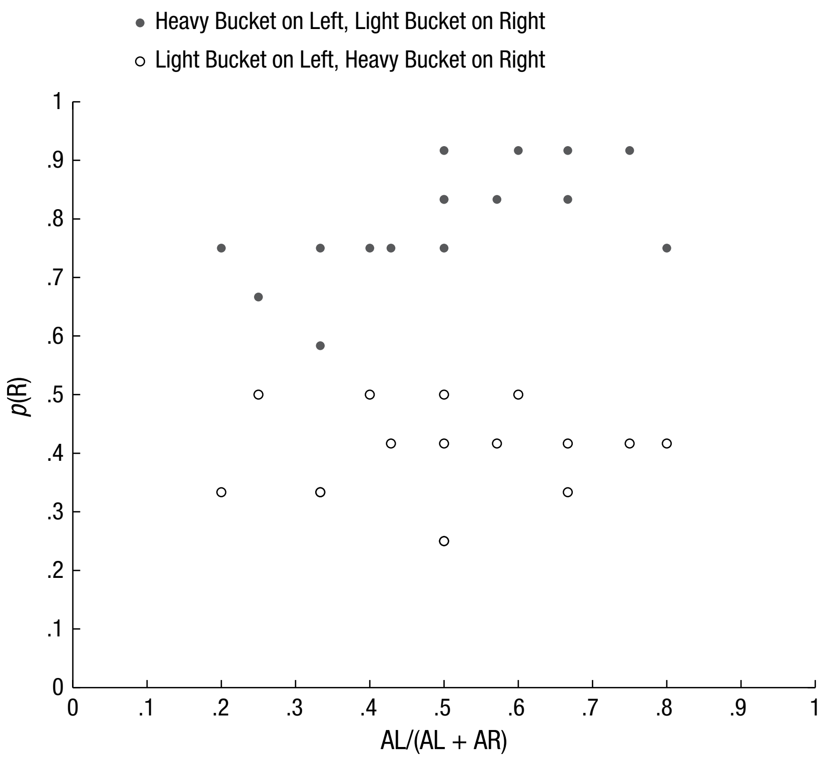

Fig. 5. Results from Experiment 9: probability, *p*(R), of choosing to carry the bucket on the right side of the alley as a function of the approach distance to the left bucket (AL) divided by the sum of that approach distance and the approach distance to the right bucket (AR), and as a function of which bucket was heavy.

General Discussion

The present series of experiments followed up earlier research on walking and reaching and began with an innocent question: Would people naturally prefer to pick up an object that could be carried a short distance rather than an object that would have to be carried a long distance? To our amazement, we found this was not the case. Participants chose to carry a near bucket rather than a far bucket to the end of the alley. Carrying the near object meant carrying it over a longer distance, the opposite of what one would expect if one thought participants would minimize their physical effort. Instead, results from the series of experiments we conducted suggest that there was a strong close-object preference that was not due to a desire to maximize the distance an object was carried (Experiment 7), to a concern about hand-foot coordination (Experiments 5 and 6), to simple attention grabbing by the closer object (Experiment 8), or to disregard for object weight (Experiment 9).

So what accounts for the close-object preference? Were our participants simply being irrational, grabbing the "low-hanging fruit" no matter what the cost? Irrationality is a hot topic in psychological science, especially in the wake of Tversky and Kahneman's (1974) ground-breaking research that led to the field of behavioral economics (cf. Kahneman, 2011). It has been argued that irrationality (suboptimal behavior) is not seen in perceptual-motor tasks such as visually guided aiming (Trommerhäuser, 2009). That perspective might lead one to say that irrationality would not extend to a perceptual-motor task like walking and picking up an object. However, suboptimal behavior has been found in other perceptual-motor tasks (Jax & Rosenbaum, 2007; Neyedli & Welsh, 2013; van der Wel, Fleckenstein, Jax, & Rosenbaum, 2007).

Rationality and irrationality are relative terms that depend on the eye of the beholder. Is it possible in this connection that perceptual estimates of the distances to be covered were influenced by the actions that were possible, à la embodiment views of distance perception (Witt, 2011)? Was it the case that carrying distances looked shorter when approach distances were shorter, an effect perhaps mediated by object weight? We cannot rule out this possibility, but we admit that we are skeptical of it. We also feel, more generally, that appealing to an embodiment account of our results leaves open the question of why participants saw the environment as they did.

So again, what accounts for the close-object preference? If anyone could tell us, our participants could. As we mentioned before, our participants said that they chose the closer bucket to get the task done sooner. Apparently, hastening completion of the subgoal of grabbing a bucket made completion of the main goal seem closer at hand.

The desire to get closer to a goal by completing a subgoal quickly might be more the rule than the exception. Research on prospective memory shows that imposing a delay on when subjects can execute a prospective memory task leads to declines in performance on that task (Einstein, McDaniel, Manzi, Cochran, & Baker, 2000; McDaniel, Einstein, Stout, & Morgan, 2003). Recovering from task interruptions taxes cognition (van Bergen, 1968). Keeping busy (getting things done) is more appealing than doing nothing (not getting things done; Hsee, Yang, & Wang, 2010). Finally, a number of colleagues with whom we spoke volunteered that when they drive or walk places, they are more likely to make a needed turn and travel a short distance before travelling a long straight distance than they are to travel the long straight distance and then turn to complete the remaining short distance. Although the two paths lead to the same destination, the turn-first path creates the illusion of arriving sooner.[4]

Coming now to our own main goal—presenting a coherent account of the surprising phenomenon we have discovered—we can say that holding a goal in mind loads working memory and that, if there is a way to reduce that working memory load, people will do so. The urge to reduce the working memory load may be so great that people are willing to expend extra physical effort. This finding points to the great importance that psychological science can have in explaining how effort is managed, whether the effort is mental or physical.

Author Contributions

D. A. Rosenbaum and L. Gong designed the first seven experiments. L. Gong took primary responsibility for conducting and analyzing the data from the first seven experiments. D. A. Rosenbaum and C. A. Potts designed the eighth and ninth experiments. C. A. Potts took primary responsibility for conducting and analyzing the data from the eighth and ninth experiments. D. A. Rosenbaum drafted the manuscript. All authors approved the final version of the manuscript for submission.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Notes

1. The term has been suggested before, at least on the Internet. We use a hyphen to reduce the chance the word is read as "procrastination."
2. In our lab, we have conducted many experiments using "do-whatever-is-easier" instructions. The experiments have always yielded sensible results; for a review, see Rosenbaum, Chapman, Weigelt, Weiss, and van der Wel (2012). We were sure the participants in all the experiments reported here correctly understood what they were supposed to do.
3. We report Experiments 1, 2, and 3 as three separate experiments rather than one because we added weight to the buckets in Experiment 2 after obtaining the results we did in Experiment 1, and we added still more weight to the buckets in Experiment 3 after obtaining the results we did in Experiment 2.
4. Elizabeth Bjork told the first author that the late William K. Estes, the first editor of *Psychological Science*, was surprised to learn, when she asked him about this, that he had never considered walking down a long hallway from his office at Rockefeller University and then down the stairs, rather than walking immediately to the stairs that were closer to his office, going down those stairs, and then going down the long hallway that would take him to the same destination.

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