

Tempering optimistic bias in temporal predictions: The role of psychological distance in the
unpacking effect

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

People typically underestimate the time it will take them to complete tasks, even when they are familiar with the process of executing those tasks (the “planning fallacy”; Kahneman & Tversky, 1979; Buehler, Griffin & Ross, 1994). One reason that individuals may show a chronic misprediction of task completion time hinges on an incomplete conception of the steps required for task completion. Support Theory (Tversky & Koehler, 1994) suggests that “unpacking” such steps may help to attenuate the planning fallacy. Indeed, when a task is unpacked into procedural steps, people give longer task completion time estimates, and the planning fallacy is minimized (Kruger & Evans, 2004). Construal level theory (Liberian & Trope, 1998) suggests that a lower-level construal of a task (i.e., a task construed in the near-future) may also foster less optimistic predictions, akin to the underlying mechanism of unpacking a task. It is hypothesized that the effects of unpacking on task completion time will be more pronounced for near-future tasks, because the lower-level construal of such tasks emphasizes details of component steps, making them more readily available to be “unpacked” as part of the prediction process. Conversely, for distant-future events, unpacking effects should be attenuated. Further, these distance-dependent unpacking effects should depend critically on the content of steps unpacked. These hypotheses were tested in five studies. Unpacking effects on completion time estimates are attenuated for distant- relative to near-future tasks, and that this attenuation emerges as a result of an abstract conception of the steps of the task when considered in the distant future.

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Introduction

When individuals are asked how long a task might take to complete, they tend to err optimistically, in the direction of under-estimation of time required. The planning fallacy, defined by Kahneman and Tversky (1979) and empirically investigated by Buehler, Griffin and Ross (1994), differs from simple optimistic bias in that it is present even in cases where individuals have experience with the task, and can accurately recall past task completion times. That is, individuals should make predictions using completion times from past, related tasks, but instead optimistically predict for the current case: individuals know the past, but are doomed to repeat it (Buehler, Griffin & Ross, 1994; Buehler, Griffin & Peetz, 2010).

One interpretation of the planning fallacy stems from a motivational account of prediction error: predictions may be biased by preferences and desires, or by simple wishful thinking (see Kunda, 1990; Koehler & Poon, 2006; Weinstein, 1980; Kruger & Dunning, 1999; Alicke & Gorovun, 2005). For example, Koehler and Poon (2006; Study 1) asked students to rate their intentions to give blood at a later blood drive on campus. Critically, students completed a questionnaire aimed at enhancing intentions to participate (e.g., by rating support for statements such as “More Canadians should donate blood”) either before or after making estimates of how likely they were to participate in the drive. Participants who completed the questionnaire before making an estimate predicted that they were much more likely to attend the blood drive, suggesting that the questionnaire increased intentions to attend. However, these participants were no more likely to actually attend the blood drive, suggesting that even strong intentions did not ameliorate the error in prediction observed amongst control students (who completed the questionnaire after making predictions).

In support of this notion, Buehler, Griffin and Ross (1994) note that in general, when individuals make predictions, they tend to be forward-focused, using plans and motivations to make predictions of how long a task will take to be completed. Indeed, Buehler, Griffin and Ross (1994; Study 1) asked honors thesis students to predict how long before the deadline their theses would be completed. In addition, students were asked to make predictions if everything went as well as possible (an optimistic prediction), or as poorly as possible (a pessimistic prediction). Students were optimistic about the completion time of their theses 6 weeks before the project deadline, but took longer to complete the project than was implied by both their “realistic” scenario predictions and their “pessimistic” scenario predictions, suggesting that simply asking individuals to describe a worst-case scenario does not eliminate the planning fallacy. Participants who described the worst case scenario tended to discount the likelihood of it actually happening; as a result, intentions or motivations to complete the thesis farther before the deadline maintained their influence on predictions.

Individuals typically do not look back at past experience with similar events when making predictions, despite the predictive power that these instances may offer (see also Frederick, Loewenstein & O’Donoghue, 2002; Gonzalez & Zimbardo, 1985). Buehler, Griffin and Ross (1994) note that even when individuals do look at past experience when making a prediction, they have a difficult time deciding what past events are similar enough to the target task, and tend to disregard these similar past experiences (especially when they result in failure), because they feel the present case is unique in some way. As such, the planning fallacy appears to rely on a combination of ignorance of past predictive information, as well as an ignorance of possible obstacles or difficulties in task completion.

The Inside/Outside Account and the Planning Fallacy

A second, complementary interpretation of the planning fallacy focuses on what task information is attended to when making a task completion prediction. Drawing on work by Kahneman and Lovallo (1993; also, Buehler, Griffin & Ross, 1994), this account of the planning fallacy describes optimistic predictions as being made from an “inside” view; that is, task completion predictions are made while focusing on details of the case-specific plan that an individual has formed. Predictions made when adopting an inside view are likely to ignore past behavior or events in favor of seeing the current situation as unique. By contrast, if an outside view is instead adopted, focus would be placed on the broader context under which a task is performed, as well as on base rates (i.e., the previous experiences and their associated completion times). An outside view thus includes distributional information, which would be expected to encourage a more realistic, and typically more pessimistic, task completion prediction.

This hypothesis has garnered much attention in the literature. Kahneman and Tversky (1979) argue that the planning fallacy results primarily from a failure to adopt an outside perspective and examine past experiences in similar or related scenarios. When individuals fail to adopt this perspective, they tend to neglect previous failures and associated obstacles that could otherwise be used as tools to more accurate prediction. This is supported by Buehler, Griffin and Ross (1994), who suggest that “the existence of the planning fallacy implies that people typically adopt an internal perspective when predicting their own completion times” (p. 367).

Buehler, Griffin and Peetz (2010) note that when predicting task completion times, individuals tend to focus on the future (and on novel aspects of the task), not the past, despite past experience being a reliable and highly predictive source of information about future

behavior. Furthermore, while predictions are influenced by future focus, actual completion times are not. This suggests that individuals typically adopt an inside view of the task, focusing on detailed plans, instead of adopting an outside view, considering past experiences. Further, it suggests that adopting an inside or future-focused perspective does not confer any advantage in terms of reduced prediction error.

Similarly, in the domain of spending predictions, Peetz and Buehler (2009) have shown that when individuals make predictions about how much they will spend in a given week, they tend to underestimate how much they will spend, maintaining an optimistic, future-focused (inside) perspective. Individuals tend to ignore information about spending from previous weeks, which is highly predictive of spending in the current week, in favor of predicting that they will spend less and save more. However, individuals tend to overspend despite their well-intentioned motives. This work suggests that thinking about future-focused plans may encourage individuals to recognize the current situation as unique from past failures (see also Newby-Clark et al., 2000), facilitating optimism. As such, a cognitive mechanism that does not piggyback on desirability of outcome might also be critical to understanding (and ameliorating) optimistic predictions¹.

One additional conclusion that might be drawn from this work is that while adopting an outside view may reduce or eliminate prediction bias, it is quite difficult to implement this type of strategy.

¹ It might be hypothesized that simply encouraging a pessimistic focus should eliminate optimism, which could in turn reduce a reliance on future-focus in predictions. However, motivating participants to think pessimistically about a scenario does not decrease optimism associated with the outcome: when participants were asked to make task completion predictions for a school assignment that were pessimistic (i.e., a worst-case scenario; relative to optimistic or best-case scenarios, and realistic scenarios), pessimistic predictions were longer (i.e., participants predicted that they would finish closer to the deadline), but remained optimistic relative to actual completions (Newby-Clark, Ross, Buehler, Koehler & Griffin, 2000, Study 1; see Byram, 1997 for a similar finding). This work suggests that using imagined scenarios to produce more appropriate probability estimation is not enough to translate to a change in behavior, even when desire for behaving in accordance with predictions are strong.

Disarming the Planning Fallacy: Unpacking as a Prediction Aid

While there is some evidence that an outside perspective encourages a better use of distributional information, the literature is by no means conclusive on whether adoption of this perspective can be effectively manipulated (Newby-Clark, Ross, Buehler, Koehler & Griffin, 2000; Byram, 1997). Kruger and Evans (2004) argue instead that “a piece of the planning fallacy puzzle may be missing” (p. 587), given that individuals tend to be better equipped to process tasks from an inside perspective. They suggest that adopting an even more detailed inside perspective to the task might increase predicted task-completion times, drawing heavily on arguments made by Support Theory (Tversky & Koehler, 1994). The main hypothesis suggested by Support Theory is that decomposition of an event into its components increases its subjective probability, particularly when the decomposed elements are unique or dissimilar from one another (Tversky & Koehler, 1994; also Fischhoff, Slovic & Lichtenstein, 1978; Brenner & Koehler, 1999; Rottenstreich & Tversky, 1997). By “unpacking” an event, possibilities that may have been initially overlooked become more evident, and those possibilities that have already been considered are made more salient simply by being mentioned (Tversky & Koehler, 1994). For example, imagine a participant is asked to predict the probability that an individual that dies this year will die of natural causes. An unpacked version of this event might ask participants to predict after reading a list of possible causes of natural death, such as heart disease, cancer, or other natural causes. By estimating probabilities of these three sub-components, participants’ (summed) estimates of the larger bracket of “death by natural causes” increases. Indeed, it has been demonstrated that when these sub-components are unique or contextually relevant, unpacked descriptions of events produce particularly large estimates. For example, Rottenstreich and Tversky (1997) have shown that when an event is unpacked according to a relevant

characteristic (e.g., unpacking “homicide” into possible assailant categories), individuals are more likely to assess risk of homicide as more probable than when an event is unpacked by an irrelevant characteristic (e.g., unpacking “homicide” into occurrence in day versus evening). When unpacking into irrelevant characteristics, individuals are more likely to “repack” those irrelevant components, producing a holistic estimate that is smaller. This work is a first indication that the content of unpacking is particularly important to its influence on prediction.

Several demonstrations similar to the unpacking effect can be found throughout the judgment and reasoning literature. For example, decomposing a probability estimate into its components produces better-calibrated estimates relative to those obtained holistically (Hora, Dodd & Hora, 1993) and more accurate estimates of probability distributions (Henrion, Fischer & Mullin, 1993), as well as more correct responses to probability-based trivia questions (Armstrong, Denniston, & Gordon, 1975). Similarly, breaking larger problems into smaller sub-problems has been demonstrated to increase logical problem solving (Kahneman & Tversky, 1982), and validity of estimates (Arkes, Gonzalez-Vallejo, Bonham, Kung & Bailey, 2010). Unpacking environmental hazards has even increased perceived suffering of populations subjected to these hazards (Van Boven & Epley, 2003). Finally, breaking down probability estimates might actually encourage participants to consider a wider range of possible outcomes, allowing for more accurate estimates of probability (Haran, Moore & Morewedge, 2010). However, despite the success of these strategies, individuals still prefer to make holistic estimates (Morera & Budescu, 2001; Brenner & Rottenstreich, 1999), suggesting that unpacking-like manipulations may be cognitively taxing to employ, or that people regard unpacking to be of little or no help in improving the accuracy of their judgments.

Unpacking probabilities have also been demonstrated to shift diagnostic probability judgments in medical decision making. Redelmeier, Koehler, Liberman and Tversky (1995) asked physicians to make predictions of outcomes in hypothetical medical situations. When more possible diagnoses were listed, probabilities assigned to those individual diagnoses increased, and so probability ascribed to the residual (i.e., “other diagnoses”) was reduced. Unpacking effects have been observed not just in individual predictions, but also in cases of group projects. Savitsky, Van Boven, Epley and Wight (2005) asked students completing group projects to either estimate how much of the completed project they were responsible for (control), or how much they and each of their group members were responsible for (unpack condition). Participants who considered the contributions of group members, in addition to their own, rated their personal contributions as smaller, on average. This effect was obtained even when participants were simply asked to draw their group members, with no reference to their contributions (Study 4), suggesting that the mere presence of an unpacked group member encourages individuals to think about the “residual” in more detail.

Unpacking effects have been demonstrated in several prediction domains. For example, unpacking a task has been demonstrated to influence predicted enjoyment of a task. When participants were asked to unpack one feature of an event (e.g., unpacking “types of water sports” on a Bahamian vacation) before predicting enjoyment of the trip, they tended to predict more positive evaluations of the trip—that is, they predicted that the trip would be more fun relative to those participants who unpacked types of water sports *after* predicting trip enjoyment (Van Boven & Epley, 2003, Study 2). Similarly, unpacking has been shown to influence predicted product success. Biswas, Keller and Burman (2008) observed that when positive side effects of a drug were unpacked, they exerted a stronger impact on later judgments on a drug’s

future success. These studies suggest that unpacking extends well to domains outside of estimates of probability.

As such, the same unpacking procedure used in increasing probability estimates could also increase task completion estimations in the domain of task completion prediction. Adopting this hypothesis, Kruger and Evans (2004) suggested that one reason individuals underestimate task-completion times is that they do not spontaneously unpack those tasks into their various subcomponents (see also Tversky & Koehler, 1994). For example, when asking a student how long they think it will take to write a paper, the student may make a holistic estimate based on a combination of how motivated they are to complete the paper and how much they enjoy the course (i.e., based on strength of intentions, Koehler & Poon, 2006). Instead, if we ask the student to first list the steps required for writing a paper (such as conducting a literature search, writing a rough draft, etc.), predictions are likely to be longer as a result of unpacking steps that may have been previously ignored or overlooked. Further, because the focus has been shifted away from the holistic perspective, a reliance on motivations or intentions may also be reduced. In the work of Kruger and Evans (2004, Studies 3 and 5), participants were given the task of formatting an unformatted document. Participants in the unpack condition listed the different formatting steps required of the task, such as italicizing, punctuating, and so on, before making task completion predictions. Participants in the control condition performed the same unpacking task, but did so after they made task completion predictions. Kruger and Evans (2004) demonstrated that unpacking a task increased task-completion predictions, and as a consequence, the size of the planning fallacy was reduced.

This work also suggests that the content of what is unpacked might be particularly important when considering the effects of unpacking on task-completion predictions. For

example, the *number of steps* has been shown to influence the size of the unpacking effect: as more steps are unpacked, the unpacking effect becomes larger. For example, Tversky and Koehler (1994) demonstrate that probability of “death by natural causes” was greater when participants read nine unpacked causes of death, relative to when they read only three unpacked causes of death. Similarly, Kruger and Evans (2004, Study 2) asked participants to predict how long it would take to get ready for a date. Critically, half of participants were asked to list the steps required for getting ready for a date before making a prediction. Overall, they observed an unpacking effect: participants who had unpacked the steps required for getting ready for a date predicted that it would take longer to prepare. However, a secondary analysis revealed that this unpacking effect was only present among participants who listed more steps required in preparation (females). Males tended to list only one step fewer, on average, than females; however, this was enough to reduce the unpacking effect (see also Tversky & Fox, 1995; Sanna, Parks, Change & Carter, 2005, Study 3). Correspondingly, in the context of task-completion time estimates, Kruger and Evans (2004, Study 5) note that more complex tasks produced the most robust unpacking effects: for complex tasks, unpacking encouraged much longer task completion predictions, relative to predictions made in a control condition. Perhaps because of the complexity of these tasks, there were more steps to unpack. Together, this work suggests that while unpacking may influence predictions of task completion times, the content of what is unpacked may be important in determining how robust the unpacking effect is.

One additional example of how content of unpacking is relevant can be exemplified in a discussion with an undergraduate student in regard to her thesis. When asked at the beginning of the year, she “unpacked” her thesis as a literature search, running one or more studies, writing, revising, and so on. When the same student was approached closer to the deadline, she included

many new and important steps: rewriting sections of the paper, revising with a graduate student, and waiting for the supervisor to respond to an e-mailed draft of the paper. These steps were more salient as the deadline came nearer, and provided the student with a more clear understanding of what tasks needed to be done before the deadline. This suggests that at a relatively distant time point, optimism toward task completion may be observed. Taken together, we might hypothesize that as task deadlines approach, contents of unpacking might also shift toward a more detailed construal, promoting longer and more realistic task-completion predictions.

Temporal Distance and Construal Level Theory

Construal-level theory (Liberman & Trope, 1998; Trope & Liberman, 2000, 2003) provides one account of how psychological distance changes people's responses to events by changing the way people mentally represent those events. Individuals are hypothesized to construe near-future situations concretely, seeing elements in a more detailed fashion. In the distant future, situations are construed abstractly, and elements are viewed more holistically and broadly. As applied to task-completion predictions, when individuals view a task concretely versus abstractly, they are likely to make different predictions about what is required to complete the task. Trope and Liberman (2003) show that individuals tend to focus on concrete aspects of near-future events, and abstract aspects of distant-future events, suggesting that particularly for tasks in the near future (which are construed concretely), details of the task may be more easily brought to mind (see also Bilgin & Brenner, 2008). Applied to the previous work on unpacking (discussed above), construal level theory offers one explanation as to why the content of what is "unpacked" might change as the task moves from the near- to distant-future: in the near future,

tasks are construed as relatively more concrete, and as such, when prompted to unpack the task, the task may be unpacked into more, and more detailed, steps. Conversely, in the distant future, tasks are construed as relatively more abstract, and as such, when prompted to unpack the task, the task may be unpacked into fewer, and less detailed, steps.

Hypotheses

Several hypotheses are developed to examine the importance of content of steps and psychological distance to the unpacking effect. I hypothesize that unpacking effects are more pronounced for near-future (concretely-construed) tasks than for distant-future (abstractly-construed) tasks because the level of detail that a task is construed at directly affects how easily or readily the task is unpacked. Importantly, a concrete construal alone is not enough to produce more realistic predictions: in the domain of spending, Peetz and Buehler (2012) demonstrate that when individuals make spending predictions from a concrete construal, they made overly optimistic spending predictions. Further, individuals tend to avoid unpacking a task despite its effectiveness in reducing optimism in predictions (Morera & Budescu, 2001; Brenner & Rottenstreich, 1999), and there is no evidence that shifting construal influences propensity to unpack spontaneously.

H1: The unpacking effect should be more robust for near-future (concretely-construed) relative to distant-future (abstractly-construed) tasks.

A near-future, concrete construal of a task may enhance the detail associated with the task, and may highlight potential obstacles. For example, Peetz, Buehler and Wilson (2010)

observed that for tasks set in the near (versus distant) future, when tasks were real (i.e., construed in a low level), participants mentioned obstacles more frequently in a thought listing exercise associated with making predictions (Study 4), which was associated with overall longer task completion predictions². Critically, a concretely-construed task is also likely to allow individuals to unpack previously overlooked steps; as such, it is hypothesized that when construed concretely (in the near future), unpacking a task should result in listing more component steps, relative to when a task is construed abstractly (in the distant future).

H2: More steps will be unpacked for near- than for distant-future tasks, as a consequence of near-future tasks being construed in a more detailed and concrete manner.

Finally, Support Theory suggests that by unpacking a task into more steps, predicted task-completion times should be longer and therefore less optimistic (Tversky & Koehler, 1994; Tversky & Fox, 1995; see also Ross & Sicoly, 1979).

H3: Length of task-completion time predictions should be positively correlated with the number of steps that a task is unpacked into.

Given the hypotheses above, unpacking concretely-construed tasks, which are unpacked into greater detail, should be predicted to have longer task completion times. If these hypotheses are supported, unpacking may become a more useful tool in terms of improving accuracy of

² Conversely, when tasks were hypothetical (i.e., construed in a high level) and near, participants mentioned concrete plans more frequently in the thought listing exercise, which was associated with overall shorter task completion predictions. This suggests that in the distant future, unpacking tasks may not result in a reduction in optimistic task completion predictions.

predictions, and in terms of reducing unrealistic optimism that leads to inappropriate time resource allocations. Indeed, from a theoretical standpoint, these studies may offer a more thorough understanding of the boundaries of unpacking, and of the planning fallacy.

Overview

Throughout the studies presented in this thesis, the hypotheses outlined above are examined with respect to hypothetical and real task completion predictions, a critical source of optimistic bias associated with the planning fallacy. In Studies 1-3, participants' task completion predictions on hypothetical everyday tasks are used to test the primary hypothesis (H1) that unpacking effects are larger for near- than for distant-future tasks. Studies 1-4 examine links between temporal distance, the number of steps unpacked, and task-completion time predictions (H2, H3). Study 5 focuses more directly on the connection between construal level and task-completion time predictions.

Experiments

Study 1: Making Predictions Throughout The Year

To first examine whether the unpacking effect is attenuated when participants adopt a distant-future perspective, participants were asked to make a series of hypothetical task completion predictions over the course of a hypothetical year (in four separate months). Two control conditions were included: one where participants simply read the task description before making a task completion prediction (a pure control), and one where participants read the task description, and formed a plan before making a task completion prediction. This plan condition served to rule out an alternative hypothesis that any observed effect of unpacking is simply a consequence of participants spending more time contemplating the task. Planning, too, requires thinking about the task, but it is hypothesized that effects of forming a plan should not be influenced by temporal distance, given that forming a plan does not require listing all of the steps required to complete a task.

Participants

Participants ($N = 173$; 102 female, 71 male) were recruited from Amazon Mechanical Turk (M Turk). Participants were paid \$0.60 for completing the Human Intelligence Task (HIT) called “Making task predictions”. Participants ranged in age from 18 to older than 65, with a mean age in the 25-44 range (see Table 1 for frequencies).

Table 1.

Age range frequency in Study 1. Age ranges were arbitrarily determined, and participants indicated their range from a drop-down menu in the demographics page of the HIT³.

Age	Frequency
18-24	45
25-44	80
45-64	43
65+	5

Method

Participants were linked from the MTurk HIT page to a website on the University of Waterloo server, which randomly assigned the participant to one of three conditions: unpack, control, or plan. After reading an information letter and indicating consent, participants were asked to make a series of predictions in 4 separate months. They were informed that:

“The purpose of this study is to examine how individuals make predictions about different types of tasks. Throughout this study, you will be asked to make a series of predictions regarding several different tasks, all given in different scenarios. Please try to be as accurate as possible when making these predictions.”

In the control condition, participants were asked to fill in all text boxes (each of which represented a task completion prediction) after reading each task description. In the unpack and

³ Participants were given the option “I prefer not to disclose” when asked for their age range; no participants selected this option.

plan conditions, participants were first informed that there would be two response areas per task (the first of which contained the condition manipulation), and then were asked to fill in all response areas (each of which represented a task completion prediction), just like controls.

Participants then made task completion predictions in four separate months. Each month was presented on a separate page, and on each page, 5 prediction tasks were presented simultaneously. For each task, completion predictions were elicited by asking participants to fill in a text box below the task description with the instructions “Your prediction, in hours, here” (Figure 1). In the unpack condition, before a task completion prediction was elicited, a text box instructed participants to “please list the steps required to complete this task” (Figure 2). In the plan condition, before a task completion prediction was elicited, a text box instructed participants to “please specify when and where you intend to complete this task” (Figure 3; Koole & Spijker, 2000)⁴.



Imagine it is now December 1st.

1. Plan a holiday party for your close friends

your prediction, in hours, here.

Figure 1. Screen caption of a task presented in the control condition of Study 1.

⁴ Koole and Spijker (2000) suggest that forming implementation intentions should increase optimism associated with task completion estimates, but may also increase chances of goal completion, and so may reduce the planning fallacy. This work provides another interesting clue to the optimistic prediction puzzle, but is outside of the scope of this work.

Imagine it is now December 1st.

Please list all of the steps required to complete each task, and make predictions each of the following tasks.

1. Plan a holiday party for your close friends

please list the steps required to complete each task.

your prediction, in hours, here.

Figure 2. Screen caption of a task presented in the unpack condition of Study 1.

Imagine it is now December 1st.

Please use the space below to specify when and where you intend to complete the task. You may want to visualize the chosen situation and then to commit to this plan by silently saying "I intend to complete the assignment in situation x".

Following this plan, please predict how long it will take, in hours, to complete the task.

1. Plan a holiday party for your close friends

please specify when and where you intend to complete the task.

your prediction, in hours, here.

Figure 3. Screen caption of a task presented in the plan condition of Study 1.

Tasks were derived from several other studies (Kruger & Evans, 2004; Buehler, Griffin & Peetz 2010; Peetz, Buehler & Wilson, 2010; Buehler & Griffin, 2003; Bilgin & Brenner, 2008), and to increase set size, novel tasks were created and included. These novel tasks had well-defined steps (e.g., “complete an application to attend a post-graduate program at a local school” could include steps such as printing out an application online, filling it in, getting reference letters, and so on), or were tasks that were completed frequently by most individuals (e.g., “purchase a gift for a friend whose birthday is at the end of the week”). A full list of tasks can be found in Appendix A.

Participants were run in September 2011, and so temporal distance was manipulated by presenting tasks across four separate months: September/October 2011; December 2011; February 2012; and April 2012.

For each task, the total amount of time spent completing the HIT was also measured, from the opening of the consent page to the opening of the final page, which contained the completion code (used for payment) and feedback. It was hypothesized that an unpacking effect should be more robust for near-future (concretely-construed) relative to distant-future (abstractly-construed), tasks (H1); it was also hypothesized that the number of steps the task is unpacked into would be larger for near-future versus distant-future tasks (H2), and that as more steps are listed, predictions increase in time (H3). For example, the task “write a review of Britney Spears’ most recent album for your favorite online magazine for their October issue”, set in September (the near future), might be unpacked into many concrete steps such as needing to listen to the album several times, writing a draft review, revising the review, sending to the editor, revising the review based on the editor’s comments, and so on. Conversely, the task “give

a prospective student a tour of the local campus before school closes in May”, set in April (the distant future), might only bring to mind a few, abstract steps when unpacked, such as getting a map of the campus, and walking around the campus with the student, given its distance from the present.

Results

There were no main effects of age ($F < 1, p > .50$) or gender ($F < 1.1, p > .30$) on condition.

Time spent on-task was first examined by condition. It was hypothesized that participants in the unpack condition may require more time than those in the control condition to complete the HIT (a proxy for how long participants took to make predictions), but would take no longer than those in the plan condition. A main effect of condition confirmed the hypothesized difference in time on-task for condition, $F(2,170) = 8.22, MSE = 1348.81, p < .001, \eta^2 = 0.09$. Post hoc LSD comparisons revealed that participants in the unpack condition took significantly longer on-task than did participants in the control condition ($p < .001$), but not significantly longer than did participants in the plan conditions ($p > .15$). This result rules out the possible alternative explanation that time on-task accounts for any effect of unpacking on completion time predictions.

Completion time predictions for each task were standardized before aggregating the results across tasks. Because predictions for the first two months took place in the present year, those predictions were combined into a single near-future condition. Similarly, because completion time predictions for the last two months took place in the following year, those predictions were combined into a single distant-future condition.

We conducted a 3 (Condition: control, unpack, plan) x 2 (Time: near-future, distant-future) repeated measures analysis of variance (ANOVA). There was a significant condition x time interaction, $F(2, 97) = 3.00$, $MSE = .10$, $p = 0.055$, $\eta^2 = 0.06$, reflecting a difference in near versus distant future task completion predictions by condition (Figure 4). To further examine task completion predictions by time condition, we completed separate analyses for near and distant future tasks using separate ANOVAs. For near-future predictions, there was a main effect of condition, $F(2, 97) = 6.39$, $MSE = 0.32$, $p < .01$, $\eta^2 = 0.12$. Post hoc LSD comparisons reveal that in the unpack condition, task completion predictions ($M_{\text{Unpack}} = 0.34$) were significantly longer than were task completion predictions in control ($M_{\text{Control}} = -0.10$; $p < .01$; H1) and plan ($M_{\text{Plan}} = -0.15$; $p < .01$) conditions. Control and planned predictions did not differ, $p > .70$. For distant-future task completion predictions, there was a marginal main effect of condition, $F(2, 97) = 2.55$, $MSE = 0.28$, $p = .08$, $\eta^2 = 0.05$. Post hoc LSD comparisons reveal that unpacked task completion predictions ($M_{\text{Unpack}} = 0.19$) were not significantly larger than were controls ($M_{\text{Control}} = 0.01$; $p > .15$; H1), but were significantly larger than were planned task completion predictions ($M_{\text{Plan}} = -0.14$; $p = .03$). Control and plan predictions did not differ, $p > .20$. Finally, effects of temporal distance were examined separately by condition with paired-samples t-tests. There were no significant differences by temporal distance for task completion predictions in the unpack condition ($p > .15$) or in the plan condition ($p > .80$); however, among task completion predictions in the control condition, a trend toward longer predictions in the distant future ($M_{\text{Distant}} = .01$) was observed ($M_{\text{Near}} = -.10$; $t(45) = 1.69$, $p = .10$). This trend was unanticipated, as it suggests that in the near future, participants perceived tasks more optimistically than in the distant future. This result is examined more thoroughly in the discussion.

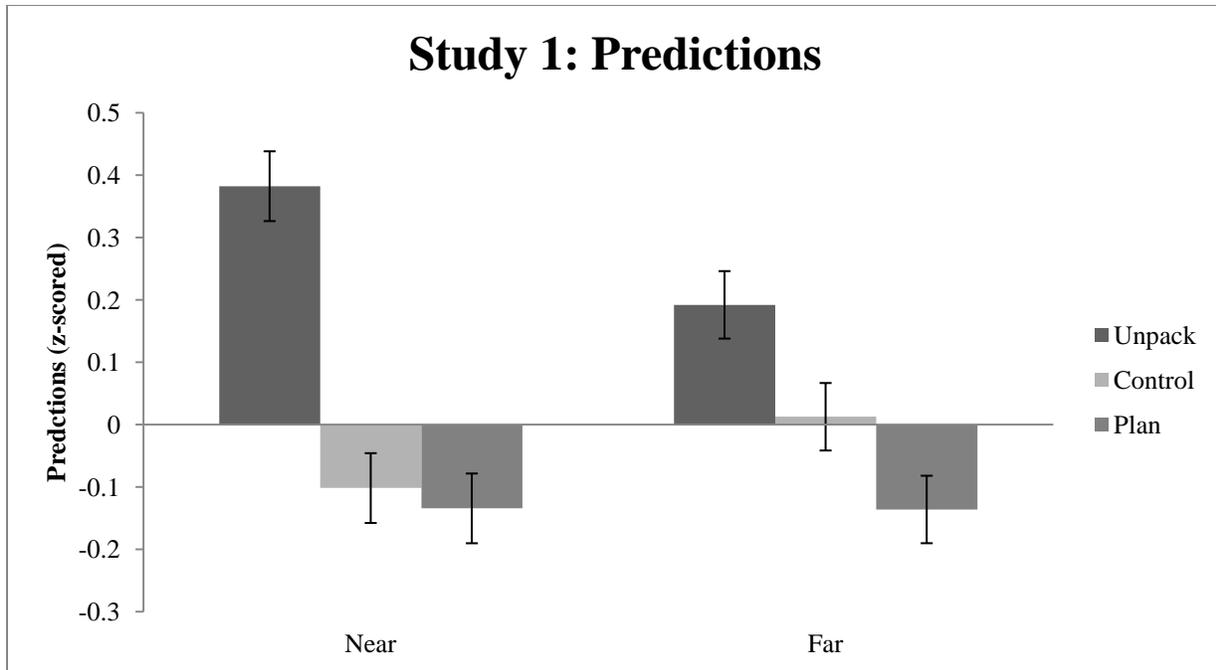


Figure 4. Predictions, standardized, across condition and time. Unpacking effects were more pronounced in the near future relative to the distant future. Error bars represent standard errors of the mean.

Finally, for participants in the unpacking condition, the number of steps unpacked were examined. When a task is temporally near (i.e., when it is construed more concretely; Liberman & Trope, 1998), it should be easier to come up with a more detailed and longer list of steps. When tasks are presented in the near future, it is thus hypothesized that unpacking should produce more steps, as a result of this shift toward a concrete construal level (H2). Number of steps unpacked were compared using a paired samples t-test, and it was observed that participants in the near-future condition ($M_{\text{Near}} = 2.30$) listed significantly more steps than did those in the distant-future condition ($M_{\text{Distant}} = 1.54$), $t(58) = 4.19$, $p < .001$ (H2). Finally, it was hypothesized that when tasks were unpacked into more steps, subsequent task completion predictions should increase (H3). Overall, there was a significant correlation between task

completion predictions and number of steps listed in the unpack condition, $r(55) = .26, p = .05$, suggesting that when participants unpacked the task into more steps, subsequent task completion predictions were longer.

Discussion

Study 1 offered a first demonstration of the distance-dependent unpacking effect. In this study, it was observed that in the near future, unpacking a task significantly increased predicted task completion time compared to the control (packed) condition. However, in the distant future, the unpacking effect was attenuated, supporting H1. One possible explanation for these effects lies in how detailed the tasks are construed when unpacked. In the near future, tasks were unpacked into more steps than in the distant future (supporting H2), and when more steps were unpacked, task completion predictions were larger overall (H3). As such, this study offers support for all hypotheses. In addition, these results suggest that unpacking a task may be a particularly robust strategy to reduce optimistic bias, but only when tasks are construed concretely.

One caveat to this study is that because tasks were not counterbalanced across time, it is possible that some confounding factor that distinguished the near- from the distant-future tasks is somehow responsible for the results; this is addressed in Study 2.

Study 2: Making Predictions throughout the Year, At Multiple Time Points

The methodology of Study 1 was modified in several ways. As noted above, because all participants in Study 1 were run at the same time of year, and tasks were constant across months, it may be that something unique about the tasks assigned to the distant- versus near-future

condition moderated the attenuated unpacking effect that was observed in the distant future. As such, in Study 2 participants were run both in October and in February, offering a counterbalance in near- and distant-future conditions. As well, because results of Study 1 did not support the time-on-task explanation of the unpacking effect, Study 2 retained only the simple (non-plan) control condition. In Study 2, the number of predictions made was decreased from 20 to 12 (3 in each of 4 time periods) to reduce attrition⁵. In addition, a task-nomination item was included, aimed at examining a real-world prediction. It was hypothesized that with a real task, participants may be particularly well-equipped to make accurate task completion predictions when the task is in the near future, given that they should be relatively experienced with the task they nominate. Real tasks tend to be construed in more concrete terms than are hypothetical tasks (Liberman, Trope & Wakslak, 2007); as such, unpacking effects may be particularly robust for these items. Lastly, because Study 2 was conducted with a university population, tasks from Study 1 were adapted to reflect the regular behaviors of the sample—that is, tasks selected from the sample in Study 1 tended to have a more academic focus. Otherwise, the methodology was identical.

Participants

Participants ($N = 144$; 68 female, 46 male) from University of Waterloo's psychology student participant pool. Participants were compensated for participation with course credit.

Methods

Participants completed the task at a computer in an on-campus lab. At the beginning of each block, a slide notified participants of the time point in which the tasks would take place

⁵ In Study 1, 27 participants clicked through to the information page of the HIT, but did not enter any information on the pages. These individuals are not included in any analyses, given that they did not start the task at any point.

(e.g., “Imagine it is December 1st, 2011”). Blocks consisted of three task trials, presented individually on-screen. As in Study 1, participants in the control condition were asked to make predictions for the task, in hours, in a textbox below the task description (Figure 5). Participants in the unpack condition were asked to list all the steps required to complete the task, in a large text box below a description of the task; they indicated that all steps had been listed by pressing the ENTER key. A second page, immediately following, was identical to the prediction elicited in the control condition: the task description remained on-screen, and participants were asked to predict how long, in hours, the task would take to complete.

Select an outfit for a date at the end
of the week

How long, in hours, will it take you to
complete this task?

Figure 5. Screen caption of prediction elicitation in control and unpacking conditions in Study

2.

All prediction elicitation methods were identical to those used in Study 1 for control and unpack conditions. A full list of tasks, including the nominated-task item, can be found in Appendix B. To act as a counterbalance, half of participants were run in October 2011, and half were run in February 2012. As such, for half of participants, October and December tasks were in the near future, and for the other half, they were in the distant future, and vice versa for the February and April tasks. We collapse across this counterbalancing variable in all analyses reported below⁶.

Results

There were no effects of gender on predictions, $F < 1, p > .30$. As in Study 1, predictions were standardized by task and averaged to form aggregates for near- and distant-future conditions. Near- and distant-future task predictions are examined first, and the nomination item is discussed separately.

Near- and distant-future task completion predictions were examined in a 2 (Condition: control, unpacking) x 2 (Time: near-future, distant-future) ANOVA. A marginal main effect of condition was observed, $F(1, 223) = 3.41, MSE = .99, p = 0.07, \eta^2 = 0.01$, such that participants who unpacked tasks made marginally longer task completion predictions ($M_{\text{Unpack}} = 0.12$) than did participants in the control condition ($M_{\text{Control}} = -0.12$). The condition x time interaction was not significant, $F < 1, p > .30$ (Figure 6). Because it was hypothesized that the unpacking effect would be less robust among the distant future tasks (H1), predictions for near- and distant-future tasks were examined with separate one-way ANOVAs. It was hypothesized that for near-future tasks, participants in the unpack condition would produce longer task completion predictions than in the control condition, and this hypothesis was supported, $M_{\text{Unpack}} = 0.19, M_{\text{Control}} = -0.18$,

⁶ There was no difference in predictions by counterbalance condition, $F < 1, p > .80$.

$F(1,111) = 3.96$, $MSE = 218.41$, $p = .05$, $\eta^2 = 0.03$. However, for tasks construed in the distant future, no unpacking effect was observed, $M_{\text{Unpack}} = 0.06$, $M_{\text{Control}} = -0.06$, $F < 1$, $p > .50$. Again, that unpacking effects were more pronounced among near-future tasks (H1). Finally, effects of temporal distance were examined by condition using separate oneway ANOVAs. There were no significant differences for predictions in the unpack condition ($p > .50$) or the control condition ($p > .30$), suggesting that temporal distance alone did not influence predictions.

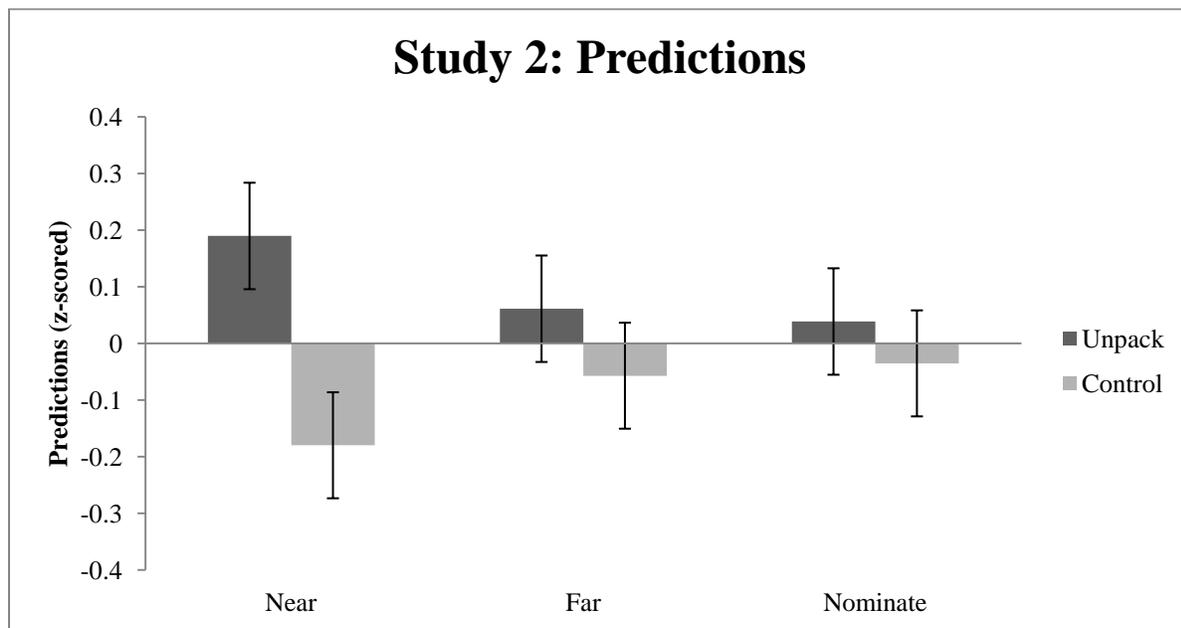


Figure 6. Predictions, standardized, across condition and time, in Study 2. Unpacking effects were more pronounced for near future versus distant future tasks. Error bars represent standard errors of the mean.

It was hypothesized that when participants nominated a real task, they might construe the task concretely and, as such, may display a robust unpacking effect (H1). However, this was not the case, $M_{\text{Unpack}} = 0.04$, $M_{\text{Control}} = -0.03$, $F < 1$, $p > .60$, suggesting that the nomination item was not predicted to take longer to complete when the task was unpacked relative to when the task was packed (control). Perhaps by encouraging participants to nominate a task that was due closer

to the end of term, the task may have been unintentionally framed as falling in the distant future. Alternatively, it may be that undergraduate students do not begin working on large projects or papers immediately after they are assigned, and instead wait until much closer to the deadline to begin—because we asked participants to discuss these projects far before their anticipated start times, predictions may have been construed very abstractly⁷. Means are displayed in Figure 6.

As in Study 1, the number of steps unpacked was examined across near- and distant-future conditions, as well as for the nominate-task item. There was a significant difference in number of steps unpacked by temporal condition, $F(2,160) = 20.49$, $MSE = 1.73$, $p < .001$, $\eta^2 = 0.20$. Post hoc LSD comparisons reveal that near-future tasks were unpacked into more steps ($M_{\text{Near}} = 3.90$) than were tasks set in the distant future ($M_{\text{Distant}} = 3.32$), $p = .02$ (H2); however, real nominated tasks were unpacked into significantly more steps than were either hypothetical category ($M_{\text{Nominate}} = 4.92$), p 's $< .001$. This suggests that perhaps the school projects nominated were quite large in nature, and may be naturally unpacked easily into many steps without much active thought processing. There was no significant correlation between number of steps unpacked and task completion predictions in the unpacked condition, $p > .60$; further, this correlation was not significant when near and distant future tasks were examined separately ($p_{\text{Near}} > .90$, $p_{\text{Distant}} > .60$).

Discussion

Novel findings of Study 1 were replicated in Study 2, whereby unpacking effects were attenuated in the distant future (H1) in a counterbalanced design. These results suggest that tasks in the distant future are construed more abstractly, and in less detail, which may account for why

⁷ Several students reported that they were not even sure what they would be working on (i.e., they had not set the topics of papers, or had not met with a group for an upcoming project), suggesting that predictions were both approximate, and potentially hypothetical.

unpacking the task does not produce the expected reduction in optimistic bias. Again, these results suggest that unpacking a task may be a particularly robust strategy to reduce optimistic bias, but only when tasks are construed concretely, given that when tasks are construed as such, more steps were listed (H2). In this study, the hypothesized positive correlation between number of steps listed and task completion predictions was not observed (H3). However, this may be due to an overall low level of variance in number of steps listed, for example.

The results of the task-nomination item were intriguing. It was hypothesized that because these tasks were real, versus hypothetical, they would be construed at a relatively concrete level (Trope & Liberman, 2003). As such, it was anticipated that real tasks would display a robust unpacking effect. However, no such effect was observed. One possibility is that because participants were asked to list real tasks that were psychologically distant (whereby details of the projects had sometimes not even been set), no differences were observed between conditions. Alternatively, because a wide variety of tasks were selected, relative to the controlled set used in hypothetical tasks in this study, and in Study 1, the nomination task may have been particularly noisy and as such, any effects may be particularly difficult to observe.

Study 3: Making Predictions for Large-Scale Tasks (The Household Tasks Study)

The null effects of the nomination item in Study 2 begged the question: is the unpacking effect reported in the first two studies limited to relatively small-scale tasks? One might reason that for small-scale tasks that only take a few hours to complete, individuals might be optimistic about completion times given that there are fewer steps to complete. Large-scale tasks that take several days to complete tend to have many steps, some of which may be complex and time-consuming. For example, painting a room of a house requires waiting several hours between

coats to allow for paint to dry—this step is well-known to even novice painters, but is also acknowledged to be time-consuming. Further, because these large-scale tasks are by definition more complex (i.e., rooms need to be taped to cover outlets and light fixtures, there are several coats of paint and primer required to paint a room, touch-ups sometimes need to be made, and so on) and take longer to complete, it is possible that individuals might recognize this and exhibit less optimism when making temporal predictions, even when not much thought is given to unpacking them. Conversely, because large-scale tasks contain many steps, each step may provide a unique opportunity for over-optimism, resulting in a greater overall prediction error (see also Roy & Christenfeld, 2008). One concern could be that if unpacking effects presented in previous studies do not apply to larger-scale tasks, they may not hold much external validity. As such, this study examined unpacking effects for large-scale tasks in form of common household tasks that were completed over the course of several days.

Finally, the results of Studies 1 and 2 were expanded on with a novel temporal distance manipulation. In previous studies, temporal distance (and construal level) has been manipulated by situating participants in the present, and having them move forward through a year. As such, effects observed thus far might be particularly robust because participants are sensitive to “moving though” a year. Though unlikely, it may be that participants recognize this transmission of time, and adjust predictions to change from month to month. In this situation, unpacking effects may only be attenuated in the distant future because participants choose to make less extreme predictions as time passes. To control for this possibility, temporal distance was manipulated independently of prediction tasks, using a between-subjects priming manipulation.

Participants

Participants ($N = 119$, 73 female, 45 male, 1 did not disclose) were recruited from MTurk, and were compensated in the same way as in Study 1. Participants ranged in age from 18 to older than 65, with a mean age in the 25-34 range (see Table 2 for frequencies).

Table 2.

Age range frequency in Study 3. Age ranges were arbitrarily determined, and participants indicated their range from a drop-down menu in the demographics page of the HIT. All participants disclosed their age range.

Age	Frequency
18-24	25
25-34	35
35-44	24
45-54	18
55-64	13
65+	4

Participants were also asked which state they resided in; the majority of participants were from the states of California ($N = 19$), Texas ($N = 14$), and Illinois ($N = 9$), but a full depiction of their home state responses is depicted in Figure 7. Two participants did not disclose their home state.

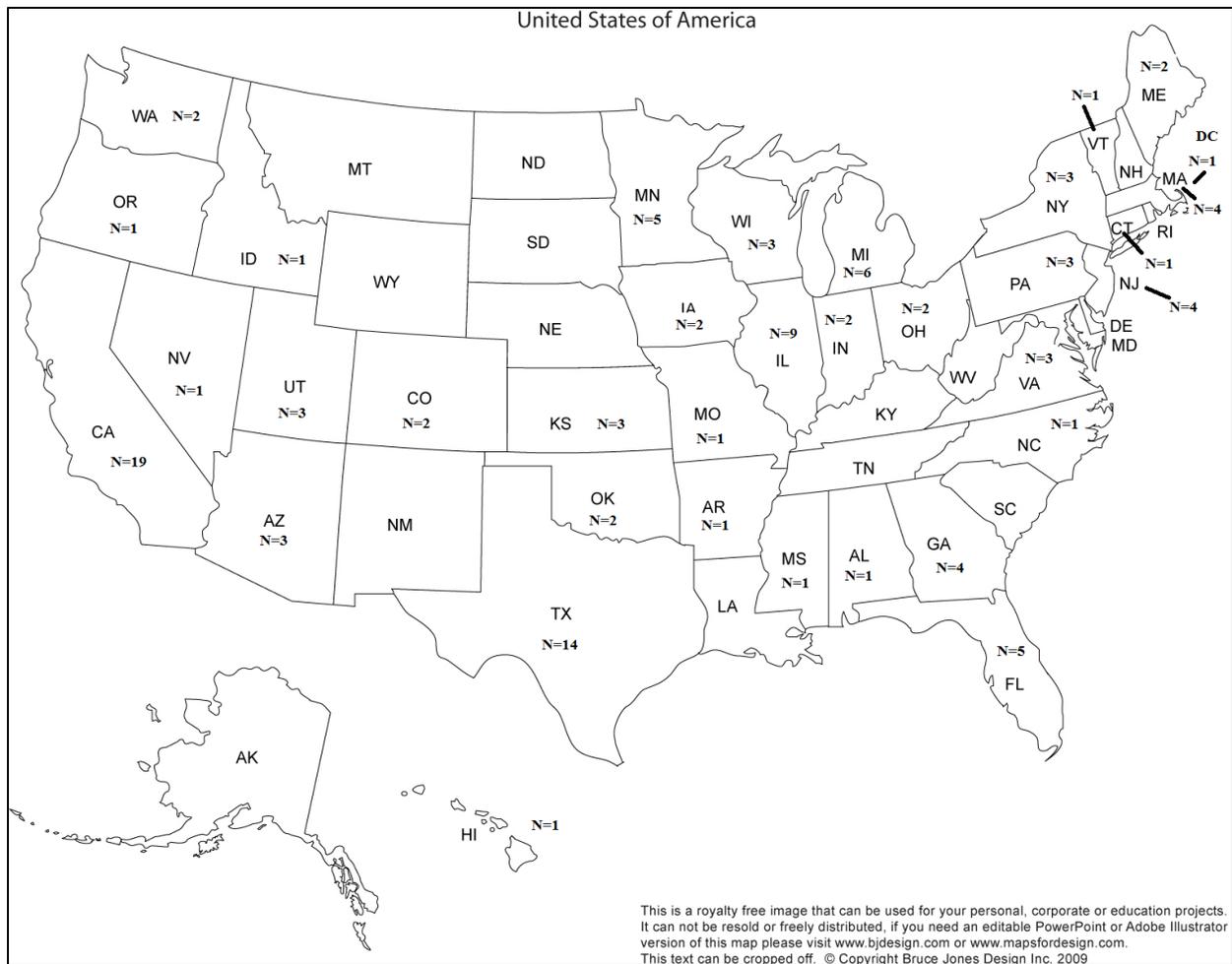
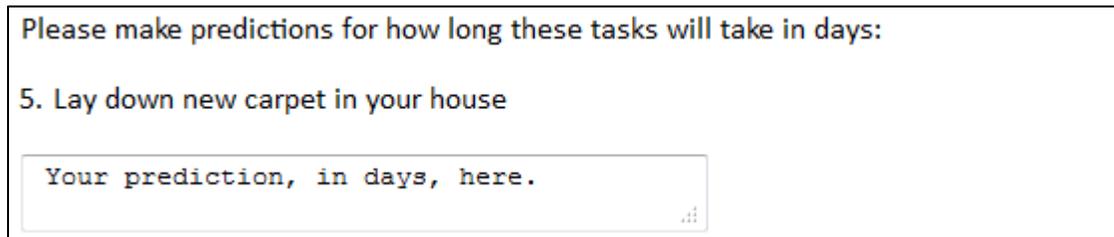


Figure 7. Participants' home states in Study 3.

Method

All demographic and prediction elicitation methods were identical to Study 1, except that the HIT was framed as a study aimed at examining how long common household tasks would take. Items were taken from a pre-test, also on MTurk, where participants were asked to list large-scale household tasks they would be completing, as well as how long those tasks might take in *days*. The five most commonly-listed tasks from this pre-test were selected for use in the present study. As such, the prediction elicitation question was amended to “please predict how long, in *days*, this task will take to complete” (emphasis added here; Figure 8). A list of tasks

used in this study, as well as their average estimated completion times on pre-test, are presented in Appendix C.



Please make predictions for how long these tasks will take in days:

5. Lay down new carpet in your house

Your prediction, in days, here.

Figure 8. Screen caption of prediction elicitation (in the control condition) of Study 3.

Finally, temporal distance was manipulated in a novel fashion by asking participants to imagine themselves in the near future (the current month) or the distant future (one year from the current month). Participants in the near future condition simply made task completion predictions. Participants in the distant future condition were asked to respond with a paragraph to the following prompt, before making task completion predictions:

“Imagine it is the first week of Feb, 2013. Please use the space below to write a short paragraph about what you think this day will be like. For example, what tasks will you be taking part in during the day? What do you think the weather will be like?”

Results

There were no main effects of age on predictions ($F < 1.5, p > .15$), but males ($M_{\text{Male}} = .16$) did make more optimistic predictions than females ($M_{\text{Female}} = .13$), $F(1, 116) = 5.50, MSE = .42, p = .02, \eta^2 = 0.04$. However, there were no differences in gender distribution across conditions.

As in previous studies, predictions were standardized within tasks, and then averaged for each participant. As in Study 2, a 2 (Condition: control, unpacking) x 2 (Time: near-future, distant-future) ANOVA was first conducted on standardized task completion predictions. A marginal interaction was observed, $F(1, 115) = 3.39$, $MSE = 0.41$, $p = 0.07$, $\eta^2 = 0.03$, as was a main effect of time, $F(1, 115) = 4.92$, $MSE = 0.41$, $p = 0.03$, $\eta^2 = 0.04$ (Figure 9). Predictions made in the distant future were longer ($M_{\text{Future}} = 0.17$) than were those made in the near future ($M_{\text{Near}} = -0.15$)⁸.

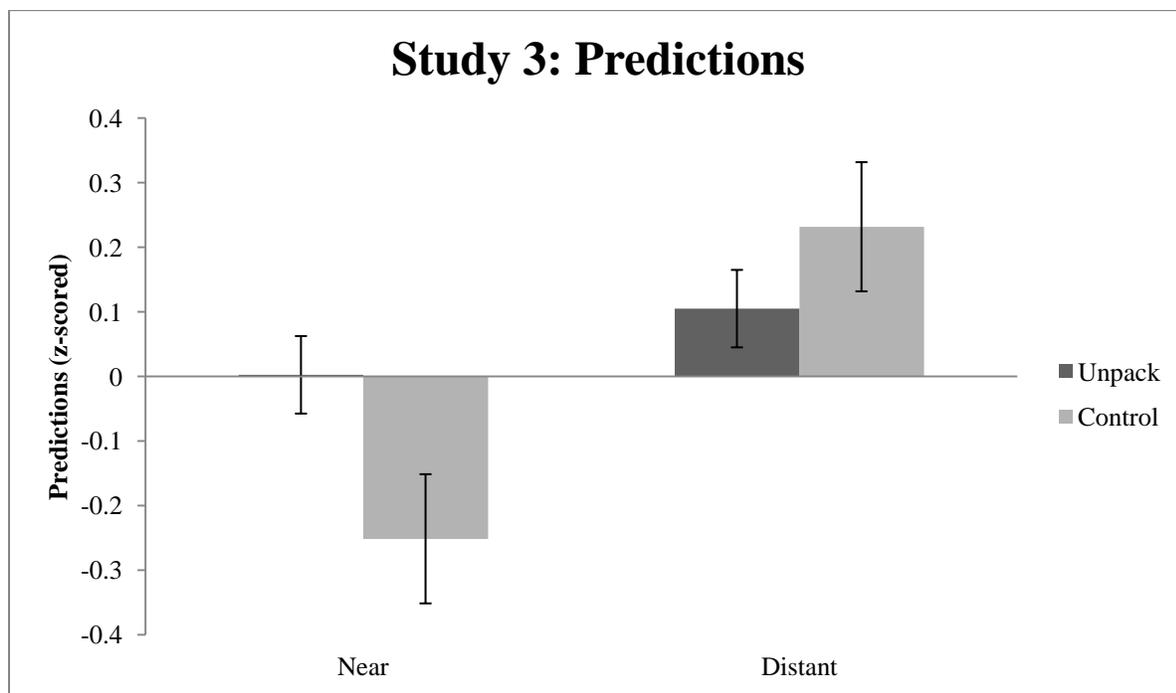


Figure 9. Predictions standardized across large tasks in Study 3. Unpacking effects were more pronounced for near future versus distant future tasks. Error bars represent standard error of the mean.

⁸ Readers may note that one of the items used in this study is not strictly a “household task”: preparing for a marathon. In the pretest, we asked participants to list tasks that were either large scale in nature, or household related; this item was commonly mentioned, so was included. When I perform the identical analysis without the marathon item, similar results are observed. The initial 2 x 2 ANOVA remains marginally significant, $F(1, 115) = 2.64$, $MSE = 0.48$, $p = .11$, $\eta^2 = .02$, which was also driven by a main effect of time, $F(1, 115) = 5.50$, $p = .02$, $\eta^2 = .05$.

To better examine near- and distant-future task completion predictions, two one-way ANOVAs were conducted for the time conditions separately. As hypothesized, there was a significant effect of unpacking on task completion predictions made for the near future, $F(1,57) = 4.41$, $MSE = 0.21$, $p = .04$, $\eta^2 = 0.07$, such that predictions made in the unpack condition ($M_{\text{Unpack}} = 0.005$) were longer than were those made in the control condition ($M_{\text{Control}} = -0.25$). However, amongst task completion predictions made for the distant future, no such effect was observed, $F < 1$, $p = .37$ (H1). Again, effects of temporal distance were examined by condition using separate oneway ANOVAs. There were no significant differences for predictions in the unpack condition ($p > .70$), but there was a significant main effect of temporal distance for the control condition, $F(1, 73) = 10.15$, $MSE = 0.45$, $p < .01$, such that predictions made for near future tasks were more optimistic ($M_{\text{Near}} = -.25$) than were those made for distant future tasks ($M_{\text{Distant}} = 0.24$). This effect was unanticipated, but a similar trend was observed in Study 1. As such, this result is examined more thoroughly in the discussion.

Next, number of steps listed in the unpack condition were examined across temporal distance conditions. There was no significant difference in number of steps listed by temporal distance condition, $F < 1$, $p > .40$, though the trend in means was in the expected direction (more steps listed in near- versus distant-future condition, $M_{\text{Near}} = 4.14$, $M_{\text{Distant}} = 3.83$; H2). Participants who listed more steps also made larger predictions, $r(43) = 0.32$, $p = 0.04$, suggesting that number of steps unpacked was an important factor in producing less optimistic task completion predictions (H3).

Discussion

Findings of Studies 1 and 2 were replicated, such that unpacking effects observed for near-future tasks were attenuated for distant-future tasks (H1). Further, this was done using a novel manipulation, whereby temporal distance was manipulated independently of prediction tasks. In addition, the use of a between-subjects design ruled out possible confounds associated with order effects, suggesting that “moving through” a year did not play a role in construal differences observed in Studies 1 and 2. These results suggest that tasks in the distant future are construed more abstractly, and in less detail, which may account for why unpacking the task does not produce the expected reduction in optimistic bias. While the number of steps unpacked did not significantly differ by temporal distance condition (H2), the observed trend was in the hypothesized direction (i.e., more steps listed for near-future tasks). Further, the strong correlation observed between number of steps unpacked and task completion predictions (H3) suggests that unpacking the task into more steps may be a critical component of reduced optimism in predictions.

In addition, the concern that the results of Studies 1 and 2 might not generalize to predictions for larger-scale tasks was ruled out. Instead, large tasks, when unpacked in the near future, were construed more concretely, and were judged to take longer than when predictions were made holistically. This result provides more evidence that unpacking effects might be particularly important in reducing optimism in predictions for larger tasks that contain many *complex* steps, and as such, contain many sources of underestimation.

Study 4: Unpacking Varied Number of Steps

Given that the previous studies all hypothesized an important function of the number and content of steps unpacked, but only tested this hypothesis correlationally, it was necessary to examine more thoroughly the effect of number of steps unpacked by task separately from the effects of temporal distance observed in Studies 1-3. So far, it has been demonstrated that individuals who unpacked more steps tended to make longer task completion predictions (H2), and that unpacking more steps also increases task completion predictions (H3). In this study, number of steps that participants unpacked was experimentally manipulated. After unpacking more steps, participants should make longer predictions for tasks (see Tversky & Fox, 1995). As the number of steps unpacked increases, so too should the temporal prediction (H3).

Participants

Participants ($N = 222$; 82 male, 140 female) were recruited from M Turk. Participants were recruited and compensated in the same manner as in Studies 1 and 3. As in Study 3, participants were asked to disclose age and home state. Average age was in the 25-34 range (a full list of frequencies can be found in Table 3). Participants were primarily from California ($N = 28$), Texas ($N = 14$), Pennsylvania ($N = 13$), New York ($N = 12$) and Illinois ($N = 12$), but a full list can be found in Figure 10.

Table 3.

Age range frequency in Study 4.

Age	Frequency
18-24	67

25-34	81
35-44	33
45-54	27
55-64	9
65+	5



Figure 10. Participants' home states in Study 4.

Method

Participants were recruited through M Turk in a manner identical to Studies 1 and 3. They were randomly assigned to few-steps or many-steps conditions. In the few steps condition, participants read the task description, and then were asked to list two steps required to complete the task (Figure 11). In the many steps condition, participants read the task description, and then were asked to list five steps required to complete the task (Figure 12). Number of steps in few versus many steps conditions was determined partly by the average number of steps listed in previous studies⁹.

Experimental Task

Below each task is room for two steps required for this task. Please list two steps required for completing this task, and then predict how long you think this task would take to complete. Note that some tasks will ask you to predict how long a task may take in hours, whereas some tasks will ask you to predict how long a task may take in days.

Please make predictions for how long these tasks will take in days:

1. Lay down new carpet in your house

Figure 11. Screen caption of prediction elicitation in the few steps condition of Study 4.

⁹ In previous studies, mean number of steps listed ranged from 2.5-4.5; as such, we chose the nearest whole numbers outside of that range.

Experimental Task

Below each task is room for two steps required for this task. Please list five steps required for completing this task, and then predict how long you think this task would take to complete. Note that some tasks will ask you to predict how long a task may take in hours, whereas some tasks will ask you to predict how long a task may take in days.

Please make predictions for how long these tasks will take in days:

1. Lay down new carpet in your house

Step 1 here.

Step 2 here.

Step 3 here.

Step 4 here.

Step 5 here.

Your prediction, in days, here.

Figure 12. Screen caption of prediction elicitation in the many steps condition of Study 4.

Participants made predictions about 10 tasks, five of which were small-scale (i.e., predictions were elicited in hours, as in Studies 1 and 2), and five of which were large-scale (i.e., predictions were elicited in days, as in Study 3). Small- and large-scale tasks were blocked, and order of presentation was counterbalanced; this is collapsed across for all analyses below. All tasks were adapted from previous studies, and a full list can be found in Appendix D.

Results

There were no effects of age, $F < 1$, though there was a main effect of gender on predictions, $F(1, 211) = 3.86$, $MSE = 0.34$, $p = 0.05$, $\eta^2 = 0.02$, such that males tended to be more optimistic than females (as in Study 3). However, there were no differences in gender by condition, $F < 1$, $p > .70$.

A univariate ANOVA on predictions (standardized within task, as in previous studies) was conducted by step condition. A significant effect of condition was observed, $F(1, 221) = 6.35$, $MSE = 0.33$, $p = 0.01$, $\eta^2 = 0.03$, reflecting longer task-completion time predictions for participants in the many steps condition ($M_{\text{Many}} = 0.12$) relative to those in the few steps condition ($M_{\text{Few}} = -0.08$; Figure 4).

It was also important to examine whether the many-steps unpacking effect was consistent across task size. As such, a repeated measures ANOVA was conducted to examine any differences by task size. A significant task size x steps interaction was observed, $F(1, 220) = 5.36$, $MSE = .30$, $p = .02$, $\eta^2 = .02$, suggesting that predictions for small and large tasks were differentially influenced by the step manipulation. Univariate ANOVAs on the effect of number of steps were thus conducted separately for small and large task conditions. For small tasks, there was a significant effect of number of steps on task completion predictions, $F(1, 220) = 14.57$, $MSE = 0.37$, $p < .001$, $\eta^2 = 0.06$, such that predictions made after listing five ($M_{\text{Five}} = 0.17$) versus two steps ($M_{\text{Two}} = -0.14$) were significantly longer. For large tasks, however, there was no such effect, $F < 1$, $p > .40$. Means are displayed in Figure 13.

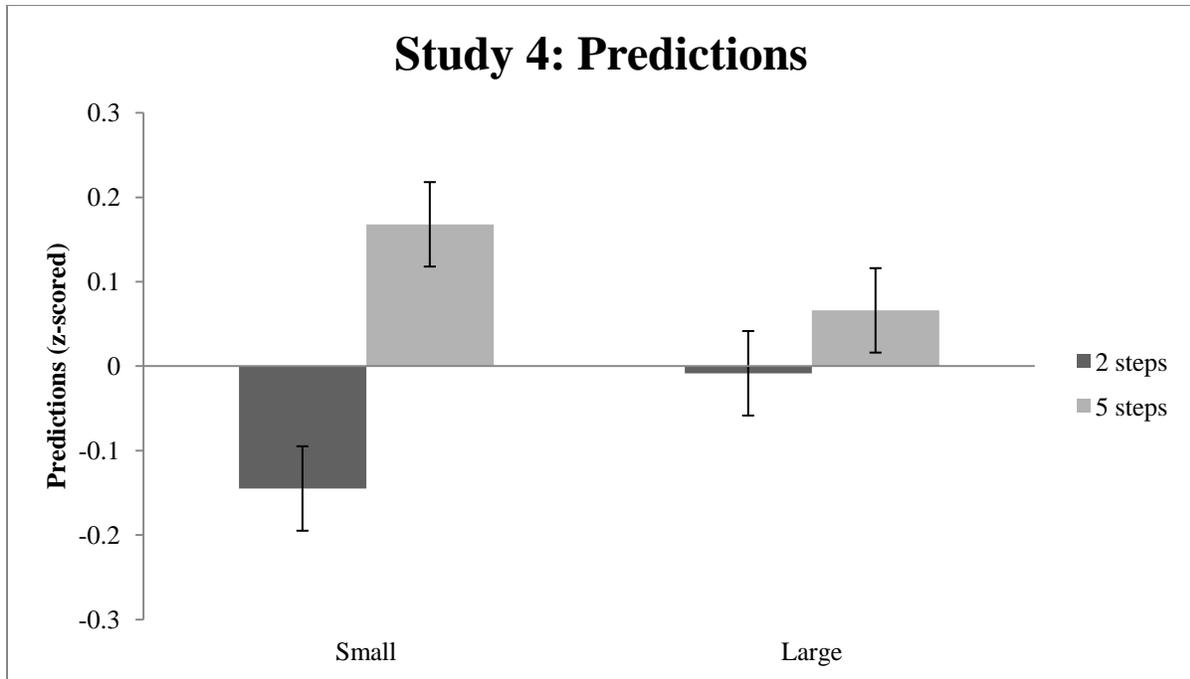


Figure 13. Predictions, standardized, across condition and time, in Study 4. Unpacking effects were larger when more steps were unpacked, particularly when tasks were small and unpacking required cognitive effort. Error bars represent standard error of the mean.

Discussion

It was hypothesized that unpacking effects would be larger when unpacking five versus two steps, because by decomposing the task into more steps, participants should produce longer task completion predictions (Tversky & Fox, 1995; H3). Overall, task completion time predictions were longer for participants who listed many steps relative to those who listed few steps, supporting H3. This effect was robust when small-scale tasks were examined (when task completions were predicted in hours), but was not present for large-scale tasks (when task completions were predicted in days). One reason for this discrepancy might relate to how easily tasks were decomposed. For example, when unpacking a task such as “laying down carpet in a room”, many steps may easily come to mind, even to a novice; as such, five steps may not

encourage longer task completion predictions. Conversely, unpacking a small-scale task like “prepare a 5-minute speech on budgeting” may be spontaneously unpacked into fewer steps, and so coming up with additional steps for these tasks may encourage longer task completion predictions.

Together, these results suggest that unpacking effects rely on the amount of detail in which unpacking a task makes salient. Again, unpacking may be a particularly robust strategy to reduce optimistic bias when tasks are construed concretely.

Study 5: Controlling the Content of Unpacked Steps

One interpretation of the results of Studies 1-3 is that for near-future tasks, a concrete construal facilitates unpacking the task into steps, whereas for distant-future tasks, an abstract construal encourages maintenance of a packed conception of the task, with the consequence that unpacking has a larger impact on predictions for near- than for distant-future tasks. In support of this hypothesis, it has been observed that more steps are unpacked in the near future (H2, Studies 1 and 2), and that when more steps are listed, task completion predictions are longer (H3, Studies 1, 3 and 4). These results suggest that while a concrete construal of the task is important when unpacking, the content of the unpacked steps might also carry weight. That is, when the task is construed in more detail, more steps are unpacked, and task completion predictions are longer. However, Studies 1-4 have not empirically tested how the construal of the content of unpacking directly influences task completion predictions. When unpacking concrete steps, relative to more abstract elements of the task, individuals should exhibit reduced optimism. As such, by controlling the content of unpacked steps (i.e., their level of construal), it may be possible to manipulate the magnitude of the unpacking effect.

One way in which construal level is conceptualized in the literature hinges on the distinction between the feasibility versus desirability of a task (Liberman & Trope, 1998). That is, when tasks are construed more concretely (e.g., when thinking about near-future events), individuals tend to focus more naturally on feasibility concerns (“how do I complete this task?”). Conversely, when tasks are construed more abstractly (e.g., when thinking about distant-future events), individuals tend to instead focus on desirability concerns (“why would I complete this task?”). As such, encouraging participants to focus on feasibility concerns might highlight more concrete components of target tasks, whereas encouraging participants to focus on desirability concerns might highlight more abstract features of target tasks. In this study, participants made task completion predictions after reading a task description (control), or after reading feasibility-based steps (concrete) or desirability-based reasons (abstract) for completing a task. Relative to the control condition, it was hypothesized that elaboration of the task in terms of concrete steps should replicate the previously observed effect of unpacking on task completion predictions, whereas elaboration in terms of abstract reasons would not necessarily be expected to have a comparable effect.

Participants

Participants ($N = 176$; 100 male, 76 female) were recruited from M Turk, and were compensated as in Studies 1, 3 and 4. As in Studies 3 and 4, participants were asked to disclose their age range and home state. Average age was in the 25-34 range (frequencies depicted in Table 4), and the majority of participants were from California ($N = 18$), New York ($N = 14$), and Florida ($N = 12$). A full depiction of home states can be found in Figure 14.

Table 4.

Age range frequency in Study 5.

Age	Frequency
18-24	71
25-34	58
35-44	26
45-64	11
65+	10

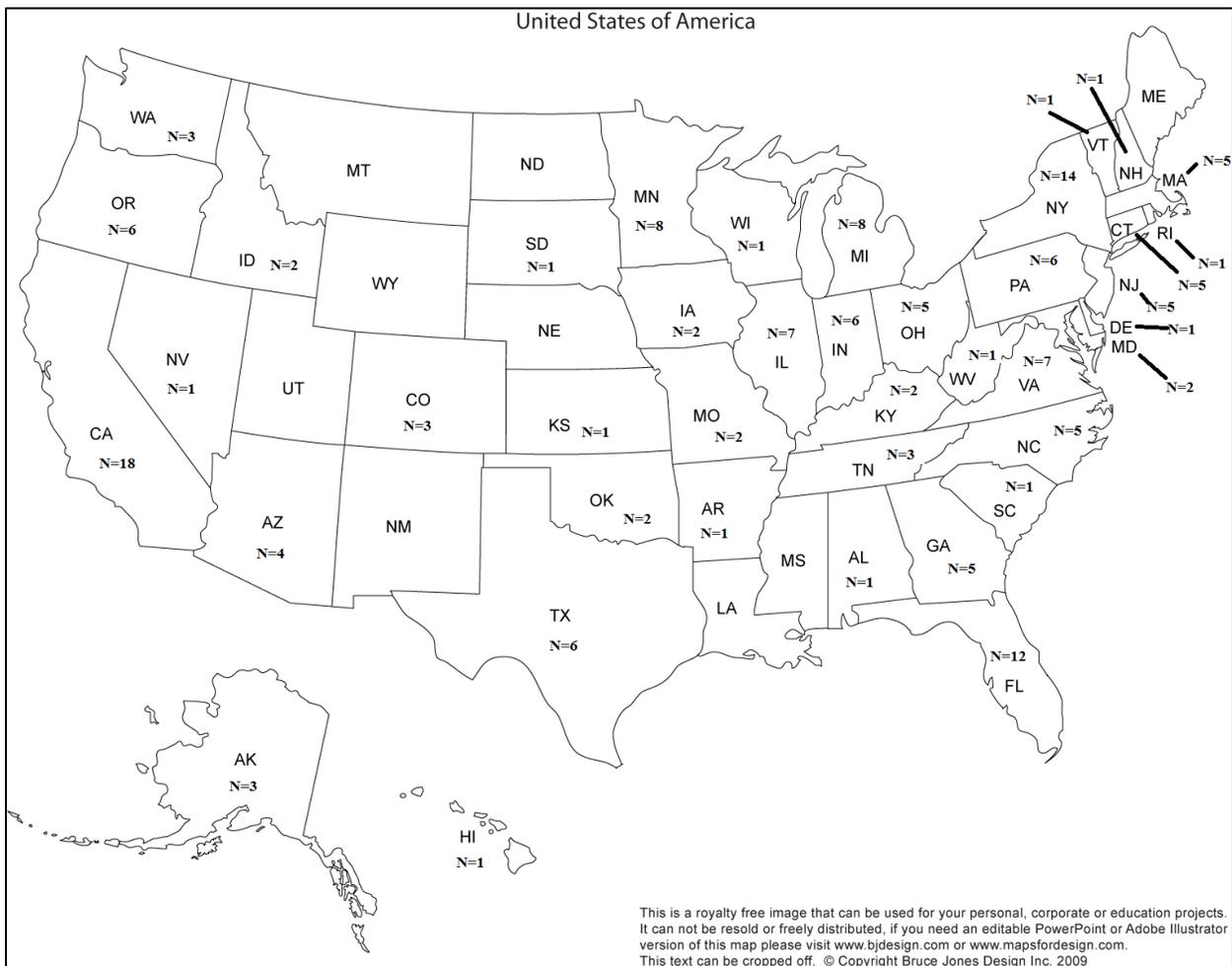


Figure 14. Participants; home states in Study 5.

Methods

Participants were randomly assigned to one of 3 conditions: in the control condition, participants read task descriptions, and were asked to predict how long, in hours, each task would take (as in Studies 1-4). There were two experimental conditions: in the unpack-steps (U-Steps) condition, participants read the task description and then read three concrete steps of the task before making a task completion prediction (Figure 15). In the listing-reasons (L-Reasons) condition, participants read the task description and then read three reasons for completing the task before making a task completion prediction (Figure 16). By reading steps (rather than reasons), participants should be primed to think about the task's feasibility concerns (rather than desirability concerns), which should reinforce a concrete construal of the task (rather than an abstract construal of the task). Longer time predictions should only be observed when the content of unpacking is construed concretely (H1). When thinking about the task is focused on abstract features (on desirability concerns), individuals may instead focus on internal motivations, resulting in more optimistic task completion predictions. In this study, all participants were given the same set of steps or reasons to control for both number and level of detail of steps unpacked. All steps were taken from unpacking results from previous studies, and all reasons were taken from a pretest that was conducted on MTurk¹⁰. A full list of tasks and unpacking can be found in Appendix E.

¹⁰ Participants in this pretest were asked to list three reasons why a series of tasks might be completed. The most common responses were selected for use in the present study.

Please predict how long, in hours, each of the following tasks will take.

Below is a list of common steps taken in completing this task. They may help you make your prediction. Please make your prediction, in hours, below.

1.Prepare a 5 minute speech on budgeting at the end of the week

Common steps:

- Research important budgeting concepts, using internet and library
- Form an outline of main points to make
- Type up speech or make index cards to aid presentation

your prediction here (in hours) .

Figure 15. Screen caption of the unpack-steps condition of Study 5.

Please predict how long, in hours, each of the following tasks will take.

Below is a list of common reasons why this behavior takes place. They may help you make your prediction. Please make your prediction, in hours, below.

1.Prepare a 5 minute speech on budgeting at the end of the week

Common reasons:

- Because giving this presentation is required
- To explain important budgeting concepts to co-workers or friends
- To encourage better financial planning in general

your prediction here (in hours) .

Figure 16. Screen caption of the listing-reasons condition of Study 5.

Results

There were no effects of age ($F < 1, p > .50$) or gender ($F < 1.5, p > .20$) on task completion predictions.

A one-way ANOVA by condition (control, unpack-steps, listing-reasons) was conducted on standardized completion time predictions (as in all previous studies). A marginal main effect of condition was observed, $F(2, 162) = 2.47, MSE = 0.26, p = 0.09, \eta^2 = 0.03$ (Figure 17).

Follow-up post hoc LSD comparisons reveal that this main effect reflected a significant difference between control ($M_{\text{Control}} = -0.09$) and unpack-steps conditions ($M_{\text{U-Steps}} = 0.12$), $p = 0.03$; neither condition differed significantly from the listing-reasons condition ($M_{\text{L-Reasons}} = -0.004$), $ps > .20$.

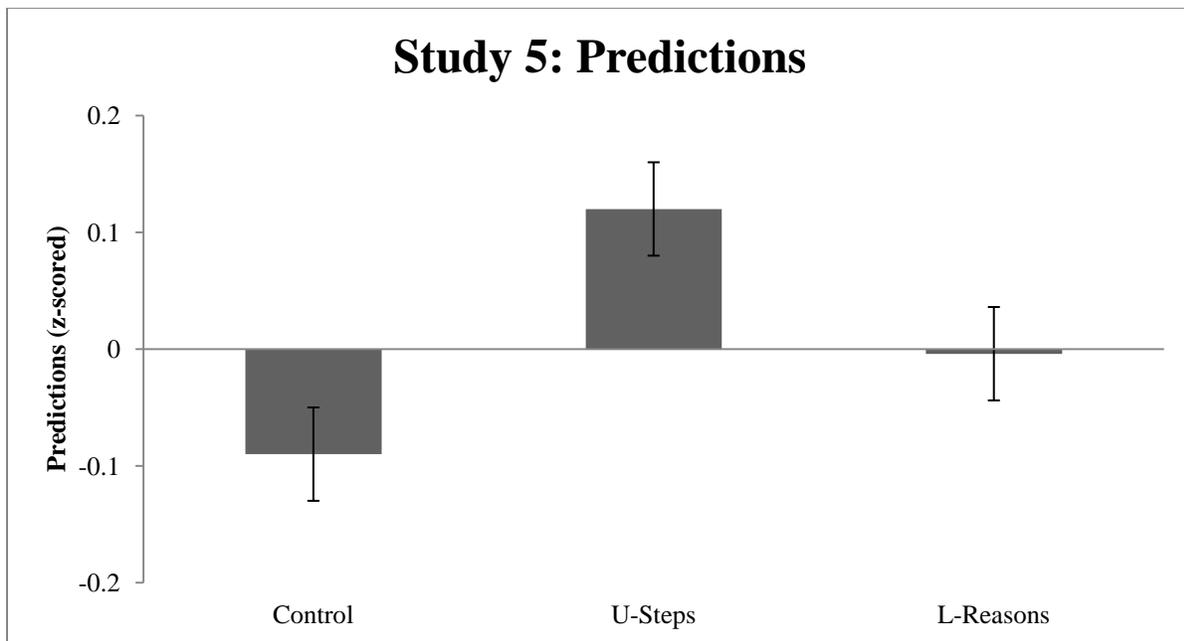


Figure 17. Predictions, standardized, across conditions and time, in Study 5. Unpacking effects (longer time predictions) were pronounced when participants read listed feasibility-related steps of the task, but not when participants read listed desirability-related reasons for completing the task. Error bars represent standard error of the mean.

Discussion

This study replicated unpacking effects observed in the previous studies using a novel unpacking manipulation whereby unpacked steps were provided for participants, rather than having participants come up with steps themselves. As such, this study rules out an alternative hypothesis that generating steps, rather than simply reading them, is critical to the unpacking effect. In this study, when participants read three unpacked steps of the task, they made longer task-completion predictions than did controls, suggesting that again, reading unpacked steps of a task was a particularly robust strategy for reducing optimistic bias (as tasks are construed concretely). When reasons were listed (instead of steps), no unpacking effects were observed. These results suggest that the unpacking effect is moderated by how concretely the task is construed after it is unpacked, and in particular, that the construal of what is unpacked is important for reducing optimism in task completion predictions (H3).

General Discussion

Individuals regularly try to maintain a positive outlook on life. Language is full of figures of speech aimed at maintaining a positive focus: we try to see the glass as half-full instead of half-empty, and try to see the silver lining to every cloud. As such, it should not be surprising that an optimistic outlook permeates to predictions of life events. Indeed, Weinstein (1980) observed that individuals perceived themselves as being more likely to experience positive life events, such as living a long life, but less likely to fall victim to negative life events, such as having a heart attack at an early age. Other work has similarly observed that people tend to describe more positive than negative events in reference to themselves (Matlin & Stang, 1978). One possibility is that level of optimism is reflective of where an individual sits relative to the mean. That is, 50% of a sample *should* believe that they are more likely than the average person to experience a positive event, or less likely to experience a negative event, given simple assessments of probability. However, individuals tend not to be well-calibrated. As far back as Freud (1928), psychologists have been aware that optimism may have an illusory component. For example, Kruger and Dunning (1999) observed that the majority of individuals in a sample regarded themselves as being funnier and more logical than the average participant in the study, providing a clear statistical error. This use of a better-than-average heuristic (Alicke & Gorovun, 2005) suggests that optimistic predictions may be clouded with wishful thinking and motivational bias, producing miscalibration. As a result, individuals may have a more difficult time appropriately assessing risk levels (Tversky & Koehler, 1994). Indeed, an underestimation of personal health risk (for example, the risk of a heart attack) might lead an individual to

inappropriately take part in risk-taking activity, such as overeating, smoking, or sedentary lifestyle choices.

The planning fallacy, which is hypothesized to be rooted in the optimistic bias, is a widely observed phenomenon (Kahneman & Tversky, 1979; Buehler, Griffin & Ross, 1994). It has been hypothesized that this misprediction of task completion times may rely on an inappropriate conception of the task. That is, individuals may unintentionally ignore or forget important steps required for task completion, leading them to inappropriately mentally represent the task (Tversky & Koehler, 1994; Kruger & Evans, 2004). However, when tasks are broken down into their components, individuals tend to produce longer completion estimates (Kruger & Evans, 2004).

In the present thesis, it was hypothesized that the unpacking effect would be particularly robust when the task is construed as psychologically near (H1), as unpacking effects are hypothesized to rely on how easily or readily the task is unpacked. Further, in a psychologically near construal, tasks should be unpacked into more steps (H2). Finally, when more steps are brought to mind, task completion predictions should subsequently become longer, and therefore less optimistic (H3).

Five studies lend support for these hypotheses (see Table 5 for summary), and for a distance-dependent unpacking effect. In Study 1, H1 was tested directly by asking participants to make task completion predictions across a hypothetical year. In the near future, it was hypothesized that unpacking effects should be robust, given that tasks presented in the near future are construed concretely, and in more detail. In the distant future, it was hypothesized that unpacking effects should be reduced or attenuated, given that tasks presented in the distant future are construed abstractly and in less detail. The unpacking effect was more pronounced in Study

1 for tasks framed as temporally near, but was attenuated for tasks framed as temporally distant. Further, when tasks were construed in the near future, they were unpacked into more steps. Finally, when tasks were unpacked into more steps, predictions were longer. This first demonstration of the distance-dependent unpacking effect was replicated in Studies 2 and 3, which examined the same hypotheses in a different sample (university undergraduates in Study 2) and different task set (large tasks in Study 3), as well as by using a unique manipulation of temporal construal (Study 3). Again, the unpacking effect was reduced or attenuated for tasks in the distant future. In addition, these studies also showed support for the hypothesis that participants unpacked more steps in the near future (Study 2), as well as the hypothesis that when more steps are unpacked, task completion predictions are longer (Study 3).

Studies 4 and 5 were focused on extending these results. In Study 4, participants unpacked either few or many steps. It was hypothesized that when unpacking fewer steps, participants would not view tasks as more detailed, and as such, should not display unpacking effects. That is, unpacking a task into fewer steps should not increase predictions of task completion. However, when unpacking many steps, participants should view tasks as much more detailed, and as such, should display robust unpacking effects. That is, unpacking a task into many steps should increase predictions of task completion, relative to when the task is not unpacked, or when the task is unpacked into a few steps only. It was observed that when many steps were unpacked, predictions were significantly longer than were predictions made when only a few steps were unpacked, supporting H3. In Study 5, predictions were examined when the content of what was unpacked was controlled for, and it was observed that when concrete steps were unpacked, task completion predictions were longer than were those for non-unpacked control tasks. It was hypothesized that when concrete steps of a task were unpacked, participants

would make longer task completion predictions, as the task would be viewed in greater detail (H1). However, when abstract reasons for completing the task were listed instead, it was hypothesized that participants would not make longer task completion predictions, as the level of detail that the task was construed at should not have changed. When concrete steps of the task were unpacked, task completion predictions were significantly longer than predictions made in a non-unpacked control condition. However, when abstract reasons were listed, there was no significant difference from predictions made in a control condition. Results of this study suggest that the unpacking effect is moderated by how concretely the task is construed when unpacked—the same reduction in optimistic predictions was not seen when abstract reasons for completing a task were considered. Also, given that in this study steps were unpacked by the experimenter, and not the participant, this study demonstrated that unpacking effects observed in previous studies were not dependent on participants unpacking the tasks themselves.

Table 5.

Summary of findings, Studies 1-5.

Study	Manipulation of construal	Tasks	Unpacking effect?	Hypotheses supported
Study 1	Temporal frame: predictions made in near- versus distant future	20 hypothetical tasks	For tasks in the near future, $p < .01$, but not the distant future, $p > .15$.	H1, H2, H3
Study 2	Temporal frame: predictions made in near- versus distant future	12 hypothetical tasks, plus one nomination task	For tasks in the near future, $p = .05$, but not the distant future, $p > .50$.	H1, H2
Study 3	Temporal frame: predictions made in near- versus distant future	5 large-scale, hypothetical household tasks	For tasks in the near future, $p < .05$, but not the distant future, $p > .30$.	H1, H3

Study 4	Detail: unpacked 2 versus 5 steps	10 hypothetical tasks	For small-scale tasks, $p < .001$, but not large-scale tasks, $p > .40$.	H3
Study 5	Desirability vs. feasibility frame: read unpacked concrete steps or listed abstract reasons for completing a task	10 hypothetical tasks	For tasks unpacked into concrete steps, $p < .05$, but not abstract reasons, $p > .20$.	H1, H3 using the feasibility versus desirability dimension of construal level

Together, this work points to the important role of a concrete construal in the unpacking effect. Construal-level theory (Liberman & Trope, 1998; Trope & Liberman, 2000, 2003) proposes that psychological distance changes people's responses to future events by changing the way people mentally represent those events, and as such, provides one theoretical explanation for the findings above. Individuals are hypothesized to construe near-future situations more concretely, seeing tasks in a more detailed fashion. In the distant future, situations are construed more abstractly, and elements are viewed more holistically and broadly (see also Zhao, Hoeffler & Zauberan, 2007). As applied to task-completion predictions, when individuals view a task in the near future (and as concrete and detailed), versus in the distant future (where tasks are construed as abstract and broad), they are likely to make different predictions about what is required to complete the task. Trope and Liberman (2003) suggest that particularly for tasks in the near future (which are construed concretely), details of the task may be more easily brought to mind (see also Bilgin & Brenner, 2008). Together with Studies 1-3, these results are highly consistent with predictions of Support Theory (Tversky & Koehler, 1994), whereby decomposition of an event into its sub-components increases the overall probability associated with the event, particularly when tasks are in the near future and details are easily brought to

mind. These studies show that unpacking a task into concrete steps increases task completion predictions.

Limitations and remaining questions

The present set of studies provides convergent evidence supporting the influence of temporal distance, and construal level, on the magnitude of the unpacking effect in task-completion time predictions. These conclusions, however, are naturally limited by the contexts in which the studies were executed, giving rise to some limitations and some open questions about the generalizability of the results.

Hypothetical nature of tasks. One critical limitation of this thesis lies in the hypothetical nature of the tasks examined. Indeed, in the one real item examined in these studies (nomination item of Study 2), unpacking effects were not replicated (although one possible explanation for this outcome may be determined by considering the framing of the task)¹¹. Given that participants were well-aware that task completion predictions were hypothetical, they may have been incentivized to make optimistic predictions to appear as an efficient and motivated participant. That is, participants may have been optimistic because predictions would never be explicitly tested (i.e., participants would never be asked to complete the tasks or report on actual behavior). Despite this, it is likely that task completion predictions were still meaningful. If participants did not construct predictions meaningfully, it might be expected that predictions

¹¹ Because participants were asked to select tasks that were due in the next 2-3 months, those tasks were both poorly-specified (the subject matter for some students was not determined yet) and relatively distal compared with day-to-day work that students typically do (e.g., weekly lab reports, readings, etc.). As such, real-world tasks, which might be construed relatively concretely, were actually construed at a more abstract level than were the hypothetical tasks within the study. This finding suggests that unpacking effects require the task to be well-defined. Poorly-defined tasks are difficult to unpack, and as such, unpacked steps may not confer much more information about the task than do holistic estimates.

should not differ by experimental condition (control versus unpacking). Effects are observed, however, throughout Studies 1-5, suggesting that predictions were not made carelessly despite their hypothetical nature. In addition, for longer tasks (i.e., large scale tasks of Studies 3 and 4), longer task completion predictions were made, suggesting that participants recognized the amount of work required for larger tasks.

Actual completion times are not measured. A separate limitation to this work is that unlike other studies of the planning fallacy (Buehler, Griffin & Ross, 1994; Kruger & Evans, 2004), actual completion times are not examined. Indeed, without this measure, it cannot be ascertained as to whether optimistic predictions and prediction error is reduced. Much of the literature suggests that unpacking manipulations affect predictions, but not actual completion times (Kruger & Evans, 2004; see also Peetz & Buehler, 2009, for a demonstration in the domain of spending), and as such, the work presented here is likely to be influential in terms of expanding our understanding of task completion predictions, and optimism in general. However, a clear demonstration of this effect with real tasks is needed to solidify the construal-dependent unpacking effect as an externally-valid contribution to the literature.

Interpretation of the Inside/Outside account. Our results may at first appear to be inconsistent with the certain interpretations of the inside/outside account of prediction error (Kahneman & Tversky, 1979). Traditionally, it has been hypothesized that people look inside their representation of the task to assess it, but fail to look outside to evaluate the relevant distribution of comparable past experiences. The planning fallacy has thus been framed as an adoption of an inside view, focused on specific plans for completion (Buehler, Griffin & Ross,

1994). This account suggests that predictions are optimistic because individuals fail to adopt a perspective that incorporates past experiences of similar events (i.e., the base rate). Peetz and Buehler (2012) have suggested that when adopting an inside perspective, individuals tend to focus on the details of their *plans*, and as such, maintain a concrete construal of the task, resulting in optimistic predictions. In the present studies, it is hypothesized that because participants were focused specifically on the *task* when unpacking, instead of their plans for completion, participants' construal of the *task* was perceived as concrete or abstract. Indeed, future plans may not have been considered by participants at all.

The present findings suggest an interpretation of the inside/outside account of the planning fallacy requires a specification as to what focal element (the task or the plan) is construed from the inside or the outside. That is, when individuals are focused on plans, adopting a broader focus should encourage thinking about the distribution (i.e., past experiences), and as such, should result in less optimistic predictions. However, when individuals are focused on the task's details, adopting a broader focus should encourage thinking about the task abstractly, with fewer steps; as such, predictions in this scenario would be more optimistic. The work of Peetz and Buehler (2012) offers support for the former portion of this hypothesis, and the present work finds support for the latter portion; however, a more comprehensive and controlled comparison is required.

Construal effects in control conditions. There exist many demonstrations that as an event draws nearer, individuals become less optimistic (Eyal, Liberman, Trope & Walther, 2004; Gilovich, Kerr & Medvec, 1993; Savitsky, Medvec, Charlton & Gilovich, 1998; Peetz, Buehler & Wilson, 2010). In conjunction with work on unpacking, this perspective suggests that

optimistic bias associated with task completion predictions should be minimized as the deadline is approached. Indeed, supporting these findings, Peetz and Buehler (2009) showed that prediction bias was larger for weekly predictions (where budgets were set once for 7 days) than for daily predictions (where budgets were set each day). Peetz and Buehler suggest that more broadly construed weekly predictions cannot be verified as quickly as can daily predictions (i.e., their deadlines are farther away in the weekly condition), and so individuals might be more motivated to maintain a “wishful thinking” focus in these longer-horizon situations. Similarly, Sanna, Parks, Chang and Carter (2005) demonstrated that the temporal frame of a task (“little time remaining” versus “a lot of time remaining”) influences subjective distance of a deadline, and thus influences the size of the planning fallacy. Individuals who adopt a “little time remaining” mindset, and see the task as temporally closer, displayed less optimism in task completion predictions, and demonstrated a reduced planning fallacy. Finally, when participants were asked to adopt a future-oriented focus by considering plans for an upcoming task, their optimistic bias was magnified relative to predictions made by participants in a control condition, who did not consider such plans (Buehler & Griffin, 2003). Finally, in both domains of future job earnings (Study 1) and in exam scores (Study 2), Shepperd, Ouelette and Fernandez (1996) demonstrated that as the task approaches in time, optimism in predicting outcomes is reduced.

In contrast, in Studies 1-3 of this work, trends in control conditions suggested that task completion predictions were *longer* (less optimistic) in the distant future compared to the near future. Collapsing across these studies, when tasks are construed in the distant future, predictions are less optimistic (longer; $M_{\text{Distant}} = 0.04$) than are predictions for tasks construed in the near future ($M_{\text{Near}} = -0.17$), $F(1, 282) = 8.19$, $MSE = 0.41$, $p < .01$, $\eta^2 = 0.03$. This suggests that when considering the distant future, participants in the control condition adopted a broader, outside

view, and as such, may have incorporated past experiences into their task completion predictions (see Peetz, Buehler & Wilson, 2010; Peetz & Buehler, 2012, for a similar explanation in the domain of spending¹²). Alternatively, it is plausible that in the present studies, participants in the control condition making task completion predictions for the near future tended to focus in great detail on motivation-based plans to complete a task, and as such, these individuals display a high degree of optimism because plans appear fully-formed and indestructible. Conversely, participants in the control condition making predictions for the distant future may view plans more abstractly and with less detail, and as such, may recognize that plans are not as well-formed or complete as they could be. That is, an abstract plan might have more obvious sources of error or interruption.

Unpacking does not always increase length of prediction. Several failures to replicate the unpacking effect suggest that there are circumstances under which unpacking steps of a task may not increase predictions. Byram (1997) found that when participants saw a building task decomposed into its major components, and assigned time estimates to each section (with the assistance of building directions), overall predictions of time to complete the task were not significantly influenced (Study 1). This suggests that perhaps unpacking might rely on steps being more detailed (H2)—the major components listed in Bryam’s (1997) work might have been too broad. Further, when a new exercise program (2 hours per week) was decomposed into daily amounts (17 minutes per day), individuals had stronger intentions to try the program, and were *more* likely to actually try the program when asked two weeks later (Peetz, Buehler &

¹² Peetz and Buehler (2012) observed that when individuals were asked to make spending predictions for the near future, they displayed an optimistic bias—they predicted spending less than in previous weeks. However, when individuals were asked to make spending predictions for the distant future, they displayed no optimistic bias—predictions were no different from behavior in past weeks. The authors argue that when considering the distant future, individuals adopt an outside view, and as such, take into account previous behavior and distributional information when predicting.

Britten, 2011, Study 1), suggesting that unpacking time actually increased optimism toward the task. This work suggests that breaking down the time required for task completion, rather than the task itself, might make the task appear more attainable. Together, these studies suggest that the content of what is unpacked is critical to how robust the effect is (H2, H3). These findings also receive support from work by Connolly and Dean (1997), who suggest that when decomposing a task, both the task itself and the content of decomposed elements contribute to the efficacy of the manipulation.

Work in the domain of probability judgments lends some assistance when examining these experimental anomalies. Sloman, Rottenstreich, Wisniewski, Hadjichristidis and Fox (2004) observed that when target events were unpacked into typical components (e.g., cause of death by heart disease, stroke), probability estimates did not significantly differ from control predictions. Further, when atypical events (e.g., pneumonia, diabetes) were unpacked, probability estimates were superadditive—predictions in this condition were smaller than were those in the control condition (see also Hadjichristidis et al., 1999, Hadjichristidis, Sloman & Wisniewski, 2001). Sloman et al. (2004) argue that by attending to low-probability outcomes, individuals instead anchor on low probability estimates, and as a result, overall probability judgments are smaller. Applying this to the domain of task completion predictions, this work suggests that focusing on unlikely events or steps may inappropriately bias an individual to make optimistic predictions, as mental representations of the task at hand have not been decomposed into relevant, detailed steps. Building on this work, Redden and Frederick (2011) have demonstrated that when unpacking an event increases perceived complexity of the problem, unpacking effects are reversed. For example, individuals prefer their odds of winning a cash prize when the probability of winning is packed (winning on trials where a die roll is an even

number) relative to when the probability of winning is unpacked (winning on trials where a die roll is a 2, 4 or 6; Study 1). In this case, unpacking a relatively simple event produces a negative cue via disfluency, which is consistent with hypotheses of Support Theory. Applying this work to the domain of task completion predictions, this work suggests a possible boundary condition to the unpacking effect, whereby unpacking simple events that are already well-understood may attenuate or reduce the unpacking effect.

Together, it seems quite clear that unpacking effects rely on the target task being decomposed (Henrion, Fischer & Mullin, 1993), and on the framing of those decomposed steps. Indeed, construal of the tasks themselves, and of the steps unpacked, should play an important role in the size of the effect.

Individual differences. In Studies 3 and 4, main effects of gender were observed, such that males were more optimistic than females. This work is consistent with other literature demonstrating that males tend to be more optimistic than females (Lin & Raghurir, 2005). Further, males tend to make more investment trades than women, suggesting that they are more overconfident about the value of their goods (Barber & Odean, 2001; Grinblatt & Keloharju, 2009). Finally, Deaux and Farris (1977), Beyer and Bowden (1997), Beyer (1998), and Johnson et al. (2006) have found that men have higher self-perceptions than women regarding testing performance, despite the general lack of difference in actual scores (a “testing fallacy”). As such, the gender differences in the present studies may reflect a trend toward more optimism in males.

Practical implications and extensions

Previous work suggests that unpacking may act as a “cure” for optimistic prediction by increasing the salience of small but consequential steps required for task completion. The present work, however, demonstrates that the content of what is unpacked changes as a function of how temporally proximal the task feels to the predictor. For tasks represented as occurring in the near future, unpacking may be quite helpful in reducing optimistic bias, particularly because the steps that are unpacked tend to be concrete and detailed, and recognition of these steps increases overall task completion predictions. For tasks represented as occurring in the distant future, however, unpacking may not reduce optimistic bias, as the steps unpacked tend to be broad and non-specific. In such cases, unpacking does not make salient the small but consequential steps, and predictions do not shift.

Spending and saving. Peetz and Buehler (2009) have demonstrated a budget fallacy whereby individuals predict spending less per week than they actually do spend. This suggests that the planning fallacy may be extended to other domains, including that of budgeting. The present results suggest that when encouraging individuals to budget more effectively, they should be encouraged to think about the spending period more proximally, and should also unpack spending. For example, participants may list daily expenditures (the “steps” of spending) over the course of the week (spending period). However, this work also suggests that if the spending period is construed abstractly (for example, if it is perceived in the distant future, as a week next month or next year), unpacking daily expenditures may not reduce optimism, and as such, the budgeting fallacy may persist or perhaps become more robust.

Extending the present findings in the domain of spending will be particularly insightful given that individuals tend not to think they will incur debt, and often make financial decisions based on this fact. For example, Yang, Markoczy and Qi (2007) have demonstrated that individuals tend not to focus on the interest rates of credit cards when selecting a card for use, despite this information being important if a balance is carried on the card for more than a month. Yang et al. suggest that because individuals do not believe they will carry a balance, they do not use interest rate as a factor in choice. Perhaps by encouraging individuals to think about spending behavior as proximal and in greater detail, participants may make less optimistic predictions about paying credit card balances, and may thus be more attentive to interest rates. Similarly, Peetz and Buehler (2009) demonstrate that when individuals anticipate the amount they will spend over the course of the next week, they tend to under-predict expenditure. This effect is more robust for individuals who have strong savings goals, suggesting again that the intention to save outweighs the ability to plan for spending. The work presented in this thesis suggests that in the domain of temporal predictions, unpacking a temporally proximal task reduces reliance on intentions when making predictions. Applying these findings to the domain of saving goals might encourage individuals to prepare better for circumstances of spending, particularly when savings goals are strong.

Subjective versus objective perceptions of distance. One important finding in this work hinges on the role of *perceived* proximity. If the same task can be thought of as relatively near or far away, then one way in which individuals may capitalize on unpacking effects might lie in representing to-be-predicted tasks as relatively more proximal. An individual looking to make a realistic prediction about completing a paper due at the end of the month might try to construe the paper as relatively proximal by comparing the paper to a project due at the end of the

semester. When asked to undertake a task in the distant future, it may be wise to first examine a task (and its component steps) in the near future. Perhaps by manipulating perceived proximity, an individual will be able to construe of the task more concretely, and as such, may be able to employ an unpacking strategy effectively.

Indeed, using this distance-dependent unpacking effect as a prescriptive tool to make decisions on whether one has time to give a talk in six months, or whether one has time to train for a marathon next year, might encourage individuals to recognize that ventures like these are time-consuming, and are likely to be completed with haste in the future, just as they might be completed if undertaken in the near future. The implications of this type of tool range from giving more engaging talks at conferences (presuming that when abstracts are due months before a conference, only speakers with an appropriate amount of time to plan a talk will submit abstracts), to less injuries in marathons (presuming that individuals who do not have time to allocate to training will not commit to running). Finally, using a tool like this may lower costs of participating in both of these ventures: giving a rushed, unprepared talk may result in negative perceptions of the caliber of your work by peers and senior members of the field; being unprepared for a marathon may result in physical injury to one's self, over-use of medical resources allocated to the race, and general disappointment with a poor race time (or worse, an incomplete finish!).

What does this mean for optimism in general? Unpacking appears to reduce optimism associated with near-future tasks, and as such, it may be wise to offer unpacking as a prescriptive aid to predictions, particularly when incorrect predictions carry consequences. However, the current task now lies in understanding how to shift construal of distant-future tasks to become

more proximal, as well as to examine whether unpacking effects may reduce optimism in these circumstances.

Conclusions

The studies presented in this thesis demonstrate that the unpacking effect (Tversky & Koehler, 1994), at least as applied to task-completion time predictions, relies on a concrete construal of the task, operationalized here in Studies 1-3 as the near future, and in Study 5 as feasibility concerns. Indeed, unpacking effects are more robust when more steps are unpacked (Studies 1, 2, and 4), and when more steps are unpacked, task completion predictions are longer (Studies 1, 3 and 4). In addition, the unpacking effect might be most robust when the task is not spontaneously broken down into component steps (Study 4). That is, when unpacking a task into many steps, optimistic predictions may be more readily adjusted after unpacking. Finally, unpacking requires the task to be well-defined; otherwise, steps unpacked are too broad to offer new insights about the task, and may encourage an internal, desirability-focused perspective (Study 5). Trope and Liberman (2010) suggest that both temporal distance and hypotheticality are two sides of the same coin, as they are both forms of psychological distance; this work suggests that when psychological distance is small (when tasks are near), optimism toward the task may remain high (Peetz & Buehler, 2012). However, by unpacking these tasks, optimism can be attenuated in favor of more appropriate, realistic estimates of task completion times.

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Appendices

Appendix A: Prediction tasks from Study 1

September 2011

1. Prepare a speech of 5 minutes in length about budgeting, to be presented at the end of the month
2. Select an outfit for a date at the end of the week (Kruger & Evans, 2004, Study 2)
3. Write a review of Britney Spears' most recent album of the summer for your favorite online magazine for their October issue (writing task; Peetz, Buehler & Griffin, 2010 Study 5)
4. Build a birdhouse for your front yard
5. Plan a party celebrating the beginning of the school year (Bilgin & Brenner, 2008, Study 1)

December 2011

1. Plan a holiday party for your close friends (Bilgin & Brenner, 2008, Study 1)
2. Shop for and purchase all holiday gifts for friends and family (Buehler & Griffin, 2003, Study 1; Peetz, Buehler & Griffin, 2010, Study 1; Kruger & Evans, 2004, Study 1)
3. Write a short summary of a book you recently read (Peetz, Buehler & Griffin, 2010 Study 5)
4. Complete an application to attend a post-graduate program at a local school
5. Purchase a gift for a friend whose birthday is at the end of the week

February 2012

1. File your taxes before the March 15th early bird deadline (Buehler, Peetz & Griffin, 2010, Study 4b)
2. Find a person to sublet your home while you are away this summer

3. Photoshop your face into the official wedding portrait of William and Kate as a Valentine's Day gift for a friend

4. Tune up your bike so you can start riding it

5. Make a flyer for a concert a friend is putting on at the end of the week

April 2012

1. Give a prospective student a tour of the local campus before school closes in May

2. Learn to use a new software package for a job you are starting at the end of the month

(Buehler, Peetz & Griffin, 2010, Study 1)

3. Help a friend move their bed out of their apartment at the end of the month

4. Pack for a weekend trip you plan on taking in a few weeks

5. Prepare a tray of appetizers for a party you are attending this evening (Kruger & Evans, 2004, Study 4)

Appendix B: Prediction tasks from Study 2

October 2011 (October 2012—Distant counterbalance)

1. Prepare a speech of 5 minutes in length about budgeting, to be presented at the end of the month
2. Plan a party celebrating the fall season (Bilgin & Brenner, 2008, Study 1)
3. Select an outfit for a date at the end of the week (Kruger & Evans, 2004, Study 2)

December 2011 (December 2012—Distant counterbalance)

1. Purchase a gift for a friend whose birthday is at the end of the week
2. Plan a holiday party for your close friends (Bilgin & Brenner, 2008, Study 1)
3. Complete an application to attend a post-graduate program at a local school

February 2012

1. Find a person to sublet your home while you are away this summer
2. Photoshop your face into the official wedding portrait of William and Kate as a Valentine's Day gift for a friend
3. Make a flyer for a concert a friend is putting on at the end of the week

April 2012

1. Learn to use a new software package for a job you are starting at the end of the month (Buehler, Peetz & Griffin, 2010, Study 1)
2. Prepare a tray of appetizers for a party you are attending this evening (Kruger & Evans, 2004, Study 4)
3. Give a prospective student a tour of the local campus before school closes in May

Nomination instruction

“Now think of a real-life large project or term paper due by the end of this term for you. Describe it below (e.g., subject matter, course).”

Appendix C: Prediction tasks from Study 3

1. Painting the kitchen (1.8 days)
2. Prepare for a marathon or race (4.2 months)
3. Repaint the exterior of the house (5.9 weeks)
4. Painting the interior of the house (1 week)
5. Lay down new carpet in your house (1.6 days)

Appendix D: Prediction tasks from Study 4

Small scale tasks

1. Prepare a 5 minute speech on budgeting
2. Prepare for a date at the end of the week (Kruger & Evans, 2004, Study 2)
3. Buy a birthday gift for a friend
4. Prepare a tray of appetizers for a party (Kruger & Evans, 2004, Study 4)
5. Tune your bike

Large scale tasks

6. Lay down new carpet in your house
7. Strip wallpaper in a spare room
8. Paint the interior of the house
9. Replace hardwood flooring
10. Re-shingle the roof of a house

Appendix E: Prediction tasks from Study 5

1. Prepare a 5 minute speech on budgeting at the end of the week

Reasons:

Because giving this presentation is required

To explain important budgeting concepts to co-workers or friends

To encourage better financial planning in general

Steps:

Research important budgeting concepts, using internet and library

Form an outline of main points to make

Type up speech or make index cards to aid presentation

2. Prepare for a date at the end of the week (Kruger & Evans, 2004, Study 2)

Reasons:

Because someone asked you on a date

To make a good impression on my date

To increase the chances of a second date or a relationship

Steps:

Look in closet to examine what you have

Try on outfit options, considering the date and weather

Choose outfit that suits the date best

3. Plan a party (Bilgin & Brenner, 2008, Study 1)

Reasons:

To celebrate a special occasion and see friends

To show friends they are important

To maintain friendships and feel good about myself

Steps:

Set guest list and send invitations to friends and their guests

Purchase food and supplies, considering number of people, theme, etc.

Prepare food: organize tables and drinks, cook appetizers, and arrange them for guests

4. Buy a birthday gift for a friend at the end of the month

Reasons:

To show you care about your friend

Because this friendship is important

We have been friends for a long time

Steps:

Think of a gift idea that is appropriate for the friend, and fits your budget

Go to store to browse options

Purchase the best gift option and wrap for your friend

5. Tune your bike

Reasons:

To be able to ride the bike

To get exercise and stay in shape

To be a healthy individual

Steps:

Get tools out to tighten bolts, adjust seat, and make other general repairs

Check tires for pressure and air; pump if necessary

Perform tune up on all areas requiring work

6. Make a flyer for a friend's band, which is playing a show at the end of the week

Reasons:

To help out the friend in the band

Because the friend in the band is a good friend

Because he or she would do the same for you, if asked

Steps:

Scan images of friend/band, selecting the best ones from what is available

Create flyer on computer using a software program

Print copies either at home or at a nearby printer's

7. Give a campus tour to a prospective student

Reasons:

It is your job to give the tour

Because you are loyal to the school

Because you enjoyed your time at the school and are proud of it

Steps:

List important spots to cover, based on the student's major and interests

Set a meeting time with student that fits both of your schedules

Give tour, taking the student to important places

8. File your tax return, due in April (Buehler, Peetz & Griffin, 2010, Study 4b)

Reasons:

To get a refund or to find out how much you owe

To avoid any late fees or penalties

To be a law-abiding citizen

Steps:

Collect documentation, including W2s, 1099s, and other receipts and donation information

Fill out forms, making sure to include all relevant information in all sections

Send forms in after checking them over

9. Learn a new software program for a job you are starting at the end of the month (Buehler, Peetz & Griffin, 2010, Study 1)

Reasons:

To be prepared and successful at the new job

To impress the boss and coworkers

Long-term incentives like promotions and raises

Steps:

Obtain software for the company, or purchase yourself

Read manual and any other guides available online

Simulate using the software for common tasks, practicing and playing around until comfortable

10. Pack for a weekend trip

Reasons:

To make sure you have everything and that you don't forget anything

To enjoy yourself

So that you can come back to work rejuvenated

Steps:

List items needed, considering the weather, location, and activities planned

Collect items for packing, including toiletries and any documentation required

Place items in bag, and make sure the bag closes