Unpacking Estimates of Task Duration: The Role of Typicality and Temporality

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Abstract

Research in task duration judgment has shown that unpacking a multifaceted task into components prior to estimating its duration increases estimates. In three studies, we find that unpacking a complex task can increase, decrease, or leave unaffected task duration estimates depending on the typicality of the unpacked components and their temporal position in the task sequence. Unpacking atypical long components increases task duration estimates, while unpacking atypical short components decreases estimates (Study 1). Unpacking atypical early components increases task duration estimates, while unpacking atypical late components decreases estimates (Study 2). Unpacking typical early or late components leaves estimates unaffected (Study 3). We explain these results based on the idea that task duration estimation involves a mental simulation process, and by drawing on theories of unpacking in probability judgment that emphasize the role of the typicality of the unpacked components. These findings hint at a deep conceptual link between probability judgment and task duration estimation but also show differences, such as the influence that temporality exerts on estimated duration.

Keywords: task duration judgments, unpacking, narrow interpretation conjecture, temporal order, mental simulation

Unpacking Estimates of Task Duration: The Role of Typicality and Temporality

Research on task duration and completion time estimation has focused on why people tend to predict they will finish a task sooner than they actually do and sooner than they remember having finished comparable tasks previously (the planning fallacy) (e.g., Buehler, Griffin, & Ross, 1994). The original inside/outside account of the planning fallacy (Kahneman & Tversky, 1979) holds that underestimation occurs because predictions are based on singular information about the current task (inside view) rather than on distributional information about previous similar tasks (outside view). People predict based on a mental scenario or simulation of how things will unfold, rather than on how the current task fits with comparable previous tasks. Another account of the planning fallacy holds that underestimation occurs not because information about previous tasks is neglected but because it is inaccurately remembered (Roy, Christenfeld, & McKenzie, 2005). Whilst there is support for each account (e.g., Buehler et al., 1994; Roy & Christenfeld, 2007; Thomas & Handley, 2008), the research emphasis has been on calibration (Do predictions accord with actual and recollected duration?) and content (Do people focus on the unique features of the target task? Do people consider previous performance?). What seems clear from such research is that, at least for familiar tasks, the planning fallacy is a robust phenomenon and that people do tend to adopt an inside view (for a review, see Buehler, Griffin, & Peetz, 2010). An outstanding question is that of the central cognitive activity underlying the prediction of task duration and completion time: What happens inside people's heads?

Kruger and Evans (2004) approached this question by drawing on support theory (Rottenstreich & Tversky, 1997; Tversky & Koehler, 1994), a descriptive account of subjective probability judgment. Support theory states that when estimating the probability of a hypothesis (e.g., death due to disease) people naturally unpack some typical components that would be included in the hypothesis (e.g., cancer, heart attack) and base their judgment upon the strength of evidence (support) these provide for the hypothesis. An unpacked hypothesis (e.g., death due to diabetes, influenza, pneumonia, or any other disease) might remind people of components that they would have otherwise neglected, and thus increase judged probability. Kruger and Evans hypothesized and supported a similar process for task duration estimation: people do not naturally unpack multifaceted tasks in sufficient detail and thus unpacking prompts consideration of additional components and increases duration estimates. For example, Kruger and Evans asked participants to predict how many days they would take to complete their Christmas shopping either directly (packed condition) or after listing the people they planned to buy gifts for (unpacked condition). Overall, duration estimates were higher in the unpacked condition.

The present research builds on Kruger and Evans's (2004) connection between task duration estimation and probability judgment, with the aim of gaining further insight into the task duration estimation process. Our hypotheses are based on probability judgment research (e.g., Hadjichristidis, Sloman, & Wisniewski, 2001), which showed that the effect of unpacking on judged probability depends on the nature of the components unpacked. Specifically, whether they are typical or atypical examples, and the strength of evidence (or support) they provide for the hypothesis. Sloman, Rottenstreich, Wisniewski, Hadjichristidis, and Fox (2004) demonstrated that unpacking "death due to disease" into "death due to pneumonia, diabetes, cirrhosis, or any other disease" decreased estimates. They suggested that, contrary to support theory, unpacking does not necessarily mean that individuals will process more components than with a packed description, but that unpacking narrows attention to the components listed (the narrow interpretation conjecture; NIC). If components are typical (those that people would spontaneously think of, given the packed hypothesis), judged probability will be the same as that for the packed description, but when components are atypical, the effect will depend on the support they provide for the hypothesis: if they provide weak support, judged probability will decrease; if they provide strong support, judged probability will increase.

We make a parallel prediction for task duration estimation, hypothesizing that in this domain also unpacking typical components will have no effect on judgment, whereas unpacking atypical components will focus attention on their characteristics. We predict that when unpacked components are atypical, estimated duration will either increase or decrease based on how time-consuming the components are perceived to be (H1) or how early or late they are located in the task sequence (H2). H1 has a clear parallel with the predictions from the NIC, with "support" interpreted in terms of how time-consuming the unpacked components are perceived to be: task duration estimates will increase if the unpacked components are perceived to be time-consuming, but decrease if the unpacked components are seen as being relatively quick to complete.

H2 is a novel hypothesis driven by a distinction between the categories commonly used in probability judgment, which involve semantic knowledge (e.g., diseases), and those commonly used in task duration judgment, which are serial and involve procedural knowledge (e.g., writing an article; preparing for a date). Natural unpacking of the former categories is likely to track typicality (Tversky & Koehler, 1994; see also, Murphy, 2003; Rosch & Mervis, 1975), whereas natural unpacking of the latter categories is likely to track temporal order, as for the "inside" mode of thinking of the inside/outside account (e.g., Kahneman & Lovallo, 1993; see Buehler et al., 2010). We hypothesize that unpacking atypical components will focus attention on the point in the task sequence where these components occur, providing a point of reference for subsequent processing. Activities that follow these components are in their relative future, whereas activities that precede these components are in their relative past. Research on mental simulation suggests that people think more thoroughly, extensively and episodically about future activities than about past activities, even if these activities are hypothetical (Van Boven & Ashworth, 2007). We predict that the reference point provided by unpacking atypical components will affect the simulation of the activities that precede and follow that reference point: unpacking atypical early components increases estimated duration because most task activities follow them and are simulated more extensively, whereas unpacking atypical late components decreases estimated duration as most activities precede them, so are mentally simulated less (H2). We also predict that unpacking typical components will leave task duration estimates unaffected, again a parallel prediction to the NIC (H3). Borrowing a term from Rottenstreich and Tversky (1997), typical unpackings might lead people to repack the description (i.e., treat it in the same manner as the packed task).

Study 1: Atypical unpacking - Long vs. Short

We tested H1 using a modified version of Kruger and Evans's (2004) document formatting task, which involved formatting an unformatted word definition from a dictionary. Participants were given the unformatted text and its formatted equivalent and had to estimate the time it would take them to modify the unformatted text using a word processor so that it looked identical to the formatted text. Unpackings highlighted elements of the task perceived as taking a long or short time to do by other similar individuals.

Method

Participants

Participants were 152 University of Trento undergraduates (96 women, 56 men; mean age = 22.49 years). They all volunteered and were tested in small groups.

Materials and Procedure

Participants were given a document-formatting task, which was embedded within a questionnaire, with the cover story that the task was used to test secretarial skills. Participants were presented with a formatted document on paper, which was a dictionary definition of the word "morphology", and its unformatted equivalent, that they had to imagine opened as an MS Word document. Their task was to estimate the time (minutes) it would take them to do all formatting changes to render the unformatted text identical to the formatted document. Although we expected participants to have sometimes used formatting operations previously, such as putting headings in their assignments in bold, the task itself was novel; most times, we do formatting changes as we type, not on complete, already typed base-documents. The unpacked components of the task were short (adding italics and boldface) or long (adding special phonetic characters). Tests on a separate group confirmed that making italic and bold changes is perceived to take less time and be easier than inserting special characters.

Participants were randomly assigned to one of three conditions: packed, unpacked-short, unpacked-long. Those in the packed condition were asked to estimate the time (minutes) it would take to make the unformatted text look identical to the formatted text. The unpacked-short condition [unpacked-long condition] was asked to estimate the time it would take to make the unformatted text look identical to the formatted text including adding italics and boldface [special characters (ə, ŏ, ĭ)], among other things.

In addition to the experimental task, the instrument included a first page that asked for age and gender, and described the task. Following the experimental task, participants were asked to self-rate their computer skills on an 11-point scale (0 = *complete novice* and 10 = *expert*). Finally, participants were debriefed and thanked for their participation.

Results and Discussion

As Table 1 reveals, estimates followed the predicted order: unpacked-short ≤ packed ≤ unpacked-long (H1). The impact of condition was analyzed using an ANCOVA, with computer skills rating as a covariate.[1] There was a main effect of Condition: $F(2,148) = 9.35$, $p < .001$, and the predicted significant linear contrast ($p < .001$). Multiple comparisons (Bonferroni corrected) revealed significant differences between the unpacked-short and packed conditions ($p = .019$) and between the unpacked-short and unpacked-long conditions ($p < .001$). Computer skills were significant: $F(1,148) = 36.06$, $p < .001$, with higher self-rated skills being correlated with lower duration estimates: $r(157) = -.47$, $p < .001$ (two-tailed).[2] In sum, the results are consistent with H1.

TABLE 1 ABOUT HERE

Study 2: Atypical Unpacking - Early vs. Late

In Study 2, to test H2, we used a more familiar task (preparing for a date) that has a strong

[1] Gender has no significant effect or interaction so is omitted from the analysis.

[2] Computer skills are included here as a control variable. Although there are variations in computer skills by group, these differences are not such as to offer an alternative explanation for the results (i.e., the group with the lowest marginal mean for duration did not have the highest level of skill).

temporality component. Specifically, we used a modified version of Kruger and Evans's (2004) date task, which involves imagining getting ready for a date with someone one has recently met. We predicted that, in comparison to a packed condition, unpacking an atypical early task component would increase task duration estimates, while unpacking an atypical late task component would decrease estimates because of the different degrees of mental simulation invoked by the early versus late reference points.

Experiment 2.1

Method

Participants

A new sample of 101 University of Trento undergraduates (80 women, 21 men; mean age = 21.32 years) participated voluntarily. Participants were tested in small groups.

Materials and Procedure

Participants were asked to imagine that they had arranged to go on a date that evening with a person they had just met. They were then told to imagine that it was noon and that they were at home, having just been jogging, with no other plans for the afternoon except preparing for the date; their date would pick them up at 7:00 PM. Participants were randomly assigned to one of three conditions: packed, unpacked-early, unpacked-late. The packed condition was asked: "How long would it take you to do everything that you need to do to prepare for the date?" Before making an estimate, the unpacked-early condition [unpacked-late condition] was told: "In order to help you respond to the following question, we can tell you that for such tasks people think about various activities, such as taking off their shoes and jogging clothes [*putting on the clothes and shoes they've selected*]". These participants were then asked, "How long would it take you to take off your shoes and jogging clothes [*put on the clothes and shoes you've selected*] and do everything else that you need to do to prepare for the date?" The unpacked components were atypical of those that participants spontaneously unpacked. If they were not prompted to consider them, participants did not see taking their clothes and shoes off as a separate component of preparing for a date, but they would be part of the process of taking a shower, which was the most common first item listed. Participants also did not spontaneously list putting on selected shoes and clothes as a component, although it was implicit in listed components such as “dress up”.[3]

The questionnaire included a first page that asked for age and gender and instructed participants to proceed page by page and not amend earlier responses. The second page contained the experimental task, followed by the question regarding the duration (minutes) of the task. The third page asked participants for a start time (When would you start preparing for the date? ____PM) and the fourth page asked for a list of all the activities participants thought of while estimating task duration. At the bottom of this page, participants were instructed to return to their list and state next to each activity the time needed to complete it. Participants were then debriefed

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[3] We did robustness checks to ensure that the unpacked components were not altering participants’ perceptions of the task. Tests on a separate group of participants showed that “Taking off the clothes and shoes you have on now/getting undressed”, “Selecting clothes to wear” and “Getting dressed” (which comprise the unpacked components of our task) were perceived as being part of getting ready for a date by a majority of participants (77%, 89% and 89%, respectively). “Taking off the clothes and shoes you have on now/getting undressed” had an equivalent percentage agreement to “Putting on underarm deodorant” (77%). Other activities which are not part of the task (although they might happen during it – e.g., watching TV) received very low ratings (13% for TV, 5% for reading a newspaper). We also checked that getting undressed (which had a relatively lower rating than getting dressed) was not adding substantially to the estimates of those in the early condition and increasing estimates. For participants who specifically mentioned undressing, the average time spent on this component was 4.26 minutes, whereas the difference between conditions in the results is considerably more than this. We also re-ran the main ANOVA with the time allocated to undressing removed from the overall estimate and the reported linear trend is still significant.

and thanked for their participation.

Results and Discussion

The data are summarized in Table 2. The predicted linear trend (unpacked-late ≤ packed ≤ unpacked-early) for task duration estimates was confirmed (H2). Moving from the unpacked-late to packed to unpacked-early conditions, participants estimated longer durations to prepare for the date. The predicted trend was also present for start time, with males showing more variation in start time across conditions.

TABLE 2 ABOUT HERE

Data were analyzed by a 3 × 2 ANOVA (Condition × Gender), testing for a linear trend: unpacked-late ≤ packed ≤ unpacked-early. Both measures showed the predicted significant linear trend for Condition (p = .032 for duration, p = .039 for start time). Multiple comparisons (Bonferroni corrected) showed significant differences between the unpacked-early and unpacked-late conditions for task duration (p = .018) and start time (p = .019). Both measures showed a main effect of gender (ps < .05), but no interaction between condition and gender (*n.s.*).

Our rationale for H2 was based on the mental simulation aspect of estimating task duration. We suggested that the unpacked atypical components will act as a reference point from which the other task activities would be framed as “past” or “future”, with participants mentally simulating past activities less extensively than future activities. This could, however, manifest in more than one way: past activities could be neglected or mentally pictured in less detail or vividness in comparison to future activities. To investigate these alternatives, we examined the activity lists participants produced after estimating task duration and start time, counting the number of activities listed and the mean time per activity (see Table 3).

TABLE 3 ABOUT HERE

The results do not support the first alternative: the unpacked-late condition did not neglect activities. If anything, this condition listed more activities than the packed condition (*n.s.*) and no fewer activities than unpacked-early condition (*n.s.*). This conclusion is also corroborated from a detailed examination of the activity lists. Ninety-five out of 100 participants strictly followed temporal order when listing components of the task. Showering was the most common starting point across all conditions, and was equally common in the packed and unpacked-late conditions, with showering and undressing (the latter being prompted) being common in the unpacked-early condition. All first activities were feasible starting points. In sum, unpacking atypical late activities did not lead participants to neglect activities.

To examine the second alternative, that the unpacked-late condition thought about “past” activities (which were all other activities in the task, as the unpacked-late component came at the very end of the task) in less detail, we analyzed mean time per activity. Consistent with the second alternative, a 3 × 2 ANOVA (Condition × Gender) on mean time per activity showed a significant linear trend (unpacked-late ≤ packed ≤ unpacked-early, p = .043). There was a main effect of gender (p < .05) but no interaction between condition and gender (*n.s.*).

Although the results are consistent with our hypothesis, Experiment 2.1 does not directly demonstrate that the extent of mental simulation differs between the three conditions. There are issues, however, in trying to investigate both issues in one experiment as making simulation salient may change estimation behavior. Work in the area of emotions, for example, has shown that taking measurements of emotions hypothesized to link to particular behaviors can change subsequent behavior (e.g. Keltner, Locke, & Audrain, 1993; Sandberg & Connor, 2009). We therefore conducted another experiment to investigate the extent of mental simulation.

Experiment 2.2

Method

Participants

Sixty-seven people from the University of Leeds campus (49 women, 18 men; mean age = 21.37 years) participated voluntarily.

Materials and Procedure

Participants were given a questionnaire containing the scenario from Experiment 2.1. We used two conditions: unpacked-early; unpacked-late. As previously, the unpacked-early condition [unpacked-late condition] was told: “In order to help you respond to the following questions, we can tell you that for such tasks people think about various activities, such as taking off their shoes and jogging clothes [*putting on the clothes and shoes they’ve selected*]”. Participants were then told “Think about taking off your shoes and jogging clothes [*putting on the clothes and shoes you’ve selected*] and doing everything else that you need to do to prepare for the date, and try to estimate how long it will take”. Participants were then asked about their feelings and what they were doing during this task duration estimation process. To investigate the extent of mental simulation, we asked participants “While thinking about taking off your shoes and jogging clothes [*putting on the clothes and shoes you’ve selected*] and doing everything else that you need to do to prepare for the date, and estimating how long it would take, did you mentally picture or think through what needed to be done to complete the task?” responding on an 11-point scale (1= *Not at all*, 11= *A great deal*). We also wished to investigate another potential explanation for our results:[4] that the focus on the place of the atypical component in the task sequence might make people feel further from (unpacked-early) or closer to (unpacked-late) the end of the task. We tested this by asking participants “How does the point in time when you will have finished preparing for the date feel…” responding on two 11-point scales (1= *Feels very close*, 11 = *Feels very far away*; 1 = *Feels very near*, 11 = *Feels very distant*). We also asked about feelings that might arise from feeling closer to the end of the task (1 = *I am short of time*, 11 = *I have plenty of time*; 1 = *I don’t feel rushed*, 11 = *I feel very rushed*; 1 = *I have lots to do*, 11 = *I have little to do*). These reactions to feeling closer to the end could provide a rationale for allocating less time to components of the task.

Results and Discussion

The data are summarized in Table 4 and were analyzed using 2 × 2 ANOVAs (Condition × Gender). For the question relating to mental simulation, there was a main effect of condition,

[4] We thank the editor and an anonymous reviewer for this suggestion.

$F(1,63) = 31.09$, $p = .032$; the unpacked-early condition mentally pictured or thought through what needed to be done more than the unpacked-late condition. There were no main effects of condition for any of the variables relating to how close the participant felt to finishing the task (*ps* > .3). The results support the mental simulation account.

TABLE 4 ABOUT HERE

Study 3: Typical Unpacking – Early vs. Late

The general aim of Study 3 was to identify the boundaries of the early versus late unpacking effect. Specifically, we examined H3, according to which unpacking typical tasks should not show the early/late effect demonstrated above, in line with the predictions of the NIC.

Method

Participants

A new sample of 125 University of Trento undergraduates (98 women, 23 men; mean age = 21.86 years) participated voluntarily. Participants were tested in small groups.

Materials and Procedure

This study uses the date task from Study 2, but two typical tasks early and late in the date preparation process are unpacked (taking a shower and getting dressed). These are broadly similar to the components used in Study 2 in terms of position in the task sequence (indeed they are the nearest correspondences from our participants' lists). The procedure used was as in Study 2.

Results and Discussion

The data are summarized in Table 5 below.

TABLE 5 ABOUT HERE

There was no significant linear trend in the task duration estimates or start time estimates across the three conditions, and no significant difference between conditions (*n.s.*). Nor was there any significant interaction between gender and condition (*n.s.*). This supports H3 and the links made in our hypotheses to the NIC; typical unpackings do not affect task duration estimates.

General Discussion

This research supports a focusing of attention, similar to that demonstrated for probability judgment in studies on the NIC, which causes unpacking of atypical task components to influence task duration estimates. Unpacking atypical components that take a short time to complete decreases estimates, whereas unpacking longer components increases estimates (Study 1). We also demonstrate a conceptually similar focusing of attention effect based on the position of an unpacked component in the temporal sequence of a task. Unpacking atypical late components reduces task duration estimates, decreasing mean times estimated per component, while unpacking atypical early components leads to longer estimates and longer mean times per component (Study 2, Experiment 2.1). This was as we hypothesized based on the idea that the unpacked atypical components provide a reference point, framing other parts of the task in the relative past or future, and thus affecting the elaboration level of the mental simulation undertaken. We also demonstrate that unpacking atypical early components prompts more mental simulation than unpacking atypical late components (Study 2, Experiment 2.2). Finally, we show that unpacking typical components has no influence on task duration estimates (Study 3).

Future research could address the specific mechanisms that underlie these effects. The short/long effect might be due to an anchoring and insufficient adjustment process (Tversky & Kahneman, 1974); [5] participants might be anchoring on the perceived duration of the short/long component and insufficiently adjusting upwards (Thomas & Handley, 2008). Note, however, that such a process cannot explain the early/late effect of Experiment 2.1. In that experiment both the early and late tasks involved similar activities in reverse order, but the former increased estimates, whereas the latter decreased them. For tasks that have a serial nature, we have shown that the position of the unpacked component in the chain of activities involved in the task is also important. Regarding the early/late effect, future research could test directly our hypothesized mechanism

[5] We thank an anonymous reviewer for this suggestion.

based on Van Boven and Ashworth (2007) by unpacking an atypical middle task component and examining how activities that come before it ("past") or after it ("future") are treated (the present unpacked early and unpacked late conditions focused participants at the very beginning and the very end of the task, respectively). To gain further insight into this process, research could also use process-tracing techniques such as verbal protocols and think-aloud studies (see e.g., Buehler et al., 1994). Finally, future studies could also address the mechanism through which a higher degree of mental simulation translates into higher duration estimates. We see two possibilities: a higher degree of mental simulation might mean that people would think about or imagine the component tasks more vividly or that it would take them longer to simulate them. Both of these quantities (vividness/simulation time) could be used as proxies for estimating task duration (Kahneman, 2003).

The unpacking effects shown by Kruger and Evans (2004) have been related to construal level theory (Fiedler, 2007), which states that the psychological distance between the individual and events being considered affects the process of evaluation for those events. When individuals consider events that are psychologically distant they use more abstract and less detailed representations (construals) compared to events that are psychologically close (see Trope & Liberman, 2010, for a review of construal level theory). Fiedler suggests that in Kruger and Evans’s research unpacking reduced the perspective distance to the task considered, making people focus on the representation of the task, construct its components in more concrete terms, and therefore increase estimates because neglected subtasks are incorporated into estimates. However, recent research (e.g., Boltz & Yum, 2010; Peetz, Buehler, & Wilson, 2010) has supported a more complex relationship between level of construal and task duration estimates; the effect of concrete construals on task duration estimates depends on what sort of information people focus on. If people focus on obstacles, then concrete construals increase estimates, whereas if people focus on plans, concrete construals decrease estimates. Peetz et al. further suggest that real tasks prompt people to focus on obstacles, whereas hypothetical tasks (like the date task used here) prompt people to focus on plans.

Alteration of construals in this way would not, however, explain our results; following Peetz et al., our unpacking manipulations should decrease task duration estimates or, at a minimum, influence estimates in a similar way, but this is not what happens. For a full account of the results one also needs to consider the atypicality of the unpacked components, in line with NIC.

Another potential explanation for the finding that unpacking can decrease or increase task duration estimates comes from research into the role of unpacking in probability judgment. Redden and Frederick (2011) have shown that certain unpacked hypotheses (e.g., rolling a 2, 4 or 6 on a die) decrease non-numerical likelihood estimates with respect to corresponding packed hypotheses (e.g., rolling an even number on a die), which they attribute to the unpacked hypotheses being more difficult to process (less fluent). The general idea is that processing fluency (subjective ease or difficulty associated with a mental act) can act as a proxy for judgment (for a review, see Oppenheimer, 2008) including task duration estimates (Song & Schwarz, 2008). Song and Schwartz found that the ease with which people could read instructions on how to complete a task influenced their estimates of the task's duration. However, it is hard to see why unpacked descriptions with atypical early or long components are less fluent than ones with atypical late or short components; the contrasts between components that are short and long or early and late in the task sequence, and the fact that estimates for the packed conditions fall between the unpacked conditions, are better explained by the focus on those tasks' characteristics rather than ease of processing.

A further potential alternative explanation is that unpacking late task components leaks information about what the experimenter has in mind (e.g., Grice, 1989). For example, the associated task instructions (see Study 2) might have suggested to participants that the preparation process started with the mentioned activities. However, we were careful to introduce the unpacked tasks innocuously as examples of what others have mentioned. Indeed, atypical unpacked late participants did consider earlier tasks, if anything they considered more tasks than packed participants (see also footnote 3). Yet they predicted shorter task durations and planned later starts. Furthermore, when the early and late tasks were typical (Study 3), no effect was present .

Kruger and Evans (2004) asked participants to unpack tasks by themselves, whereas we unpacked the tasks for participants, which is the standard way in which unpacking has been manipulated in studies of probability judgment (e.g., Rottenstreich & Tversky, 1997). It would be interesting to see in future research whether prompting participants to list atypical short/long or early/late task components before estimating task duration would elicit similar results.

In conclusion, we have shown that unpacking may increase or decrease task duration estimates depending on what is unpacked in a way conceptually similar to the effects in probability judgment predicted by the NIC. These findings hint at a deeper conceptual link between probability estimation and task duration estimation. However, they also point at differences such as the importance of the temporality of the unpacked components in task duration estimation, as the duration estimation process seems to prompt a mental simulation of how the task would unfold. We suggest that it is time to look inside the “inside account” of the task duration estimation process, and that unpacking as an experimental paradigm offers a useful tool for doing so.

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Table 1

Mean (SD) and Marginal Mean (Adjusted for Computer Skills) of Task Duration Estimates (Minutes) by Unpacking Condition, Study 1

Condition	*n*	Mean	*SD*	Marginal Mean (Adjusted for Computer Skills)
Unpacked Short	51	6.24	(4.57)	6.33
Packed	50	8.48	(6.26)	9.68
Unpacked Long	51	12.73	(8.65)	11.46

Table 2

Mean (SD) of Task Duration (Minutes) and Start Time Estimates by Unpacking Condition and Gender, with Marginal Means Per Unpacking Condition, Study 2, Experiment 2.1

		Unpacked Late		Packed		Unpacked Early	
Measures	Gender	Mean	*SD*	Mean	*SD*	Mean	*SD*
Duration	Females	67.00	(43.25)	76.35	(33.51)	89.65	(43.20)
	Males	30.63	(21.95)	39.17	(18.00)	59.29	(18.13)
	Marginal Mean	48.81	-------	57.76	-------	74.46	-------
Start time	Females	18:08	(48.46)	17:54	(45.97)	17:53	(43.63)
	Males	19:01	(32.03)	18:27	(33.43)	18:20	(45.14)
	Marginal Mean	18:35	-------	18:11	-------	18:07	-------

Table 3

Mean (SD) of Number of Activities and Time per Activity (Minutes) by Unpacking Condition and Gender, with Marginal Means Per Unpacking Condition, Study 2, Experiment 2.1

		Unpacked Late		Packed		Unpacked Early	
Measures	Gender	Mean	*SD*	Mean	*SD*	Mean	*SD*
Number of Activities	Females	5.52	(2.04)	4.44	(1.89)	5.70	(1.70)
	Males	3.75	(2.19)	3.00	(1.26)	5.86	(2.27)
	Marginal Mean	4.64	-------	3.72	-------	5.78	-------
Time per Activity	Females	12.49	(9.47)	15.16	(7.57)	15.51	(9.08)
	Males	4.87	(2.75)	10.63	(4.35)	11.77	(2.97)
	Marginal Mean	8.68	-------	12.90	-------	13.64	-------

Table 4

Mean (SD) of Extent of Mentally Picturing or Thinking Through, Feeling Relative to the End of the Task, Feeling Short of Time, Rushed and with Little/ Lots to Do, by Unpacking Condition and Gender, with Marginal Means Per Unpacking Condition, Study 2, Experiment 2.2

		Unpacked Late		Unpacked Early	
Measures	Gender	Mean	*SD*	Mean	*SD*
Mentally Picture or Think Through	Females	6.19	(2.27)	7.21	(2.54)
	Males	5.08	(3.07)	7.40	(1.95)
	Marginal Mean	5.63	-------	7.31	-------
Feel Close/ Far from Completion	Females	6.14	(2.52)	6.46	(2.53)
	Males	5.00	(2.38)	4.40	(2.51)
	Marginal Mean	5.57	-------	5.43	-------
Feel Near/ Distant from Completion	Females	5.81	(2.32)	5.96	(2.26)
	Males	5.38	(2.33)	4.20	(2.68)
	Marginal Mean	5.60	-------	5.08	-------
Short of Time/ Plenty of Time	Females	7.33	(2.63)	7.14	(2.56)
	Males	7.33	(3.17)	8.00	(2.91)
	Marginal Mean	7.33	-------	7.57	-------
Rushed	Females	4.29	(2.28)	5.54	(2.78)
	Males	4.67	(2.57)	4.80	(2.77)
	Marginal Mean	4.48	-------	5.17	-------
Little/ Lots to Do	Females	6.52	(2.02)	6.29	(2.21)
	Males	5.17	(3.01)	5.80	(2.39)
	Marginal Mean	5.85	-------	6.04	-------

Table 5

Mean (SD) of Task Duration (Minutes) and Start Time Estimates by Unpacking Condition and Gender, with Marginal Means Per Unpacking Condition, Study 3

		Unpacked Late		Packed		Unpacked Early	
Measures	Gender	Mean	*SD*	Mean	*SD*	Mean	*SD*
Duration	Females	79.17	(33.77)	64.07	(26.75)	86.29	(40.95)
	Males	37.00	(9.75)	34.58	(22.61)	44.17	(13.57)
	Marginal Mean	58.08	-------	49.33	-------	65.23	-------
Start time	Females	17:30	(37.52)	17:49	(30.51)	17:25	(39.66)
	Males	18:09	(20.12)	18:09	(24.70)	18:06	(25.10)
	Marginal Mean	17:50	-------	17:59	-------	17:45	-------