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Unpacking estimates of task duration: The role of typicality and temporality

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HIGHLIGHTS

- We examine how unpacking components of a task influences its judged duration.
- When atypical time consuming components are unpacked, judged duration increases.
- When atypical short components are unpacked, judged duration decreases.
- When atypical early components are unpacked, judged duration increases.
- When atypical late components are unpacked, judged duration decreases.

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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.

Introduction

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). While 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?

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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, that is, 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.