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Understanding and Supporting Daily Planning in Knowledge Work

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Abstract. Daily planning habits and skills have an impact on workers' productivity and job performance. While daily planning is essential for modern work, daily plans can often be challenging to execute. My PhD research has investigated the errors and challenges knowledge workers experience when planning their work day. A diary study was conducted with 20 academics as participants to learn how tasks are planned at the start of the day and which tasks are actually completed during the day. Results showed that while participants were good at estimating the duration of time-constrained tasks, they were not very good at estimating the duration of less time-constrained tasks (e.g. the time needed for email and coding tasks was underestimated, whereas the time needed for writing research and planning activities was overestimated). My future work aims to develop and test planning and scheduling (AI) tools to better support knowledge workers daily planning habits and overcome these time estimation biases in their work.

Motivation

The main aim in this thesis is to investigate how existing technology can better support knowledge workers in achieving their daily plans at work. Although daily planning is essential for many people, creating and sticking to a daily plan can be challenging. Workers often feel overwhelmed by an ever increasing list of to-dos. Distractions are one-click away and can take significant time to recover from.

Studies done by Mark (2015) show that people that people work under high time pressure which causes them stress. Syrek et al. (2017) gave evidence that failures to complete daily tasks can have negative consequences on productivity and can increase work-related rumination during periods of rest and relaxation.

Successful daily planning depends on accurate estimation of how much work can be done in a given time frame. Time estimations involved in planning are especially important for more autonomous knowledge workers, such as academics, who are able to set their own daily agendas. However, people may lack the experience or expertise to make accurate time estimates about how long their tasks will take to complete. Previous studies suggest that time estimates can also be affected by known biases, such as optimism as shown by Newman (2004). Few studies focus on time estimation errors at the workplace and no previous studies look at those in knowledge work tasks. Exploring such biases in scheduling and planning of work can help us design better support systems to reduce their impact.

Existing research aims to support automatic time estimation and scheduling of calendar tasks which can easily be time boxed, such as meetings. There are fewer research efforts to support time estimation of tasks with fewer time constraints. How long would writing a grant proposal take to complete? The person doing the task often cannot estimate this. Can we give them help?

Research questions

The overall aim of my thesis is to address the research question: How can we improve existing support tools for daily planning to better assist users in estimating the duration of their daily tasks? To answer this question, my research so far has addressed the following sub-questions:

- How accurate are people at planning their daily tasks?
- Why kinds of events cause delays in the successful completion of daily plans?
- What kind of strategies do people use to plan and prioritize their tasks, and why?

Methodological approach

My PhD research takes a mixed-method approach to understanding how to improve existing support tools for daily planning to better assist users in estimating the duration of their daily tasks. Three stages have been used to address this research question so far. The first stage consisted of a one-day diary study comparing what people aimed to achieve with what they actually did during the day. The second stage explored why people changed their plans during the day of the diary through semi-structured interviews. The third stage investigated people's planning and execution strategies in general again with semi-structured interviews.

In this paper, I shall summarise the results of a recent study that was reported in Ahmetoglu et al. (2020). For this study, academics and doctoral level students in a university were recruited as participants because they are able to set their own daily agendas. This group of people also do a mix between solo and team activities over a wide-range of projects, which allows to gain observations about many different tasks. Building on previous research Newman (2004), an augmented diary method was used. The findings were then complimented with semi-structured interviews in order to contextualise and validate them with different angles. In the following section a high-level overview of the findings of this study are reported; please refer to Ahmetoglu et al. (2020) for a more detailed account.

Findings

The first stage found that participants were not accurate when asked to estimate the duration of their daily tasks, especially for tasks which were not scheduled in their calendars, such as email and writing tasks. They both underestimated and overestimated the duration of their tasks, suggesting that some tasks were prioritized over others. The average duration of workday tasks was estimated to be 7 hours 44 min (SD = 102 min) whereas the actual duration of workday tasks reported was 6 hours 40 min (SD = 101 min). Participants spent 54 min (SD = 50 min) on work activities which were not included in the plan. Moreover, they did not complete 34% of their planned work. Those findings are in line with a previous study by Claessens et al. (2010) which used retrospective estimations to investigate how people spent their time in comparison to their plans.

To understand why there were errors in time estimations, the second stage (follow-up interviews) investigated the events that prevented people from executing work as they intended to. Thematic analysis indicated that most people made plans which lacked detail. They did not plan for all activities associated with execution of the desired end-goals from the plan during a typical workday. Specifically, participants did not factor in enough time for preparatory work tasks, breaks, requests from others and lost time due to fatigue.

Thematic analysis of interviews about planning in general (stage 3) resulted in five individual styles in daily planning. Some preferred to plan only if necessary, others planned ahead in their minds all the time, a third group updated a task list every day in a simple tool, others planned in multiple task lists (daily, monthly, annual). Finally, some participants reported having no task lists at all because they were too overwhelmed with their work to be able to think ahead of today. Those who had the habit of daily planning made more realistic plans and had more predictable days.

Next steps

This research contributed to the understanding of how knowledge workers planned and executed their tasks. Findings were triangulated by using different methods. A diary method found time estimation errors in daily plans. Two interviews studies found why those errors occurred and explored personal planning strategies to provide more context to the errors.

One of the main findings from this research was that participants consistently overestimated how much they can get done during the "free" time slots in their calendars. Those who kept a daily to-do list were more likely to execute a task as expected. However, participants reported challenges in developing habits of daily planning with a dedicated to-do list tool. A substantial group preferred to use their calendars to keep track of tasks. Current calendar apps however are not designed for task listing purposes. This points to the importance of integrating calendar and task listing tools to help people make achievable daily plans. The rest of my research will focus on exploring the appropriate ways to do this integration.

The next study will be an app functionality review to describe existing tools that allow to be integrated in a way so that task lists can have a temporal dimension in one's schedule. Existing calendar apps and to-do lists will be evaluated against a list of user needs identified in the previous study. For example, sorting tasks based on their characteristics such as difficulty and urgency when choosing what to do next, scheduling tasks with reminders or providing a record of past tasks related to a project. Functionalities will be evaluated on a scale rather than with a binary yes or no system to allow for richer understanding of "how well" apps support integration (as opposed to "do they").

The final study in my thesis will test the effect of a field intervention. The impact of encouraging daily planning through the use of integrated tools will be compared with the use of disintegrated tools and a control group. The DV will be a measure of perceived control over time and proportion of daily tasks executed as planned.

Expected contributions

The expected contributions of my thesis are related to both theory and practice. Empirical research on time estimation errors in the workplace has contributions to theory of cognitive biases. A framework of the mechanisms through which those errors occur will expand the understanding of how those errors work. Further, understanding mechanisms and impacts of time estimation errors has direct implications for interventions which aim to encourage more detailed and regular planning. Organisations and universities will benefit from evidence-based strategies to support time management of their employees beyond existing popular press advice. Finally, my thesis will contribute to the body of research by providing design requirements and early stage prototypes for an integrated scheduling and task listing tool which can help people learn how to better estimate the duration of their daily tasks.

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