**\section{Chapter introduction}**

\begin{comment}

Chapter 3 presented two qualitative studies that investigated how office workers perform data entry work in office settings. It revealed that self-interruptions to collect information is a major aspect of their work. Even though data workers tried to collect information carefully before starting a task, they often did not realise they needed certain information until starting the task. Whereas they deferred retrieving physical sources, for digital sources they self-interrupted their task immediately to retrieve additional information. The hypothesis was made that differences in expected time costs influenced people's decisions on when to switch and interrupt themselves.

Chapter 4 presented findings from three controlled experiments that supported the hypothesis: when time costs to access digital sources are consistent, and people learn and anticipate the time it will take them to retrieve information, they will look up and enter items that take the least time first, and postpone getting information that takes time to look up. An issue is that, outside of a controlled setting, people often do not know how long an interruption to look up digital information may take, and whether they should switch immediately or later. As was observed in Study 2, digital interruptions often took far longer than intended because people had to search through large and multiple documents, and could get distracted by irrelevant information. Because they did not know the time they spent on task interruptions, it was difficult to manage these self-interruptions.

The studies presented in this chapter aim to investigate whether giving people feedback on the time spent on task interruptions has any effect on people's self-interruptions. In particular, the purpose is to see whether time information reduces the number and duration of interruptions, and as a result can improve data entry performance. Study 6 used an experimental data entry task to measure if a notification showing the average duration on people's window switches had an effect on number and duration of their switches, and data entry speed and accuracy. Study 7 evaluated the feedback with data workers doing expenses work, to evaluate if the notification would be suitable for an applied task.

\end{comment}

%BRIDGE FROM LAST STUDY

%Study 6 aims to evaluate the design recommendations in a finance office with workers, to see how appropriate and feasible the proposed recommendations would be in the context for which they are developed. Depending on what the design recommendations will be, I will take them through a prototype, which can be a paper prototype, storyboard, or digital mockup, and if possible I will ask them to perform the task with and without the proposed changes.

**\subsection{Focus, a browser extension}**

%Include implementation details

The browser notification was implemented as a Google Chrome extension, using HTML, Javascript and CSS. Participants were sent a link to download the extension, named Focus, and were given instructions to install and add it to their Google Chrome browser. To use the extension, participants had to navigate to the web page in their Google Chrome browser where they had to complete their work and click on the icon of the extension. As was found in Study 1 and 2, the majority of data entry work studied in this thesis, such as processing expenses, was done in a web browser. Upon clicking on the icon, a pop-up appeared saying that the current web page was now the main task page. Every time participants switched away from this page, they received a notification indicating how long their switches away from this page are on average. Participants could stop the notifications by refreshing or closing the page.

The main difference in notification behaviour with respect to Study 6 was that participants received the notification every time they switched away from their task window, rather than at particular moments in the task. They only received it when they switched away from their task window, but not upon any subsequent switches. Furthermore, due to security issues the extension did not store any data. Instead, the application ManicTime was used to measure people's switching behaviour.

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**\subsubsection{Reflective information}**

Participants made to-do lists and schedules, but did not look back at them. P2 did look back at them, but only to move forward tasks he had not finished, and not to adjust expectations on his time management. They found it more useful to get information on current behaviour, as they did not know what to do with reflective information.

P3 would like to look back, and tried to with ManicTime, but felt it was effortful and did not have the time to reflect on it:

\textit{'I don't have time that I can set aside to work on things that will help me later (…). the only period where I would have the time to do these things, is when I get home. And when I get home, I'm at home, and I just can't be bothered doing more work stuff.'} (P3)

%Prospective information; Use of to-do lists, schedules

**\subsubsection{Prospective information: to-do lists and schedules}**

Participants used prospective time information: they made written to-do lists but did not allocate time or deadlines to these. To-do lists were used to write down specific tasks without a time allocation. Schedules were used to allocate time blocks to higher-level tasks. P2 set aside several hours to work on `finance-related' tasks, or email.

%Digital vs. non-digital interruptions

**\subsubsection{Type of interruptions}**

**\paragraph**{Digital versus non-digital interruptions}

Participants discussed that the information Focus provided would be useful, but that it currently did not capture the full data as it only looked at digital interruptions. Upon the first time of switching windows, the notification would say there was no interruption data yet:

\textit{`That's when I sort of thought: `Oh, that's not really saying much, is it? Because it's not actually true. Because of course there were interruptions.''} (P2)

P1 and P2 said that they had just as much digital as non-digital interruptions, that these were equally disruptive, and felt that time data on digital switches only told part of the story. It would be useful to get information on both of these interruptions.

All participants found the timeline that ManicTime provided on time active and away from the computer useful.

P2 would use it to schedule in more breaks, whereas it made P3 realise his breaks were much longer than he thought:

\textit{`when I'm going to print something, and I end up talking with someone, and I come back, and it's like: you've been out for half an hour. And I was like: Jesus, time's flying! No wonder I work until 6 every day.'} (P3)

Participants did not find a list of applications useful, as they spent the most time in the same applications. P2 and P3 only looked at it out of curiousity, but did not see the use of it for work.

**\subsubsection{Physical environment}**

Participants did not always work in the same location. For example, P3 worked in two different offices, and all participants worked from home occasionally. Different environments introduced different types of interruptions.

%Working from home; gaps in reflective data

**\subsubsection{Gaps in data}**

X participants worked days from home, which left gaps in the ManicTime data.

**\subsubsection{Time feedback}**

Participants were particularly interested in the time it took them when they were not at their task. For P3, it helped him take shorter and fewer breaks:

\textit{`it made me realise how long I was spending, spending/wasting, doing other stuff. I think that affected me in the sense that I wanted to take fewer breaks. Because I didn't, well by breaks I mean, as I told you earlier, it's just going to do something, and then ending up chatting with someone in the passing.'} (P3)

However, for other people it was not surprising:

\textit{`I don't really know whether that's helpful. To me, it doesn't kind of make me think: 'Oeh, I've been away too long'. I just think: OK, well I'm roughly aware that I've been away for an hour (…), I don't see how it links with being more productive. Unless I suppose, you're really easily distracted.'} (P7)

**\subsubsection{Switching between windows}**

Participants did not find it useful to see how much time they spend in certain applications or windows. P2 was curious, but did not find it surprising as he spends most time in the information systems he uses for work, which are the main task windows.

Most tasks revolved around a main task window, and participants found it easy to select one.

%Whittaker and Collins found that people think in time on tasks, not time on specific document. We found people think more in 'time on work, or specific type of work'. They do think in tasks but do not put time on it.

**\subsubsection{Distractions}**

**\subsection{Contributions}**

\begin{itemize}

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Development of design recommendations for an expenses system.

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Demonstrate how an understanding of the used information sources and people's switching strategies between entering and looking up information can be used to adapt the design of the data entry interface.

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Demonstrate the applicability of design recommendations in the financial office settings in which the expenses task is currently done.

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Demonstrate that design features can influence people's strategies in entering expenses in a financial office setting.

\end{itemize}